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Sampling, Chemical Analysis, and Bioassessment in Accordance with CWA Section 404

Houston Ship Channel Expansion Channel Improvement Project, North of Morgan's Point Houston Ship Channel, Texas

(Part 1 of 6: Text, Figures, & Tables)

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List of Acronyms

ABS	Aquatic Biosystems
ACR	Acute – to Chronic Ratio
AF	Application Factor
AOC	Area of Concern
ASTM	American Society for Testing and Materials
AWS	Air, Water, & Soil Laboratories, Inc.
BCC	Barbours Cut Channel
Benchmark	Benchmark Ecological Services
BSC	Bayport Ship Channel
CCV	Continuing Calibration Verification
CDF	Confined Disposal Facility
CDFATE	Continuous Discharge Fate (from Dredging Operations into Open Water)
cfs	cubic feet per second
cm	centimeter
CMC	Criterion Maximum Concentration
CME	Central Mining Equipment
COC	Contaminants of Concern
Cr	Chromium
CWA	Clean Water Act
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
DOD	Department of Defense
DM	Dredged Material
DMMP	Dredge Material Management Plan
ECB	Environmental Chemistry Branch
ECIP	Expansion Channel Improvement Project
EL	Environmental Laboratory
ERDC	Engineer Research and Development Center
ER-L	Effects Range - Low
ER-M	Effects Range - Median
Fugro	Fugro USA Land, Inc.
fps	feet per second
ft.	feet
g	grams
g/L	grams per liter
GC/MS	Gas Chromatograph/Mass Spectrometry
GPS	Global Positioning System
GTS	Geotechnical Testing Services, Inc. Laboratory
h	hour

HDPE	High-Density Polyethylene
hp	horsepower
HPAH	High molecular weight Polyaromatic Hydrocarbons
HSC	Houston Ship Channel
ICV	Initial Calibration Verification
ISE	Ion Selective Electrode
J	Estimated concentration
JV	Joint Venture – AECOM and Gahagan & Bryant
KCl	Potassium Chloride
L	liters
L/B	Lift Boat
LC50	Lethal Concentration (50% survival rate)
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LPAH	Low molecular weight Polyaromatic Hydrocarbons
LOEC	Lowest Observed Effect Concentration
MB	Mooring Basin
MDL	Method Detection Limit
m	meter
mg	milligrams
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mi	miles
mL	milliliters
mm	millimeters
mS/cm	milli-Siemens per centimeter
mV	millivolts
MLLW	Mean Lower Low Water
MPRSA	Marine Protection, Research and Sanctuaries Act
MRL	Method Reporting Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MZ	Mixing Zone
N	Number
NAS	National Academy of Sciences
NMP	North of Morgan's Point
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observed Effect Concentration
NTU	Nephelometric Turbidity Unit
ODMDS	Ocean Dredged Material Dumping Site
ORP	Oxygen Reduction Potential
PA	Placement Area

PAH	Polyaromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCP	Pentachlorophenol
PI	Plasticity Index
POHA	Port of Houston Authority
ppt	part per thousand
QA	Quality Assurance
QC	Quality Control
QSM	Quality Systems Manual
RIA	Regional Implementation Agreement
RL	Reporting Limit
RPD	Relative Percent Difference
s	second
SAP	Sample and Analysis Plan
S.D.	Standard Deviation
SM	Standard Method
SPT	Sample Penetration Test
SRM	Standard Reference Material
ss	stainless steel
SVOC	Semi Volatile Organic Compound
SWG	Southwest Galveston
TAL	Target Analyte List
TB	Turning Basin
TCE	Tetrachloroethylene
TCEQ	Texas Commission on Environmental Quality
TDL	Target Detection Limit
TEF	Toxic Equivalency Factor
TEQ	Toxic Equivalency
TMX	2,4,5,6-tetrachloro-m-xylene
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TNRCC	Texas Natural Resource Conservation Commission
TRE	Toxicity Reduction Evaluation
TSS	Total Suspended Solids
TSWQS	Texas Surface Water Quality Standard
U	Not detected
ug/kg	micrograms per kilogram
ug/L	micrograms per liter
UIA	Unionized ammonia
USACE	United States Army Corps of Engineers
USCS	Universal Soil Classification System
USEPA	United States Environmental Protection Agency

USGS	United States Geological Survey
VOC	Volatile Organic Compound
WHO	World Health Organization
WQC	Water Quality Criteria
WQS	Water Quality Standard
YSI	Yellow Springs Instruments
ZID	Zone of Initial Dilution

1.0 Introduction

1.1 Regulatory Background

Sediments proposed to be dredged as part of the Houston Ship Channel (HSC) Expansion Channel Improvement Project (ECIP) fall under Section 404 of the Clean Water Act (CWA). Section 404 requires the impacts of such activities to assess potential impacts to surface waters of the United States.

To assess these impacts, sediment and surface water samples were collected at representative sampling locations within the dredge prism in the ship channel from just north of Morgan's Point to the main turning basin in Houston. Media were chemically characterized, elutriate toxicity and elutriate chemistry data were generated, and the data were used in Fate of Continuous Discharge from Dredging Operations into Open Water (CDFATE) modeling to simulate dredged material discharges from four upland placement areas (PAs).

1.2 Objectives and Deliverables

The primary objectives and deliverables of this pre-dredging sampling and analysis effort for the U.S. Army Corps of Engineers (USACE) Southwest Galveston District (SWG) and the Port of Houston Authority (POHA), Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), are to provide a report that complies with the USACE project specific Sampling and Analysis Plan (SAP) (USACE, 2018). This report is focused on Segments 1, 4, 5, and 6 of the HSC that span from north of Morgan's Point (NMP) through to the main turning basin in Houston (Figure 1). These segments are described more fully in Section 1.4.

The primary objectives of this report are outlined below:

a) Sample collection: Tabulate and plot sampling sites and locations (water and sediment) showing locations and the dredging prism and to summarize and cross-reference to study documents
b) Field procedures: Summarize field procedures, observations and deviations and cross reference to project documents (i.e., compositing, physical observations (e.g., odor, stratification, etc.))
c) Quality Control (QC) (field): Describe and cross-reference procedures followed and samples collected
d) Analyses and Laboratory QC: Review and evaluate the media analyzed, analytical methods, procedures followed and results from the laboratory samples to ensure data that were usable and representative of the dredged material
e) Results and Discussion: Present and discuss data by medium and then by analyte category and by each bioassay and then within each bioassay by test organism.
   Each section has the following discussion components:
   i. Data Summary Tables: Including appropriate statistics (e.g., N=number, minimum, mean, maximum, etc.) for both analytical and miscellaneous parameters for all media and tests
   ii. Results: As per the SAP

iii. Data Review and Validation: As per SAP Attachment C and Supplemental Attachment C-1
iv. Field and Laboratory Qualifiers: As per the SAP and as well as an interpretation as to how qualifiers impact the evaluation
v. Site-Specific Parameters: Factors that impact the data discussions (e.g., matrix effects, sample dilution etc.)
vi. Deviations: Summarized and impact(s) on the study discussed
vii. Cross-Referencing of text discussion with data summary tables.
viii. Conclusions and Recommendations

1.3 Testing Approach

The evaluation of the new work sediments included chemical analyses of site surface water and sediment through direct sampling, and both chemical analysis and toxicity testing on the modified elutriate samples. Elutriate chemistry and elutriate bioassay data were evaluated and applied in CDFATE modeling to look at mixing zone requirements at the point of discharge from the upland PAs after placement.

The northern section of the HSC is industrialized and due to the industrialization in this area, no categories of contaminants of concern (COCs) listed in the Regional Implementation Agreement (RIA) between the Galveston District of the USACE and Region 6 of the USEPA (USEPA/USACE, 2003) were excluded from analysis. A full chemical analyses (i.e., volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), pentachlorophenols (PCPs) total petroleum hydrocarbons (TPH), pesticides, total polychlorinated biphenyls (PCBs), target analyte list (TAL) metals, dioxins/furans, and miscellaneous parameters) were performed for all media types. Dioxins/furans are not routinely analyzed for in dredging projects, however, due to the presence of the San Jacinto Waste Pits and the Area of Concern (AOC) associated with the historical releases of dioxins/dibenzofurans from this area north of Morgan's Point (Figure 2), this analysis has been added for this project.

Elutriate samples were analyzed for the same chemical suites as surface water and sediment, and had suspended particle bioassays run using two taxonomically and functionally dissimilar species (mysid shrimp *A. bahia* and the fish *M. beryllina*) to assess the potential for biological effects of dredged material (DM) released into the water column during DM discharge (elutriate toxicity tests).

Preliminary CDFATE modeling was run to examine the mixing zone dilution requirements. Simulations of dredged material discharges into four upland placement areas (PAs) were run using CDFATE to establish compliance with water column toxicity criteria for the HSC sediment samples HSCNew-NMP-02, HSCNew-NMP-03, HSCNew-NMP-04, HSCNew-NMP-05, HSCNew-NMP-06, HSCNew-NMP-07, HSCNew-NMP-08, HSCNew-NMP-09, HSCNew-NMP-10, and HSCNew-NMP-11.

1.4 Project Area Description

The Houston Ship Channel (HSC) system is located in southeast Texas and spans Harris, Chambers, and Galveston Counties in Texas and is approximately 52 miles (mi) in length from Bolivar Island to the Main Turning Basin (Figure 1). The HSC for the Expansion Channel Improvement Project (ECIP) has been divided into the following six study segments (USACE, 2017).

- Segment 1 - Bay Reach
    - Includes Bolivar Roads to Redfish (BR-RF), Redfish to Bayport Ship Channel (RF-BSC), and Bayport Ship Channel to Barbours Cut Channel (BSC-BCC)
- Segment 2 – Bayport Ship Channel (BSC)
- Segment 3 – Barbours Cut Channel (BCC)
- Segment 4 – Boggy Bayou to Sims Bayou
- Segment 5 – Sims Bayou to I-610 Bridge
- Segment 6 – I-610 Bridge to Main Turning Basin (TB)

This sampling and analysis effort focuses on the following segments only: Bay Reach (Segment 1) north of Morgan's Point only (Stations 0+05 to 684+03), Boggy Bayou to Sims Bayou (Segment 4; Stations 684+03 to 833+05), Sims Bayou to I-610 Bridge (Segment 5; Stations 1110+77 to 1160+62), and I-610 Bridge to Main Turning Basin (Segment 6; Channel Stations 1160+60 to 1266+48, and Main TB Stations 0 to 30+95). The existing authorized depth of the Houston Ship Channel for this study area ranges from -41.5ft. to -46.5 feet (ft.) mean lower low water (MLLW) and the existing width is 300 ft. The entire channel is not proposed for widening and deepening, but instead, individual target segments were identified for improvements and are specified below:

Segment 1 (north of Morgan's Point): The existing width and depth of the main channel in Segment 1 north of Morgan's Point is 530 ft. to 600 ft. and -46.5 ft. respectively, and will remain at this existing width and depth. The Mooring Basin (MB) at Station 500+00 is approximately 57 acres and ranges in depth from approximately -18 ft. to -41 ft. and will be deepened to -41.5 ft.

Segment 4: Segment 4 has an existing width of 300 ft. with a new proposed width of 530 ft. from Boggy Bayou to Greens Bayou only; the remainder of Segment 4 (Greens Bayou to Sims Bayou) will remain at its existing width (300 ft.). The existing depth of Segment 4 ranges from -38.5 ft. to -41.5 ft. Boggy Bayou to Washburn Tunnel has an existing depth of -41.5 ft. and a proposed depth of -46.5 ft. The remainder of Segment 4 will remain at its existing depth.

Segment 5: Segment 5 has an existing width of 300 ft. and will remain at its existing width. The depth of Segment 5 is -37.5 ft. with a proposed depth of -46.5 ft.

Segment 6: Segment 6 from I-610 Bridge to Main TB has an existing width of 300 ft. and the Main TB has an existing width of 400 ft. to 932 ft. and will remain at its existing width. The depth of Segment 6 is -37.5 ft. with a proposed depth is -41.5 ft.

Evaluation of dredge material for Segments 1 (south of Morgan's Point), 2, and 3 are discussed separately in the "Sampling, Chemical Analysis, and Bioassessment in Accordance with MPRSA Section 103, Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) South of Morgan's Point Report, 2019" (USACE, 2019a) since the sediments from these segments will be placed in the Ocean Dredged Material Dumping Site (ODMDS).

2.0 Materials and Methods

2.1 Project Design and Rationale

As outlined in the SAP, the area to be dredged covered in this evaluation is composed of four primary segments:

1) **Segment 1: Bay Reach North of Morgan's Point (Mooring Basin, Station 500+00):** Dredged material from this segment was expected to consist primarily of new work material, consisting solely of undisturbed base layer geological formations free of impacts from industrial sources or transport mechanisms. There was a chance that influence from industrial sources may have occurred. As a result, these dredged materials were conservatively considered exposed new work surficially and unexposed new work at depth.
2) **Segment 4: Boggy Bayou to Sims Bayou (Boggy Bayou to Washburn Tunnel ,Stations 684+03 to 974+07):** Dredged material from this segment was expected to consist of some maintenance material in the existing channel, but primarily be new work material, consisting solely of undisturbed base layer geological formations free of impacts from industrial sources or transport mechanisms. There was a chance that influence from industrial sources may have occurred. As a result, these dredged materials were conservatively considered exposed new work surficially and unexposed new work at depth.
3) **Segment 5: Sims Bayou to I-610 Bridge (Stations 1110+77 to 1160+62):** Dredged material from this segment was expected to consist of some maintenance material in the existing channel, but primarily be new work material, consisting solely of undisturbed base layer geological formations free of impacts from industrial sources or transport mechanisms. There was a chance that influence from industrial sources may have occurred. As a result, these dredged materials were conservatively considered exposed new work surficially and unexposed new work at depth.
4) **Segment 6: I-610 Bridge to Main TB (Stations 1160+60 to 1266+48; Main TB Stations 0 to 30+95):** Dredged material from this segment was expected to consist of some maintenance material in the existing channel, but primarily be new work material, consisting solely of undisturbed base layer geological formations free of impacts from industrial sources or transport mechanisms. There is a chance that influence from industrial sources may have occurred. As a result, these dredged materials were conservatively considered exposed new work surficially and unexposed new work at depth.

According to the SAP (USACE, 2018), the new work sample locations were based upon geotechnical borings from 1963 and 1964 and were selected to be representative of general subsurface geological

composition within the study area. Each channel sample is a composite of material representative of a geological component of the new work dredge prism in the ship channel, since the location of these sampling points was based upon geotechnical boring information. As noted in the SAP, geotechnical borings surveys were not available for Segments 5 and 6, these samples were distributed evenly across the length of the remaining channel to be spatially representative of the dredging prism materials. A total of 12 sediment, surface water, and bulk water samples were collected (11 channel locations and 1 duplicate location). Each sediment sample is a composite of subsamples from within the area proximate to the channel location. Justification for choosing these sample locations is discussed in detail in Attachment A of the SAP (USACE, 2018).

The SAP was written with the expectation that the optimal locations to maximize sediment boring volumes might require sampling locations to be shifted within each sampling area in the field. If a sediment sample could not be acquired at a designated location, the location was moved within the sampling area and the portion of the borings collected kept were consistent with the study's dredge prism. Final sediment sample locations are justified and summarized in Section 2.2.1 and are plotted in Figures 3 through 5. Surface water samples were collected mid-column at one sample location within each sampling area.

2.2 Sample Collection Techniques

2.2.1 Field Effort

In October 2018, the field contractor, FUGRO USA LAND, INC (Fugro), conducted sample collection according to the USACE SAP. USACE oversight was not provided for this sampling event as was the case for the south of Morgan's Point sampling effort; this is discussed further in "Sampling, Chemical Analysis, and Bioassessment in Accordance with MPRSA Section 103, Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) South of Morgan's Point, Houston Ship Channel, Texas" (USACE, 2019a). The full field report is included as Appendix 2 of this report.

The following samples were collected:

HSCNew-NMP-01 (Segment 1, Station 503+00): One representative sample (i.e., '**-A**') was collected from one side of the existing Mooring Basin as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment was collected.

HSCNew-NMP-02 (Segment 4, Station 730+00): Two representative samples (i.e., '**-A**', '**-C**'), one on each side of the HSC near the assigned station, were collected and composited to one sediment sample as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment was collected.

HSCNew-NMP-03(Segment 4, Station 794+00): Two representative samples (i.e., '**-A**', '**-C**'), one on each side of the HSC near the assigned station, were collected and composited to one sediment sample as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment was collected.

HSCNew-NMP-03-Field Duplicate (Segment 4, Station 794+00): Two representative samples (i.e., '**-A**', '**-C**'), one on each side of the HSC near the assigned station, were collected and composited to one sediment sample as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment was collected.

HSCNew-NMP-04 (Segment 4, Station 873+00): Two representative samples (i.e., '**-A**', '**-C**'), one on each side of the HSC near the assigned station, were collected and composited to one sediment sample as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment was collected.

HSCNew-NMP-05 (Segment 4, Station 961+00): Two representative samples (i.e., '**-A**', '**-C**'), one on each side of the HSC near the assigned station, were collected and composited to one sediment sample as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment was collected.

HSCNew-NMP-06 (Segment 5, Station 1127+00): Two representative samples (i.e., '**-A**', '**-C**'), one on each side of the HSC near the assigned station, were collected and composited to one sediment sample as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment was collected.

HSCNew-NMP-07 (Segment 5, Station 1180+00): One representative sample (i.e., '**-A**'), on one side of the HSC near the assigned station, was collected as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment is collected.

HSCNew-NMP-08 (Segment 6, Station 1200+00): Two representative samples (i.e., '**-A**', '**-C**'), one on each side of the HSC near the assigned station, were collected and composited to one sediment sample as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment was collected.

HSCNew-NMP-09 (Segment 6, Station 1230+00): Two representative samples (i.e., '**-A**', '**-C**'), one on each side of the HSC near the assigned station, were collected and composited to one sediment sample as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment was collected.

HSCNew-NMP-10 (Segment 6, Station 1260+00): Two representative samples (i.e., '**-A**', '**-C**'), one on each side of the HSC near the assigned station, were collected and composited to one sediment sample as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment was collected.

HSCNew-NMP-11 (Segment 6, Main TB, Station 24+00): Two representative samples (i.e., '**-A**', '**-C**') were collected on each side of the current Main TB and composited to one sediment sample as proposed for this reach of new work material; surface water and bulk water samples were collected mid-column where the bulk of the sediment was collected.

2.2.2 Deviations from SAP

The following deviations occurred during the sample collected when compared with the procedures outlined in the north of Morgan's Point (NMP) SAP:

- **Sample Repositioning:** When possible in advance of field work, repositioning of sample locations was jointly agreed upon by Fugro, the JV (AECOM and Gahagan & Bryant), and ERDC study personnel. Additional changes were made in the field as a judgement call on the part of the field contractor at the time of sample collection (Appendix 2). Reasons for sample repositioning included:

    - Deviations existed to accommodate unfavorable field conditions and to avoid HSC traffic constraints. These deviations included the relocation of proposed sub-sampling locations, which changed ahead of and during the field effort due to one or more of the following reasons:
        - Sub-sample locations in the middle of the HSC ('B') were eliminated for all sampling locations; between the writing of the SAP and the initiation of field work, the decision was made to not deepen the ship channel only widen it, making the middle location unnecessary
        - Sub-sample locations were shifted to one side of the channel ('A' or 'C') for HSCNew-NMP-01 and –NMP-07 due to spatial constraints from berthed ships and moorings.
        - Sub-sample locations were moved the least distance possible from given locations to accommodate for pipeline obstructions, steep channel slopes or difficult sampling conditions, poor sediment recovery while remaining with the dredge prism, high occupancy ship docks . This deviation affected all sampling locations except HSCNew-NMP-02, -NMP-09, and –NMP-11 and is described more fully in Section 2.6 of the field report (Appendix 2).

- **Schedule and Deliverables:** Sediment samples were collected in October of 2018. Samples were collected in close coordination with ERDC laboratory personnel to work with the days that favored shipment strategy and openings in the laboratory testing schedule. Shipping deviations resulted in some sample arrival delays which are discussed later in this section. There were no other deviations from the NMP SAP and project schedule.

- **Sampling (approach and collection):** Sediment was sampled using a 4" Central Mining Equipment (CME) sampler in conjunction with a hollow stem auger system to collect large volumes of sample throughout the sediment column. There were deviations from the originally planned sampling method proposed due to soft sediment conditions. Although the soft and loose sediment located close to the mudline or within strata at deeper depths posed sample recover challenges, the use of hammer sampling to handle these conditions best handled the circumstances (Section 3.1 of the Field Report in Appendix 2). Deviations included corrective actions taken to replace the 4" CME sampler damaged by percussive driving. The use of a smaller percussion split spoon

sampler was attempted in an effort to maximize sample recovery and selective re-sampling of missing sample intervals at adjacent locations, however, the smaller sampler did not on average recover more sample and was impractical logistically due to the reduced volume of the 3" I.D. sampler.

- **Sample Storage**: Sediment sample collection completed on October 4, 5, and 6, 2018 remained on the lift boat (L/B) in the refrigerated trailer until they were delivered to the offloading dock in Galveston, TX on Monday, October 8, 2018. Benchmark Ecological Services, Inc. (Benchmark) employees arrived at the L/B first thing Monday morning to unload the sediment samples from the refrigerated trailer into a refrigerated box truck for delivery to the ERDC laboratory in Vicksburg, MS. At this point, it was discovered that the refrigerated trailer on the L/B was not running. Benchmark employees immediately began placing ice on the samples to keep the samples cool. Benchmark employees measured the temperature in one of the smallest sample jars and the temperature was 3.9 °C which is within the acceptable temperature range of 1 °C to 4 °C. Benchmark notified the appropriate AECOM, USACE, ERDC, and Fugro personnel of the issue on October 8, 2018. Sediment samples were removed from the L/B, placed into a refrigerated box truck and delivered to the ERDC Vicksburg laboratory on October 9, 2018.

- **Sample Delivery:** In order to meet sample hold times, sediment samples collected on October 2 and 3, 2018 were shipped via FedEx to the ERDC Vicksburg laboratory on October 4, 2018. The samples were scheduled to be delivered to the laboratory first thing October 5, 2018. Nine coolers were packed with ice and shipped from Houston, TX to Vicksburg, MS. Two of the nine coolers arrived at the laboratory within temperature on October 5, 2018. The remaining seven coolers were held-up at FedEx in Memphis, TN and were not delivered to the laboratory on October 5, 2018. Benchmark employees worked with FedEx employees and arranged to have the seven coolers held in Memphis, TN to be delivered to Jackson, MS on October 6, 2018. A Benchmark employee picked up the sample coolers at 0900hours on October 6, 2018 from a FedEx shipping center. The sample coolers were opened immediately, and ice was observed in all seven coolers. The temperature of the samples was measured below 4 °C. The coolers were repacked with fresh ice and driven to Vicksburg, MS. The sediment samples were delivered to ERDC personnel in Vicksburg, MS midday on October 6, 2018. The sediment samples arrived in time to conduct the analyses and within the acceptable temperatures defined in the SAP. No impact to the analyses resulted.

- **Chain of Custody and Shipping:** Appropriate chain of custody protocols were followed. Samples were shipped and samples were received in the facility with holding times met. No deviations reported on this field activity except by occurrence explained in the Sample Delivery above.

There were no deviations on the water collection operations, processing, sample storage, or shipping while conducting the sample event that adversely impacted the outcome of the study.

2.2.3 Decontamination Procedures

Prior to and between sample collection, all containers and sampling equipment were cleaned using a new scrub brush, tap water, Alconox Detergent Powder and rinsed with distilled water based on protocols described in Plumb (1981). Any equipment that came into contact with sediment samples was deconned between channel sample locations. Care was taken to avoid contamination to sampling devices from the barge deck or other surfaces. Powderless latex or nitrile gloves were worn during sample collection and sample handling. The equipment rinsate blank was collected to evaluate field sampling and decontamination procedures by pouring deionized water over the decontaminated sampling equipment used for sample collection.

2.2.4 *In situ* Water Column Measurements

In situ water column samples were collected and water depth measurements were taken to determine the Mean Lower Low Water (MLLW). The following data was also recorded: dissolved oxygen (DO), pH, salinity, conductivity, water temperature, sample date, sample time, sample depth, sample location ID, and Sample ID (Appendix 2).

2.2.5 Site Water Sampling

In accordance with the SAP, eleven (11) site water samples and 1 duplicate sample, HSCNew-NMP-01, -NMP-02, -NMP-03, -NMP-04, -NMP-05, -NMP-06, -NMP-07, -NMP-08, -NMP-09, -NMP-10, -NMP-11, and –NMP-03-Field Dup were collected for analyses. The specific sample locations are presented in Tables 1A and 1B and Figures 3 through 5 and in the Field Report (Appendix 2). All water samples were collected on October 22, 2018 after completion of the sediment sampling to avoid any resuspended sediment that might have been produced. Water samples were collected for use in both chemical analyses and in bulk for toxicity/bioassay testing. Appropriate sampling methods and containers were used for each sample collection, as described below.

Water samples were collected using a 24-foot sample vessel subcontracted to Benchmark Ecological Services, Inc. (Benchmark) of Houston, Texas. Prior to conducting the sampling event, final sediment sample location coordinates were loaded onto a sub-meter Trimble Geo XH 6000 Global Position System (GPS) unit and used to navigate the sample vessel to each water sample location. A single site water sample was collected at each of the eleven (11) sample locations and 1 duplicate sample location (HSCNew-NMP-03-Field Dup).

Water samples were collected from mid-depth at each sample station. Mid-depth was determined using a weighted line and measuring tape. Water samples were collected using high-volume geopumps, tubing and filters. Field filtered water samples were submitted for all chemical analyses except total mercury, total selenium, and total suspended solids in accordance with the SAP (USACE, 2018). In addition, filters were not used when collecting bulk water samples into 5 gallon cubitainers a total of 5 five gallon cubitainers were collected at each sample location. New tubing and filters were used at each sample station and site water was flushed through the tubing with a volume of at least five times the volume of

the sample tubing. Flushing water was discarded back into the ship channel after each sample was collected.

Water samples were collected into laboratory-supplied pre-cleaned sample containers and new 5-gallon cubitainers. Care was taken to avoid contamination to sampling devices (tubing, sample containers, pumps) from the boat deck or other surfaces. Powderless nitrile gloves were worn during sample collection and handling.

Immediately after sample collection, water samples were placed into a refrigerated box truck set at 4 °C. Water samples were kept at 4 °C in the refrigerated truck and transported to the laboratory on October 23, 2018.

2.2.6 Sediment Sampling

Sediment core samples were collected from the channel from October 2, 2018 through October 6, 2018. A summary of the final sample locations are provided in Tables 1A and 1B. Full details of the sediment sampling are provided in the Field Report (Appendix 2).

Drilling operations were completed using Fugro's CME-75 Truck Mounted Drill Rig. The rig was positioned on the L/B Shallow Draft 17 such that drilling operations could be conducted on deck through the "moon pull" on the work platform. Sediment sampling was accomplished by lowering a CME 4" by 5 ft. long Bearing Head Continuous Sample Tube System (CME 4" sampler) through the Hollow Stem Augers into the seafloor. Once the sampler was secured inside the augers, the augers were rotated to the depth of the sampler length (about 5 ft.), and the first sample was obtained. The auger was then rotated through the next 5 ft. and sample obtained, with this process repeated to get through the target prism depth. Occasionally and due to very soft or very loose sediment conditions at and below seafloor, augers did not need to be rotated. Augers and samples were just lowered to the next sampling depth by hammering and/or using their own weight or by pushing them with the drill rig.

Augers were used as casing to stabilize the upper/near surface of the boreholes. At the completion of the borehole, all augers were recovered. Sampling was mainly performed with the CME 4" continuous sample tube sampler, however, driven sampling techniques were used as a last resort. Sampler for driven sampling techniques included the sample penetration test (SPT) split spoon and the Modified California Sampler (2 ft. long by 3" inside diameter). The hollow stem auger and CME 4" sampler configuration was modified at one point of the investigation, in efforts to maximize sample recovery on the loose sands and very soft clays. No rotary wash drilling techniques were used during the sediment sampling campaign.

Sampling was performed continuously from mudline to termination depth of the boring. Both the driller and the engineer on shift kept accurate logs of all activities performed and all recovered materials (Appendix 2).

2.2.7 Field Quality Control

A duplicate sediment sample was collected at sediment sample location HSCNew-NMP-03. A total of six (6) two (2) gallon buckets were filled with sediment at sample location HSCNew-NMP-03 and -NMP-03-Field Dup.

A duplicate water sample was collected at sample location HSCNew-NMP-03. Two sets of sample containers provided by the laboratory and ten (10) five (5) gallon cubitainers were processed at sample location HSCNew-NMP-03.

One (1) sediment equipment blank was processed associated with the sample collection of sediment samples using the drill rig. The equipment blank was prepared by pouring deionized water (provided by the laboratory) over sample and processing equipment that came into contact with the sediment while collecting and processing the samples (e.g., drill rig sampler device, stainless steel spoon, plastic bucket, and nitrile gloves).

One (1) sample equipment blank for water was prepared using deionized water provided by the laboratory for equipment that contacted water samples (e.g., tubing, filter, and nitrile gloves).

Field duplicate and equipment blank sample data were recorded on field data sheets and provided in the Field Report (Appendix 2).

2.2.8 Sample Transport, Processing, and Custody

To ensure the integrity of sediment and water samples during collection in the field, storage and during shipping, the procedures outlined below were followed.

2.2.8.1 Sample Storage and Transport to the Laboratories

The procedures for sample collection, preservation, and storage as provided by the project laboratory are summarized in the SAP (Appendix 1) and the Field Report (Appendix 2).

Sediment samples were placed into pre-cleaned two (2) gallon buckets and sample jars provided by the analytical laboratory. Sediment samples were collected and processed for the following analyses:

- VOCs/ SVOCs
- Metals including chromium (Cr) III and VI
- Pesticides
- Dioxins/Furans
- PAH/PCPs
- PCBs
- TOC
- Grain Size
- Ammonia
- pH

- Cyanide
- Sulfide
- TPH
- Total and Volatile Solids

The buckets were labeled with sample location ID, sample date, sample time, initials of sampler, and bucket number. Immediately after sample collection, bucket lids were sealed on each sample container. Sealed sample buckets were placed into a refrigerated trailer located on the barge. The refrigerated trailer was kept at a temperature of 2 °C to 4 °C. At a minimum, the temperature of the refrigerated trailer was checked once a day and recorded on a temperature log data form. Sediment samples were stored in the refrigerated trailer from the time of sample collection until they were shipped to the analytical laboratory. Sediment samples from locations HSCNew-NMP-07, -NMP-08, -NMP-09, -NMP-10, and -NMP-11 were collected on October 2 and October 3, 2018 and shipped via FedEx on October 4, 2018 and delivered to the analytical laboratory on October 6, 2018. Sediment samples from locations HSCNew-NMP-01, -NMP-02, -NMP-03, -NMP-03 Field Dup, -NMP-04, -NMP-05, and -NMP-06 were collected on October 4 through October 6, 2018. These, sediment samples were offloaded from the sample barge on October 8, 2018 and immediately placed in a refrigerated box truck set at 2 °C to 4 °C; sediment samples were stored in the refrigerated box truck and delivered to the laboratory by Benchmark on October 9, 2018.

Water samples were collected into sample containers provided by the laboratory for the following chemical analyses:

- Dissolved Organic Carbon (DOC)
- Dissolved Ammonia
- Dissolved Metals including Cr III and VI
- Dissolved Sulfides
- TPH (preserved with HCl)
- VOC (preserved with HCl)
- TOC (preserved with sulfuric acid)
- Total mercury and selenium (preserved with nitric acid)
- Total Suspended Solids (TSS)
- SVOCs
- Pesticides
- Dioxins/Furans
- PAH/PCPs
- PCBs
- Cyanide

Bulk water samples for the additional analyses, elutriate samples, and bioassays listed were collected into new five (5) gallon cubitainers. A total of five (5) five (5) gallon cubitainers (in addition to the sample containers provided by the laboratory) were collected at each sample location. All sample containers

were labeled with sample date, sample time, sample location, and with the initials of the sampler. Immediately after sample collection, water samples were placed into a refrigerated box truck set at 4 °C. Water samples were kept at 4 °C in the refrigerated truck and transported by Benchmark to the USACE ERDC laboratory at Vicksburg, MS on October 23, 2018.

Samples were delivered within the recommended holding times, as listed in the SAP. Laboratory staff verified and confirmed all sample handling, storage and preservation requirements with the analytical facility performing the project analyses. Sample preservation and storage methods described in the SAP were followed without deviation.

Chain of custody protocols were followed while conducting the field sampling event. Chain of custody forms and sample labels were provided by the laboratory prior to sample collection. Chain of custody forms were filled out and signed by field personnel as the samples were collected and processed. Chain of custody forms were signed by laboratory personnel upon transfer of samples to the laboratory. Copies of the chain of custodies are included in Appendix 3.

2.2.8.2 Homogenization and Compositing

Discrete sediments from each representative sample composite were combined in equal volumes and homogenized in a 7 gallon high density polyethylene (HDPE) bucket (e.g., HSCNew-NMP-06A, -NMP-06-B, -NMP-06A&C combined in equal volume to create HSCNew-NMP-06) on 9 October 2018 (up to 3 days after collection depending on the sampling site). A total of 6 gallons of each composite was generated. Homogenization was performed with a 0.43 hp Lightnin™ homogenizer (Rochester, New York) with stainless steel (SS) dual impeller (7'' diameter). Mixing was conducted for a minimum of 2 minutes or until uniform consistency was achieved. The 7 gallon HDPE buckets were pre-cleaned prior to homogenization with soap, water, isopropyl alcohol, and rinsed with reverse osmosis water. Props and shafts of the mixer and other tools utilized in the mixing were also cleaned following the same procedure between samples. The composited sediments were left in the 7 gallon bucket and placed in cold storage. Additional information on sample nomenclature and compositing can be found in the Tier III Biological Testing Report (Appendix 8).

2.2.8.3 Modified Elutriate Preparation

Modified elutriates were prepared by the ERDC-EL Environmental Chemistry Branch according to guidance (USACE, 2003). Briefly, 150 g/L sediment (dry weight, calculated from sediment wet-dry ratios in Appendix B of Appendix 8) was be added to site-collected water at sufficient total volume to accommodate analytical chemistry and biological test requirements. The sediment-water slurry was agitated via aeration to maintain the suspension for 60 minutes, followed by 24 hours (h) settling. The resulting sample was the 100% (undiluted) elutriate used in chemical and biological analysis. Each sediment elutriate composite was prepared using a separate site-water associated with that sampling location. The supernatant was siphoned and used for testing. This supernatant was defined as the 100% elutriate.

Following elutriate preparation samples were analyzed for the following:

- VOCs/ SVOCs
- Metals including chromium (Cr) III and VI
- Pesticides
- Dioxins/Furans
- PAH/PCPs
- PCBs
- TOC
- DOC
- Dissolved Ammonia
- Dissolved Sulfides
- Cyanide
- TPH
- TSS

2.3 Physical and Chemical Analytical Procedures

All physical and chemical analytical procedures were performed and/or coordinated by ERDC. Additional details pertaining to physical and chemical analytical procedures are found in the following sections.

2.3.1 Physical Procedures

2.3.1.1 Particle Size Distribution

Sub-samples were homogenized and composited into a composite sample by ERDC (Vicksburg, MS) for each sample location and sent to Air Water & Soil Laboratories, Inc. (AWS) (Richmond, VA) for particle size analysis. The samples were evaluated using sieve analysis (American Society for Testing and Materials (ASTM) D 422 (2007)) and hydrometer analysis (ASTM D 422 (2007)). The particle size distribution reports are provided in Appendix 4.

2.3.1.2 Percent Solids

Percent solids was determined in general accordance with Standard Method (SM) 18 2540G by AWS (Richmond, VA). The sample weight was recorded and the sample was placed in an oven and dried to a constant mass at 105 °C. Once a constant dry mass was obtained, the percent moisture was determined by subtracting the dry mass from the wet mass, then by dividing the loss in mass due to drying by the wet mass.

2.3.1.3 Physical Analyses Laboratory

All other physical procedures (specific gravity and Atterburg limits) for sediment samples were performed by the Geotechnical Testing Services, Inc. Laboratory (GTS) (Coraopolis, PA).

2.3.2 Chemical Analytical Procedures

The following sections describe the development of site-specific COC lists for all media types, analytical laboratories used, and analytical methods followed for this project. Analyses were tailored to be project-specific and site-specific to this portion of the HSC associated with new work in, or proximate to the Gulf of Mexico. A summary of the rationale is presented below and can be found in the SAP (Appendix 1).

2.3.2.1 Development of the Project Specific and Site Specific List of Chemicals of Concern (COCs)

The list of COCs for evaluation for this project were determined from the master list of chemicals in the Target Detection Limits (TDL) table in Appendix C of the U.S. Environmental Protection Agency's (USEPA) *Regional Implementation Agreement (RIA)* (USEPA/USACE, 2003). This master list of chemical is comprehensive and includes:

- Metals (total), Cr+/Cr+6
- Organic compounds (low molecular weight PAH (LPAH) compounds, high molecular weight PAH (HPAH) compounds, organonitrogen compounds, phthalate esters, phenols/substituted phenols, dioxins, dibenzofurans, PCBs (congeners, Arochlors, total), pesticides, chlorinated hydrocarbons, VOCs, halogenated ethers, miscellaneous organics (isophorone, benzyl alcohol, benzoic acid, methyl ethyl ketone, resin acids and guaiacols)
- Conventional/ ancillary parameters (e.g., ammonia, cyanides, TOC, TPH, grain size, pH, percent moisture, etc.)

The northern section of the HSC is industrialized and due to the industrialization in this area, no COCs were considered for exclusion from the master list provided in the RIA.

Dioxins/furans are not routinely analyzed for in dredge material projects, however, due to the proximity of the San Jacinto Waste Pits and the Area of Concern (AOC) associated with the historical releases of dioxins/dibenzofurans from this area north of Morgan's Point (Figure 2), dioxins/furans have been retained in the analyte list for this project.

2.3.2.2 Analytical Laboratories

All chemical analytical procedures for sediment, site water, and elutriate samples were performed by the Environmental Chemistry Branch (ECB) of the Environmental Laboratory (EL) at ERDC (Vicksburg, MS) or by their sublabs. ECB performed analysis for pesticides, sulfide, total suspended solids, (TSS), percent moisture, percent solids, total organic carbon (site water samples), and dissolved organic carbon. Alpha Analytical (Mansfield, MA) performed SVOC and PAH analysis. Kathadin (Scarborough, ME) performed TPH analysis. Air Water & Soil Laboratories (Richmond, VA) performed cyanide, VOC and TOC (sediment samples) analysis. Maxxim Laboratories (Mississiuga, Ontario) performed dioxins analysis. Details of the chemical analytical procedures are summarized in the following sections.

2.3.2.3 Site Water Chemistry

Site water samples were analyzed for COCs consistent with the analyte list as described in Section 2.3.2.1. The methods for each of these analyses are summarized below. The TDLs for site waters were extracted from the RIA and are included in Table 5 of this report and Table 3 of the SAP (Appendix 1).

- VOCs – USEPA 8260B
- SVOCs – USEPA 8270D
- PAHs – USEPA 8270D
- Pesticides – USEPA 8081A
- PCBs – USEPA 8082
- Dioxins and Furans – USEPA 1613Bm
- Metals – USEPA 6020
- Cr III/VI – USEPA 7199M
- Hg – USEPA 7474
- Cyanide – USEPA 9012B
- DOC – USEPA 9060
- TSS – USEPA 160.2
- TOC – USEPA 9060
- Ammonia as N – USEPA 350.2
- Sulfide – USEPA 376
- TPH – TNRCC 1005

2.3.2.4 Sediment Chemistry

Sediment samples were analyzed for COCs consistent with the analyte list as described in Section 2.3.2.1. The methods for each of these analyses are summarized below. The TDLs for sediments were extracted from the RIA and are included in Table 6 of this report and Table 4 of the SAP (Appendix 1).

- VOCs – USEPA 8260B
- SVOCs – USEPA 8270D
- PAHs – USEPA 8270D
- Pesticides – USEPA 8081A
- PCBs – USEPA 8082
- Dioxins and Furans – USEPA 1613Bm
- Metals – USEPA 6020
- Cr III/VI – USEPA 7199M
- Hg – USEPA 7474
- Cyanide – USEPA 9012B
- Sulfide – USEPA 9030
- Volatile Solids – SM22 2540G-2011
- % Moisture – ASTM D2216-98
- TOC – USEPA 9060A

- Ammonia as N – USEPA 3501.1
- TPH – TNRCC 1005

2.3.2.5 Modified Elutriate Chemistry

Modified elutriate samples were analyzed for COCs consistent with the analyte list as described in Section 2.3.2.1. The methods for each of these analyses are summarized below. The TDLs for sediments were extracted from the RIA and are included in Table 7 of this report and Table 3 of the SAP (Appendix 1).

- VOCs – USEPA 8260B
- SVOCs – USEPA 8270D
- PAHs – USEPA 8270D
- Pesticides – USEPA 8081A
- PCBs – USEPA 8082
- Dioxins and Furans – USEPA 1613Bm
- Metals – USEPA 6020
- Cr III/VI – USEPA 7199M
- Hg – USEPA 7474
- Cyanide – USEPA 9012B
- DOC – USEPA 9060
- TSS – USEPA 160.2
- TOC – USEPA 9060
- Ammonia as N – USEPA 350.2
- Sulfide – USEPA 376
- TPH – TNRCC 1005

2.4 Biological Testing

Bioassays were conducted by the ERDC Environmental Laboratory (ERDC-EL, Vicksburg, MS) in basic accordance with standard guidance (USEPA, 2002; USEPA/USACE, 1998; RIA USEPA/USACE, 2003; HSC NMP SAP). The aquatic toxicity testing facility at the ERDC-EL consists of three laboratories containing five (5) temperature and humidity controlled environmental rooms (Darwin, St. Louis, MO, USA) and four (4) temperature controlled water baths. Elutriate testing was conducted in the environmental rooms. Relevant equipment for processing samples and fulfilling all requirements of laboratory bioassays (e.g., pH meters, DO meters, temperature probes, ammonia probes, refractometers, centrifuges, etc.) were available. Bioassays were conducted to assess the potential for biological effects of dredged material (DM) released into the water column during DM discharge (elutriate toxicity tests), using two taxonomically and functionally dissimilar species. Elutriate toxicity tests employed the mysid shrimp *A. bahia* and the fish *M. beryllina*.

2.4.1 Elutriate Bioassays

Elutriate bioassays were conducted for 96-hours using the 100% elutriate; where toxicity was expected due to elevated ammonia concentrations, additional 50% and 10% elutriate concentrations were added. All concentrations, including the control and reference waters, were replicated five times. The standard test organisms *A. bahia* (formerly *Mysidopsis bahia)* and *M. beryllina* and were used in survival tests in basic accordance with dredged material evaluation guidance (USEPA/USACE, 1991; 1998; 2003). All elutriate toxicity tests were conducted at 20 ± 1 °C in temperature and humidity controlled environmental rooms (Darwin, St. Louis, MO, USA).

Other than the reference sediment, all of the site waters collected for elutriate preparation had low salinities (≈ 0 to 22 parts per thousand (ppt)) that were outside the tolerance ranges of the standard test organisms (25 to 30 ppt; USEPA / USACE, 1998). The salinity of each site water was individually adjusted to approximately 30 ppt by incrementally adding ≈ 151 to 570 g/19L Crystal Sea® Marinemix prior to elutriate preparation. The salinity adjusted site waters were then used to prepare the elutriate test waters, as described above.

2.4.2 Americamysis bahia

The mysid shrimp *A. bahia* was exposed to the sediment elutriate water at 4-days old (specified range: 1 to 5 days with no more than a 24-h range in age; USEPA/USACE, 1998). Shrimp were shipped overnight from Aquatic Biosystems (ABS, Fort Collins, CO, USA), immediately observed for potential shipment impacts and fed brine shrimp (*Artemia*) upon receipt. Mysid shrimp were held for 72-hours (received at the appropriate age to be 4-day old) prior to testing for acclimation and observation. The control water and dilution water was reconstituted seawater (30 ppt) prepared using Crystal Sea® Marinemix. Each test concentration included five (5) replicates, 1 L glass beakers containing 400 mL test media and ten (10) *A. bahia* each. The larger beaker size and two daily feeding rations were used to avoid aggressive interactions and potential for cannibalism during the exposure. Test acceptability criteria included water parameters (temperature, pH, salinity, dissolved oxygen) within the specified range (USEPA/USACE, 1991; 1998), at least ninety (90%) survival in the performance control and sensitivity to a reference toxicant (e.g., KCl) within acceptable control chart ranges (± two (2) S.D. from the mean). The ninety six (96) hour tests were conducted from October 29 to November 2, 2018, according to USEPA/USACE (1998). The measurement endpoint was survival.

2.4.3 Medindia beryllina

The inland silverside *M. beryllina* was exposed to the sediment elutriate water at twelve (12) days old (specified range: 1 to 14 days with no more than a 24-h range in age; USEPA/USACE, 1998). Fish were shipped overnight from Aquatic Biosystems (ABS, Fort Collins, CO, USA) immediately observed for potential shipment impacts and fed brine shrimp (*Artemia*) upon receipt. The *M. beryllina* were held for 72-hours (received at 9 days old) prior to testing for acclimation and observation. The control water and dilution water was reconstituted seawater (30 ppt) prepared using Crystal Sea® Marinemix. Each test concentration included five (5) replicates, 600 mL glass beakers containing 400 mL test media and ten (10)

M. beryllina each. Fish were fed at 24-h and 72-h to maintain health. Test acceptability criteria included water parameters (temperature, pH, salinity, dissolved oxygen) within the specified range (USEPA/USACE 1991, 1998), at least ninety (90%) survival in the performance control and sensitivity to a reference toxicant (e.g., KCl) within acceptable control chart ranges (± two (2) S.D. from the mean). The ninety six (96) hour tests were conducted from October 29 to November 2, 2018 according to USEPA/USACE (1998). The measurement endpoint was survival.

2.4.4 Reference Toxicity Tests for Elutriate Bioassays

Reference toxicant tests were conducted on each batch of test organisms to assess test organism sensitivity relative to historic information recorded ERDC-EL in-house laboratory control charts. The selected reference toxicant was potassium chloride (KCl). Reagent grade KCl was weighed and completely dissolved into the appropriate reconstituted waters for each test species (described above). Five concentrations (3 replicates each) were prepared (100%, 50%, 25%, 12.5%, and 6.25%) with the previously described number of organisms in each replicate. The 100% concentration used was 2.0 g/L for *M. beryllina* and 1.0 g/L for *A. bahia*. The endpoint measured was survival after a 48- hour or 96-hour exposure. The median effects endpoints generated in the reference toxicity tests were compared to historic information recorded in ERDC or vendor control charts (± two (2) S.D. from the mean).

2.4.5 Water Quality Parameters

Water quality during bioassay testing was measured using either a Yellow Springs Instruments (YSI)™ Model 556 multiprobe system (Yellow Springs, OH) or a Thermo Scientific Orion Star™ A329 (Thermo Orion Electron Corp., Beverly, MA) for temperature, salinity, pH, and Dissolved Oxygen (DO). Total ammonia-N and pH was measured using a 720A ion-selective electrode (ISE) meter (Thermo Orion Electron Corp., Beverly, MA) equipped with a 95-12 ammonia-sensitive electrode and a 9107BN automatic temperature compensating pH triode (Thermo Orion Electron Corp., Beverly, MA). Total overlying water ammonia-N during bioassays was also measured using LeMotte titration kits (Chestertown, MD, USA). Note that both ammonia measurement methods determined ammonia as total ammonia-nitrogen (-N). Total ammonia and un-ionized ammonia were calculated based on molecular mass and measured pH, temperature and salinity in the test water (USEPA, 1999), specifically using the equation in Section 2.2.5 of the Tier III Biological Testing Report (Appendix 8).

2.4.6 Statistical Analysis

The process by which elutriates were tested is summarized in Figure 1 of Appendix 8. Statistical analysis was performed when survival in the undiluted (100%) elutriate water was reduced by more than 10% relative to the dilution water control, as specified by guidance (USEPA/USACE, 1998; 2003). Statistical analyses are conducted using Toxcalc® statistical software (Version 5.0, Tidepool Scientific Software, McKinleyville, CA). Data normality was determined by the Shapiro-Wilk's Test and homogeneity of variance by Bartlett's Test. If survival was not reduced by at least 10% relative to the dilution water, no statistics were performed. If at least a 10% reduction was observed, initially a two sample t-test was performed to compare the undiluted (100%) elutriate to the dilution water control. If that was statistically

significant, then treatment differences (dilution water, 10%, 50% and 100% elutriates) were performed by one way ANOVA and Dunnett's Method (one-tailed analysis); the Bonferroni t-test was performed in the case of uneven replicates. If normality could not be achieved, Steel's Many-One Rank test (one-tailed analysis) was used. If applicable, the lethal median concentration producing 50% mortality (LC50) in elutriate or reference toxicity test dilutions is determined by the Spearman–Karber method using Toxcalc® (version 5.0, Tidepool Scientific Software, McKinleyville, CA).

2.5 Data Reporting and Statistical Requirements

Data reporting and statistics are summarized in the following sections.

2.5.1 Background

The chemical concentration, method detection limit (MDL), and reporting limit (RL) for water and elutriates were reported on a wet weight basis. The sediment chemical concentration, MDL, and RL were reported on a dry weight basis.

The MDL is the statistically-derived minimum level that can be measured and reported with 99% confidence that it is greater than zero but is present at levels that are too low to estimate analytically. The RL is the minimum level a lab will report with confidence in quantitative accuracy. Common laboratory procedures for defining a RL include assigning it to a fixed factor above the MDL or by using the lowest calibration standard. Reporting limits are often adjusted by the laboratory for sample-specific parameters such as sample weight, percent solids, or dilution.

2.5.2 Reporting for All Analyses Data for All Media Types

1) If the reported result was greater than the RL, the result was simply reported.
2) If analyte concentrations were equal to or greater than the MDL but below the RL, the result was qualified with a "J" flag as having lower precision and greater uncertainty; these values were reported in the summary tables as reported values with the "J" qualifier in the adjacent table cell.
3) "J" values represent potential concentrations of contaminants that were detected below the RL and were acceptable for use in sediment management decisions; they would be reported as real values.
4) If analyte concentrations were below the RL and qualified with a "U" flag, the analyte concentration was between zero and the MDL.
5) "U" values represent minimal concentration of contaminants and were reported in the summary tables as ###.## with the "U" qualifier in the adjacent table cell, where ###.## is the RL.

2.5.3 Calculations and Statistical Analyses for Site Water, Elutriate, and Sediment Data

1) If the reported result was greater than the RL, the result was used as reported.
2) If an analyte concentration was below the RL and "U" flagged, one-half of the RL was used in the calculation.

3) If an analyte concentration was between the MDL and the RL (i.e., "J" flagged values), the concentration was included in the summation at face value.
4) If the RL exceeded the TDL, regardless of whether the result was qualified or not, the RL was used (no half substitutions permitted).

2.5.4 Calculating Total PAH

1) If the reported result was greater than the RL, the result was used as reported.
2) Undetected results ("U" flagged) were included in the summations at half the value of the RL.
3) The estimated values between the MDL and the RL (i.e., "J" flagged values) were included in the summation at face value.
4) If the RL exceeded the TDL, then the RL was used.
5) If all constituents in a chemical group were undetected, the group sum was reported as undetected, and the highest MDL and RL of all the constituents were reported as the MDL and RL for the group sum.

2.6 Data Reduction and Applicable Technical Quality Standards

2.6.1 Surface Water and Modified Elutriate Chemistry

Results of site water and elutriate sample analyses were screened against the following benchmark criteria, listed in order of prioritization: (1) 2014 Texas Surface Water Quality Standards (TSWQS) Marine - Acute and (2) USEPA Water Quality Criteria (WQC) Marine Criterion Maximum Concentration (CMC).

2.6.2 Sediment Chemistry

Results of laboratory analyses of sediment samples were screened against the following sediment guidance values, listed in order of prioritization: (1) National Oceanic and Atmospheric Administration (NOAA) Marine Effects Range – Low (ER-L) and (2) NOAA Marine Effects Range – Median (ER-M).

2.7 Mixing Zone Calculations- CDFATE

A full CDFATE report is provided in Appendix 7, and the approach is summarized below.

2.7.1 Objectives and Background

The CDFATE report details the mixing zone modeling performed by the ERDC to support a Clean Water Act (CWA) Section 404 sediment testing characterization study for HSC ECIP, NMP. Simulations of dredged material discharges into four upland placement areas (PAs) were run using the Fate of Continuous Discharge from Dredging Operations into Open Water (CDFATE) module, Windows version 1.0, (Havis, 1994; Doneker and Jirka, 1990; Akar and Jirka, 1991; Jones, 1990) of the ADDAMS model to establish compliance with water column toxicity criteria for the HSC sediment samples HSCNew-NMP-02, HSCNew-NMP-03, HSCNew-NMP-04, HSCNew-NMP-05, HSCNew-NMP-06, HSCNew-NMP-07, HSCNew-NMP-08,

HSCNew-NMP-09, HSCNew-NMP-10, and HSCNew-NMP-11. Modified elutriate chemistry and elutriate bioassay data were performed as described in Sections 2.3 and 2.4. Results were evaluated as described in Sections 4.5 and 4.6 and applied in the modeling.

2.7.2 Dredging and Placement Locations

The dredging and placement plan for NMP Segments 4, 5, and 6 is displayed in Figure 6. Four upland placement areas are identified to receive dredged material as represented by the sample locations summarized below.

- New BW-8 PA
    - HSCNew-NMP-02 (Segment 4)
    - HSCNew-NMP-03 (Segment 4)
- New E2-Clinton PA
    - HSCNew-NMP-04 (Segment 4)
    - HSCNew-NMP-05 (Segment 4)
- Glendale PA
    - HSCNew-NMP-06 (Segment 5)
    - HSCNew-NMP-07 (Segment 6)
    - HSCNew-NMP-08 (Segment 6)
    - HSCNew-NMP-09 (Segment 6)
    - HSCNew-NMP-10 (Segment 6)
- Filter Bed PA
    - HScNew-NMP-11 (Main Turning Basin)
- HSCNew-NMP-01 (Segment 1) is now not planned to be dredged and is therefore not included in the mixing zone analysis

Discharge locations and drainage paths to receiving waters for the four PAs are discussed in detail in Appendix 7 (Section 2.0, Figure 2). A mixing zone evaluation is needed to determine if the effluent discharged from these PAs would be sufficiently diluted within allowable mixing zones to comply with applicable water quality and toxicity criteria.

2.7.3 Mixing Zone Evaluation Approach

Dilution of effluent from the dredged material placement area occurs when the effluent discharge mixes with the waters of the receiving stream. The extent to which the two streams (PA effluent and receiving stream) mix depends on physical characteristics of the flows such as density and flow rate (or velocity) of both streams, geometry of the receiving stream, and size and orientation of the effluent pipe (or channel). The CDFATE model was used to evaluate the extent of mixing for effluent from each PA into their respective receiving streams.

The amount of dilution (D) that is required to meet water quality criteria is a function of the contaminant concentration in the effluent discharge (as represented by modified elutriate concentrations (C)), the

applicable water quality criteria (C_{wq}), and the background concentration of the receiving water (C_B). Required dilution is expressed in terms of how many parts of receiving water need to be mixed with one part of effluent to reach the applicable criteria.

Equations to calculate dilution requirements for both water quality ($D_{a\text{-}wq}$) and toxicity ($D_{a\text{-}tox}$) are provided below.

$$D_{a-wq} = \frac{C-C_{wq}}{C_{wq}-c_B} \quad (1)$$

where

$D_{a\text{-}wq}$ = dilution required to achieve concentration equivalent to water quality criteria
C = contaminant concentration in modified elutriate sample
C_{wq} = water quality criteria
C_B = background (receiving water) contaminant concentration

$$D_{a-tox} = \frac{100-LPC}{LPC} \quad (2)$$

where

$D_{a\text{-}tox}$ = dilution required to achieve LPC for toxicity
LPC = limiting permissible concentration based on elutriate toxicity evaluation

As shown in Equation 1, the quality of the receiving water affects dilution requirements. The higher the background concentration, the more water has to be mixed in to sufficiently dilute. The concentration of the mixture will necessarily fall between the concentration of the effluent and of the receiving water. If the background concentration is above the criteria, then it is impossible to demonstrate sufficient dilution to reach the criteria.

Texas Surface Water Quality Standards (TSWQS) allow for application of a mixing zone (MZ) and zone of initial dilution (ZID). Acute toxicity is not allowed in a mixing zone, and chronic toxicity is not allowed beyond a mixing zone (TCEQ, 2012). The ZID is a small area where initial dilution with receiving waters occurs and may not meet criteria applicable to the receiving water. Acute criteria may be exceeded within a ZID; thus acute criteria apply at the edge of the ZID. Chronic criteria apply at the edge of the MZ. Typically, the amount of mixing and dilution increases with distance from the discharge point. CDFATE modeling quantifies the location (distance from the discharge point) at which dilution is sufficient to reach acute and chronic criteria and thus determine the dimensions needed for the ZID and MZs for each discharge location.

2.7.4 Modified Elutriate Chemistry and Toxicity

Modified elutriate chemistry and toxicity were evaluated for comparison to water quality criteria to determine the need for a MZ evaluation for each PA. Contaminants of concern for which the modified

elutriate concentration are shown to be below marine water screening criteria do not pose a problem for meeting criteria. In Section 4.5, 16 COCs are identified in which either the modified elutriate concentration exceeded the screening criteria (either acute or chronic), or the RLs are above the screening criteria and therefore cannot be verified as meeting the criteria.

The site water results for samples that represent receiving water are also provided in Table 1 of Appendix 7. Site water from the sample locations nearest the discharges to Buffalo Bayou/HSC (sample HSCNew-NMP-02-SW for New BW-8 PA, and sample HSCNew-NMP-11-SW for Filter Bed PA) represent background concentrations for the receiving water for those PAs. Site water data was not available for the receiving water location on Hunting Bayou from New E2-Clinton PA (receiving material from locations HSCNew-NMP-04 and -NMP-05) and Glendale PA (receiving material from sample locations HSCNew-NMP-06, -NMP-07, -NMP-08, -NMP-09 and -NMP-10). U.S. Geological Survey (USGS) gauge data from 2000 were reviewed but determined to be unusable for this work as the data set was not a COC match and had several unreported or elevated reporting limits. As Hunting Bayou discharges into Buffalo Bayou/HSC between sample locations HSCNew-NMP-04 and -NMP-05, and representative data was unavailable, the site water data (conservative worst-case) from these two locations were applied as the background concentrations for the discharges from Glendale and New E2-Clinton PAs into Hunting Bayou.

2.7.4.1 COCs with Reporting Limits above Criteria

In cases where contaminants are not detected in elutriate or receiving water, the RLs are (conservatively) assumed to be both the elutriate and the receiving water concentrations. Use of the RL in such circumstances makes it impossible to achieve dilution to meet either acute or chronic criteria concentrations, as it cannot be certain as to whether the criteria are exceeded. For COCs were non-detect in any of the elutriate, site water and sediment samples, there is no reason to believe these contaminants are present at concentrations of concern, and they were not evaluated further.

2.7.4.2 COCs above Criteria and Background

Several other COCs had limited evidence of their presence in the HSC sediment and waters with a few detections among all of the samples. The detection of these COCs suggests they are present, and they were retained for further evaluation.

2.7.4.3 COCs with Background above Criteria

If background receiving water concentrations are already above criteria, then it is impossible to dilute the effluent to below the criteria. In this case, a mixing zone evaluation is not necessary. Contaminants that have receiving water concentrations (either detected or RL applied) above chronic criteria, but below acute criteria were not further evaluated for mixing zone requirements. Contaminants where acute criteria were exceeded and dilution could be achieved were evaluated in the mixing zone analysis.

If contaminant concentrations of the background water exceeded acute screening criteria and dilution cannot be achieved resulted in the COCs not being evaluated in the mixing zone analysis.

2.7.4.4 Bioassay Results

In CWA Section 404 evaluations, it is recommended (but not required) that a multi-species testing approach be used to assess potential effects on the receiving waters. As described in Section 2.4 and Appendix 8, standard acute (96 hour) toxicity tests were conducted to assess toxicity of the elutriate samples. Elutriate bioassay test results are reported in Section 4.6 and Appendix 8.

Reported endpoints from the bioassay tests depends on the resulting mortality. If test mortality was high enough (50% effect was bracketed by dilution series and a no observed effects concentration (NOEC) was obtained), the end result of the effluent elutriate toxicity evaluation is the 96-hr median lethal concentration (LC50), expressed as a percentage of the suspended dredged material concentration (or 100% elutriate). However, if acute toxicity was demonstrated but mortality was not high enough to calculate a LC50, then the NOEC and lowest observed effects concentration (LOEC) were reported. Only samples for which acute elutriate toxicity was observed were evaluated in the mixing zone analysis.

As discussed previously, chronic criteria apply at the edge of the mixing zone and acute criteria at the edge of the ZID. The NOEC was applied as the acute criteria. The chronic criteria was determined as either the LC50 multiplied by an application factor (AF) or (where a LC50 was not calculated) the LOEC multiplied by an AF. The AF generally represents the inverse of the acute-to-chronic ratio (ACR). An AF of 0.01 was used here as a conservative approach within this initial screening evaluation. The 0.01 AF was recommended by the National Academy of Science (NAS) and adopted in the MPRSA and USEPA/USACE dredged material testing guidance (Kennedy et al., 2015). There is precedent, however, for applying AFs other than 0.01 where ammonia is the driver of toxicity. Kennedy et al. (2105) suggests the use of a larger AF of 0.05 to 0.1 for dredging evaluations for non-persistent contaminants. Although the conservative AF of 0.01 was used in this evaluation, it is recommended that a less conservative AF be considered in light of the ammonia toxicity discussed in Section 4.6 and that the toxicity criteria be recalculated in subsequent evaluation.

2.7.4.5 Dilution Requirements

Water Quality - Table 3 of Appendix 7 presents the chemical concentrations (elutriate and background), water quality criteria and calculated dilution requirements to be applied in the CDFATE modeling for the COCs that were not previously eliminated from evaluation based on lack of detection and inability to dilute due to background concentrations above criteria. The lowest of the acute criteria was applied to the dilution calculation using Equation 1 (Section 2.7.3).

Toxicity - Based on the acute and chronic criteria determined from the bioassay evaluation, dilution requirements were calculated for each elutriate and test species using Equation 2 (Section 2.7.3). The resulting dilution requirements are also presented in Table 3 of Appendix 7. The highest dilution required for any elutriate sample and species for a given PA was applied as the dilution requirement for that PA.

2.7.5 Dredged Material and Site Water Properties

The dredged slurry entering the PAs will consist of a mixture of the dredged material and entrained site water. Most of the solid particulates are expected to settle within the PA, so that the effluent will consist

primarily of site water with some fraction (primarily fines) of suspended solids that did not settle. Physical properties of both the effluent and receiving water, such as density as a function of salinity and temperature, affect the mixing behavior between the effluent and receiving water. Water samples were taken at mid-depth. Properties of the collected site water are shown in Appendix 7, Table 5.

Grain size distributions and other physical properties of the sediment samples were collected as part of the sampling event. Although they are not used directly in the CDFATE modelling, the physical properties of the dredged material are always useful in interpreting the results. These are provided in Section 4.2.1 and Appendix 4

2.7.6 CDFATE Input

Mixing zone calculations were made using the CDFATE model (Havis, 1994; Doneker and Jirka, 1990; Akar and Jirka, 1991; Jones, 1990). CDFATE uses four categories of input parameters for these calculations: 1) discharge parameters; 2) site receiving water conditions, 3) effluent density modeling and 4) mixing zone data. Each of these are discussed below.

2.7.6.1 Discharge Parameters

Table 6 of Appendix 7 describes the discharge parameters for each of the PAs. A 24-inch hydraulic cutterhead dredge is planned for use. Assuming a typical pipeline velocity of 15 feet per second (fps) and a conservative assumption of 20% downtime, yields a flow rate of 37.7 cubic feet per second (cfs) (1.07 m^3/s) into the PAs. It was assumed the discharge rate from the PAs would be equal to the inflow rate. Each candidate PA is discussed further below.

2.7.6.1.1 Placement Area – New BW-8 PA

New BW-8 PA discharges to Buffalo Bayou/HSC just east of the PA through an underground culvert. The culvert size was assumed to be 6 ft. (1.83 m). Using Manning's equation, and assuming a slope of 0.01 (vertical:horizontal) and roughness value of 0.014 for concrete pipe, yields a flow depth of 1.25 ft. (0.38 m). The pipe is assumed to extend perpendicular to the channel. Mixing is affected by the location the pipe discharges within the channel cross section, yet the actual pipe length is not known. Therefore, two separate model runs were performed assuming the pipe protrudes 150 ft. (45.72 m) and 196 ft. (60 m) into the channel. A cross section was developed based on the bathymetry, for which an average depth was calculated as 24.7 ft. (7.51 m). The channel width in that vicinity is approximately 1238 ft. (377.5m). The water depth at the end of the pipe was estimated as 5.02 m, although the actual bathymetry was not known outside the channel. It was estimated that the angle between the bank and the horizontal culvert was 3.00 degrees based on the bank slope.

2.7.6.1.2 Placement Area – Filter Bed PA

The Filter Bed PA discharges to Buffalo Bayou/HSC through an underground culvert approximately 0.75 mi north of the turning basin. The culvert size was assumed to be 6 ft. (1.83 m), with a flow depth of 0.38 m. Bathymetry of the Buffalo Bayou/HSC channel at the Filter Bed PA discharge location was obtained from USACE hydrographic surveys (eHydro), and a cross section delineated with an average channel depth of 14.8 ft. (4.512 m). The channel width in that vicinity is approximately 305 ft. (93 m). Two model runs

were performed because the actual pipe distance was not known; one assumed the pipe protruded 2.2 m and one 15.24 m into the channel where the water depth is 3.5 m or 4.40 m, respectively. Side slope at the discharge location was estimated as 40 degrees.

2.7.6.1.3 Placement Area – New E2-Clinton PA and Glendale PA

Although New E2-Clinton and Glendale PAs are not located proximate to each other, they are discussed together because both New E2-Clinton PA and Glendale PA discharge into Hunting Bayou from Turkey Run Gulley, and their discharge parameters are the same. Bathymetry data for Hunting Bayou and Turkey Run Gulley was not located. The depth of Hunting Bayou at the discharge location was provided as 7.5 – 8 ft. (USACE, 2019b). From Google Earth, it appears the channel width at this location is 50 ft. (15.24 m). A trapezoidal cross section was assumed with a depth of 7.75 ft. (2.36 m) and 2:1 (horizontal:vertical) side slopes (an angle of 26 degrees), which yielded an average depth of 5.35 ft. (1.63 m). Turkey Run Gulley was estimated from Google Earth to have a channel width of 17 ft. (5.18 m), an estimated water depth of 3.5 ft. (1.07 m) and to extend perpendicularly into Hunting Bayou 4.1 m at a water depth of 2.1 m.

2.7.6.2 Site Receiving Water Conditions

Data input for the receiving water for each PA is provided in Appendix 7, Table 7. Receiving water widths and depths were provided based on bathymetry or assumptions discussed above. For each PA, the channel was assumed to be narrow (bounded), as a conservative assumption, even though the channel width at the New BW-8 PA discharge is rather wide. Receiving water density was calculated based on temperature and salinity. It is important to note that the salinities measured at mid-depth may not be representative of the salinity of the dredge slurry from a cutterhead dredge operating at the sediment surface. According to City of Houston and PBS&J (2003), there is significant density stratification within the artificially deepened Buffalo Bayou/HSC. Salinity/conductivity profiles with depth, taken during several years, shows a steep increase in salinity with depth in some years, and less stratification in drier years when overall salinity is higher. Plots of conductivity with depth from the City of Houston and PBS&J report (2003) were used to estimate bottom salinities at the Buffalo Bayou locations in the report as: 9 part per thousand (ppt) at Main Turning Basin (near Filter Bed PA discharge and location HSCNew-NMP-11), 12 ppt at Sims Bayou (downstream of HSCNew-NMP-06), and 15 ppt at Beltway 8 (near the New BW-8 PA discharge and HSCNew-NMP-02). As expected, salinity decreases with distance upstream.

For the purpose of the CDFATE model, the receiving waters near the Filter Bed PA and New BW-8 PA discharges were assumed to have linear stratification. As it is shallower, the Hunting Bayou receiving water is expected to be less stratified. Water temperatures and surface salinity were obtained from the collected water samples, location HSCNew-NMP-11 for the Filter Bed PA outfall, and -NMP-02 for the New BW-8 PA outfall. Salinity or density data was not located for Hunting Bayou at the discharge. It was assumed the receiving water at Hunting Bayou would be uniformly mixed, and might resemble the surface water of Buffalo Bayou/HSC at about the same distance from the mouth of Hunting Bayou, which would be between sample locations HSCNew-NMP-05 and HSCNew-NMP-06. Thus, the salinity and temperature of those samples (Appendix 7, Table 5) were averaged to estimate that of Hunting Bayou.

Stream gauges with discharge or velocity data were not in the vicinity of any discharge locations. The nearest stream location for Filter Bed PA discharge on Buffalo Bayou/HSC is USGS 008074000 Buffalo

Bayou at Houston, approximately 8 mi upstream. The closest gauge located for the New BW-8 PA outfall on Buffalo Bayou/HSC is the NOAA g08010 gauge approximately 10.4 mi downstream at Fred Hartman Bridge. The nearest gauge for Hunting Bayou is the USGS sta 08075770 for Hunting Bayou at IH 610, approximately 5.5 mi upstream of the Turkey Run Gulley discharge.

Summer stream flow data was located for Buffalo Bayou in a technical memorandum by Brown & Root, Inc. (1998), with a figure showing volume and velocity as a function of distance from river mouth. Based on the figure, it appeared the New BW-8 PA discharge location had a discharge of approximately 2,200 cfs or a velocity of 0.07 ft./s (0.022 m/s). The Filter Bed PA discharge location appeared to be approximately 2,000 cfs velocity 0.44 ft./s (0.136 m/s). For Hunting Bayou, discharge data was acquired for the upstream gauge at IH610. The median daily mean discharge between 1965 and 2019 was 7.66 cfs. It was assumed velocity would be similar between the gauge and discharge locations. Bathymetry was not available for either location. The channel width at the gauge was estimated as 20 ft. (Google Earth), and a cross sectional area estimated as 43 ft^2. This yields a mean channel velocity of 0.18 ft./s (0.055 m/s).

Manning's roughness values were obtained for Buffalo Bayou/HSC as 0.0177 from Guthrie and Schoenbaechler (2012), and for Hunting Bayou as 0.055 from AECOM Technical Services, Inc. (2014). Hourly wind speeds at the NOAA 8770777 station at Manchester, TX averaged 2.5 m/s during the year 2018.

2.7.6.3 Effluent Density Modeling

Appendix 7, Table 8 provides CDFATE input data for the effluent discharged from the PAs and entering the receiving streams. The total suspended solids (TSS) content of the effluent was estimated as 0.1 kg/m^3 and was assumed to consist mostly of clay with some fine silt. A column settling test (USACE, 2015; Palermo et al., 1978; Palermo and Thackston, 1988; Thackston et al., 1988) would be needed to predict the site-specific settling behavior of the dredged material in the PA and resulting TSS, which is also a function of the PA design and weir operation. The assumed concentration of TSS is likely sufficient for modeling purposes; density is controlled more by the salinity than the solids content.

The effluent densities were calculated based on temperature and salinity at the corresponding sample locations on Buffalo Bayou/HSC. Due to the discussed salinity stratification, it was assumed the salinity of the dredge slurry and effluent would be best represented by the conservatively picking the bottom salinity in the channel where the salinity is greatest. The salinity of the effluent from the Filter Bed PA was assumed to be represented by the bottom salinity near HSCNew-NMP-11 (9 ppt); New BW-8 PA discharge was assumed to have a salinity of 15 ppt. The salinity of discharges into New E2-Clinton would range between that of the bottom salinities of Buffalo Bayou/HSC at Beltway 8 and Sims Bayou, estimated as 13.5 ppt, and that of the Glendale PA discharge would range between that of the bottom salinities of Buffalo Bayou/HSC at Turning Basin and Sims Bayou, estimated as 11.5 ppt. A maximum distance of 2000 m and 100 reporting periods, which are locations at which concentration is reported, were used to fully delineate mixing zone requirements and provide sufficient resolution.

2.7.6.4 Mixing Zone Data

Mixing zone input is provided in Appendix 7, Table 9. CDFATE modeling was performed to delineate dilution with distance using a generic pollutant X with concentration of 100 and zero background concentration. These concentrations do not affect the physical degree of mixing and dilution and were used for easy calculation since this is a preliminary mixing evaluation. Though mixing zone distance and criterion were supplied as input, these values were also not used in determination of dilution with distance.

3.0 Quality Assurance/ Quality Control (QA/QC)

This section provides a QA/QC review of all field, laboratory, and toxicological data. The following are included in full detail as appendices: HSC ECIP NMP SAP (Appendix 1); field report (Appendix 2); chain of custody (Appendix 3); particle size distribution (Appendix 4); analytical summary tables (Appendix 5), analytical laboratory reports, MDL studies, case narratives, internal QC checks, calculations of data quality indicators (Appendix 6), CDFATE model output (Appendix 7), Tier III biological testing report (Appendix 8), and data validation worksheets (Appendix 9).

The following is applicable for all laboratory analyses (i.e., site water, sediment, and elutriate):

Target Detection Limit (TDL) is a performance goal set between the lowest, technically feasible, detection limit for routine analytical methods and available regulatory criteria or guidelines for evaluating dredged material.

Method Detection Limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero (ERDC/TN EEDP-04-36) but is present at levels that are too low to estimate analytically. The MDL studies are conducted using ideal, laboratory-prepared samples of a spiked clean matrix.

Reporting Limit (RL) is established by the low standard of the initial calibration curve or low-level calibration check standard and represents a concentration at which quantitation is considered accurate. At a minimum, the RL should be three times the MDL.

The relationship between these three metrics should be: MDL < RL < TDL. When this is not the case, the implications for bias in the data usability and representativeness (negative/low, neutral, positive/high) will be discussed.

3.1 Field Data

Deviations encountered during sample collection are summarized in Section 2.2.2. There were no additional deviations or QA/QC issues pertaining to field data. Field quality control is summarized in Section 2.2.8.

3.2 Laboratory Data

The following subsections include a summary of the analytical laboratory's case narratives. Full narratives and lab reports can be found in Appendix 6. These descriptions of specific analysis QC failures are reviews to ensure the usability and representativeness of data when QC deviations occurred.

3.2.1 Site Waters

3.2.1.1 VOCs

The chain of custody did not request VOCs for the sediment equipment rinsate, HSCNew-NMP-EQPB. The laboratory control sample (LCS) had an elevated recovery of 157% (Laboratory Limits 45% to 150%) for tetrachloroethylene but the matrix spike/matrix spike duplicate (MS/MSD) had acceptable recoveries based on laboratory limits of 45% to 150%. No significant bias was suspected for the VOC results.

3.2.1.2 SVOC/PAH/PCP

The RL of 20 ug/L exceeded the TDL of 1 ug/L for benzidine for all the samples, however benzidine was not detected in any of the site water samples. Azobenzene was reported instead of 1,2-phenylhydrazine due to the degradation of 1,2-phenylhydrazine in the injection port of the gas chromatograph/mass spectrometer (GC/MS). The WG1167814-3 laboratory control duplicate (LCD) recovery, associated with HSCNew-NMP-EQPPB (L1841553-01), was below the acceptance criteria for benzidine (9 %); however, it has been identified as a "difficult" analyte and the results of the associated samples were reported. Per USEPA Method 8270D benzidine may be subject to oxidative losses during solvent concentration and its chromatographic behavior is poor (USEPA, 1998). The WG1167722-1 method blank had concentrations above the reporting limit for several compounds. The results of the original analysis were reported and are qualified with a "B" for any associated sample concentrations that are less than 10x the blank concentration for this analyte. For HSCNew-NMP-07-SW (L1843397-07) and HSCNew-NMP-11-SW (L1843397-11), the surrogate recoveries were outside the acceptance criteria for 2-fluorophenol (13 %) and phenol-d5 (12 %) (Project Limits 30 % to 150 %); however, re-extraction could not be performed due to lack of additional sample. The results of the original analysis were reported; however, all associated compounds are considered to have a potential low bias. The matrix spike/matrix spike duplicate (MS/MSD) was not performed on the SVOC/PAH/PCP due to insufficient sample volume. The sub-laboratory did not notify ECB of the required QC volume of 5 L and were supplied with 2 L as per standard practice. Without the MS/MSD the ability to assess bias associated with matrix interferences is not possible. There is an overall potential low bias of the data for SVOC/PAH/PCP due to low surrogate recoveries, however due to all detections being "J" qualified, and significantly below the screening criteria the data is deemed useable.

3.2.1.3 Pesticides

The equipment rinsate, HSCNew-NMP-EQPB, was extracted five days outside of holding time due to a laboratory processing error. HSCNew-NMP-EQPB was sampled on October 6, 2018 and was received by ECB on October 9, 2018 with a shipment of sediment samples. The laboratory believed that the sample was a sediment sample and had a 14 day holding time versus the actual holding time of 7 days. One of

the continuing calibration verification (CCV) standards had low recoveries of 83.3 and 82.9 % for 4,4'-DDT and oxychlordane, respectively (Project Limits 85 % to 115 %); however, the recoveries were within the DOD QSM 5.1 limits of 80 % to 120 %. The initial calibrating verification (ICV) standard had an elevated recovery of 127 % (Project Limits 80 % to 120 %) for delta-BHC. The results of toxaphene for the ICV was not reportable. The ICV is a second source standard that did not match the pattern of the standard used for the calibration. SW846 states that some toxaphene components, particularly the more heavily chlorinated components, are subject to dechlorination reactions. As a result, standards from different vendors may exhibit differences, which could lead to possible false negative results or large differences in quantitative results. No bias was observed for the pesticide results based on the quality control samples.

3.2.1.4 PCBs

The laboratory control sample/laboratory control duplicate (LCS/LCD) and MS/MSD had elevated recoveries ranging from 156 % to 177 % (Project Limits 50 % to 150 %) for PCB 170. The MS/MSD had elevated recoveries ranging from 160 % and 167 %, respectively, (Project Limits 50 % to 150 %) for PCB 153. No bias was observed for the PCB congener results based on the quality control samples because all PCBs for all samples were non-detect.

3.2.1.5 Metals

The duplicate had an elevated relative percent difference (RPD) of 72.3 % (Project Limits 30 %) for antimony; however, the RPD was calculated using estimated concentrations that were "J" qualified and below the RL of 0.005 mg/L. All other QC samples for antimony were within acceptable limits, and data is considered useable. One of the two matrix spike duplicates had a low recovery of 57.8% (Project Limits 70 % to 130 %) for zinc. The recoveries for the LCSs and MS and MS/MSD were within the acceptable project limits for zinc. The low recovery in MS/MSD does not impact data usability for zinc due to all samples being non-qualified detections. No bias was observed for the metal results based on the quality control samples.

3.2.1.6 Cyanide

Residual chlorine or other oxidizing agents were detected in the container of all the site waters. Chlorine is an interference that can decompose cyanides; therefore, the results may have a low bias.

3.2.1.7 Petroleum Hydrocarbons

The chain of custody filled out in the field did not request TPH for the sediment equipment rinsate, HSCNew-NMP-EQPB; resulting in the sample not being analyzed for TPH. The RLs for site water samples ranging from of 5,000 to 10,000 ug/L exceeded the TDL of 100 µg/L for TPH by TCEQ (TNRRC) 1005. The hydrocarbon ranges were not detected above the RL for all of the samples. Potential low bias was observed for the TPH samples since the RL was an order of magnitude greater than the TDL.

3.2.2 Sediment

3.2.2.1 VOCs

The laboratory control sample had an elevated recovery of 166 % (Laboratory Limits 65 % to 140 %) for tetrachloroethylene (TCE). The matrix spike/matrix spike duplicate elevated recoveries of 156 % and

146 %, respectively (Laboratory Limits 45 % to 150 %). TCE was not detected in any of the sediments; therefore, a high bias was not suspected. The laboratory control sample had a slightly elevated recovery of 129 % (Laboratory Limits 75 % to 125 %) for 1,1-dichlorethane. The analyte,1,1-dichlorethane, was not detected in any of the sediments; therefore, a high bias was not suspected.

3.2.2.2 SVOC/PAH/PCP

The RLs ranging from 933 ug/kg to 2180 ug/kg exceeded the TDL of 5 ug/kg for benzidine for all samples, however, benzidine was not detected in any of the sediment samples. The RL ranging from 200 ug/kg to 468 ug/kg exceeded the TDL of 100ug/kg for pentachlorophenol (PCP). However, the MDLs ranging from 59.9 ug/kg to 98.7 ug/kg were below the TDL except for HSCNew-NMP-01-SD, which had a MDL of 140 ug/kg. PCP was not detected in any of the sediment samples. Azobenzene was reported instead of 1,2-phenylhydrazine due to the degradation of 1,2-phenylhydrazine in the injection port of the GC/MS. The MS/MSD for aniline had low recoveries of 3 % and 1 % (Projects Limits 50 % to 150 %), respectively, as well as an elevated RPD of 60 % (Project Limits 30 %). The LCS/LCD for aniline had acceptable recoveries of 71 % and 70 %, respectively, as well as an acceptable RPD of 1 %. Some of the SVOC analytes had slightly elevated RPDs in the MS/MSD ranging from 31 % to 41 % (Project Limits 30 %). Some of the SVOC analytes had low recoveries in the MS/MSD ranging from 0 % to 32 % (Project Limits 30 %). All of the SVOC analytes have acceptable recoveries and RPDs in the LCS/LCD. Low bias was suspected for aniline due to matrix interferences based on the quality control samples.

3.2.2.3 Pesticides

There were some elevated recoveries in the CCV ranging from 116 % to 126 % (Project Limits 85 % to 115 %), however, several analytes were within DOD QSM 5.1 limits of 80 % to 120 %. The results of toxaphene for the ICV was not reportable. The ICV is a second source standard that did not match the pattern of the standard used for the calibration. SW846 states that some toxaphene components, particularly the more heavily chlorinated components, are subject to dechlorination reactions. As a result, standards from different vendors may exhibit differences, which could lead to possible false negative results or large differences in quantitative results. The LCS had low recoveries of 25.4 % and 42.3 % (Project Limits 50 % to 150 %) and an RPD of 50 % (Project Limits 30 %) for endrin aldehyde but that analyte had acceptable MS recoveries. The recovery of beta-BHC could not be determined in the matrix spikes due to an interfering peak but that analyte had acceptable recoveries in the LCS (Project Limits 50 % to 150 %). The matrix spikes had low recoveries of 22.6 % and 22.7 % (Project Limits 50 % to 150 %) for endosulfan I but that analyte had acceptable recoveries in the LCSs (Project Limits 50 % to 150 %). The standard reference material (SRM) recoveries were within manufacturer's acceptance limits. No bias was observed for the pesticide results based on the quality control samples.

3.2.2.4 PCBs

The surrogate, 2,4,5,6 tetrachloro-m-xylene (TMX), had elevated recoveries of 119 %, 122 %, and 142 % in the CCVs and PCB 8 had an elevated recovery of 118 % in one of the CCVs. The recoveries of TMX were low in both the LCS and LSD at 14 % and 10 % (Project Limits 30 % to 150 %), respectively. The recoveries of PCBs 18, 44, and 52 could not be determined in the matrix spikes since the inherent analyte concentration in the samples were greater than the spiked concentrations; however, the LCSs for these

analytes were within acceptable ranges (Project Limits 50 % to 150 %). PCB 28 had a low recovery of 47.7 % in one of the matrix spikes but had acceptable recoveries in the other MS/MSD. The SRM recoveries were within manufacturer's acceptance limits. No bias was observed for the PCB congener results based on the quality control samples.

3.2.2.5 Dioxins and Furans

The peak detected for 1,2,3,7,8,9-hexa CDF does not meet ratio criteria and has resulted in an elevated detection limit of 0.640 pg/g for sample HSCNew-NMP-04-SD. The retention time for the detected peak was greater than 3 seconds when compared to the expected retention time from the internal standard for the analysis of 1,2,3,7,8-penta CDF in HSCNew-NMP-04-SD. The peak detected for 1,2,3,6,7,8-hexa CDF does not meet ratio criteria and has resulted in an elevated detection limit of 1.96 pg/g for HSCNew-NMP-10-SD. Potential low bias was observed for dioxins and furans based on the quality control parameters.

3.2.2.6 Metals

The MS/MSD had low recoveries for antimony of 55.3 % and 54.4 % (Project Limits 70 % to 130 %), respectively. Some low bias was possibly observed for the results of antimony due to matrix interferences. The method blank had a concentration of 2.4 mg/kg for barium that was above the RL of 0.1 mg/kg; however, the concentration was less than 10 % of the sample results, which was negligible according to the USEPA 6020 method criteria. One of the four CCVs had a slightly low recovery of 89.1 %(Project Limits 90 % to 110 %) for selenium. The duplicate had an elevated RPD of 46.1 % (Project Limits 30 %); however, the MS/MSD had an acceptable RPD of 27.2 %. The method blank had a concentration of 0.192 mg/kg for silver that was slightly above the RL of 0.1 mg/kg. Two of the four CCVs had slightly low recoveries of 88.5 % and 86.6 % (Project Limits 85 % to 115 %). The duplicate had a slightly elevated RPD of 33.7 % (Project Limits 30 %) for silver. There could be a potential for high bias for silver in the sediment samples. The standard reference material (SRM) had an elevated recovery of 173 % (Project Limit 70 % to 130 %) for mercury. The SRM has an acceptable concentration of 31.3 mg/kg based on the certificate of analyses from NSI labs for the SQCI-001 which states the acceptable limits for mercury is between 12.3 mg/kg to 35.5 mg/kg. Chromium(Cr) (VI) was not detected in any of the sediment samples, and both the matrix spike and matrix spike duplicate yielded a 0 % recovery (Project Limits 50 % to 150 %), despite acceptable recoveries of 96.5 % to 97 % for the two LCSs. USEPA Method 3060, alkaline extraction for chromium(VI), requires a post digestion spike, which was also performed, with low recovery of approximately 23 %. Section 8.5.1 of USEPA Method 3060 describes sediment samples that are incompatible with Cr(VI) and where no native Cr(VI) can be present. The Eh of the sediments in question was measured, with all values measured ranging from -22 mV to 58 mV. Section 8.5.1 and Figure 2 in USEPA Method 3060 indicates any sample with an Eh less than approximately 300 mV (lowest possible Eh at any relevant pH) will be incompatible with Cr(VI) (USEPA, 1996). Therefore, since all samples measured had Eh values substantially below this value, no Cr(VI) is present in any sample and the data cannot be qualified or rejected.

3.2.2.7 Total Organic Carbon

The method blank had TOC concentrations of 0.00559 mg/kg and 0.00725 mg/kg, which was slightly above the RL of 0.005 %. The MS/MSD had recoveries ranging from 125 % to 168 % (Project Limits 75 % to

125 %). The MSD had elevated RPDs ranging from 21.5 % to 26.5 % (Project Limits 20 %). These results suggest a high bias.

3.2.2.8 Petroleum Hydrocarbons

The RL of 50 mg/kg to 100 mg/kg exceeded the TDL of 5 mg/kg for TPH by TCEQ (TNRRC) 1005. Due to a laboratory error, another aliquot of the extraction surrogate, 1-chlorooctane, is used to test the effectiveness of the method for hydrocarbons C6 to C12. 1-chlorooctane was added to the LCS QG238699-2, instead of the spike mix. Consequently, the LCS had an elevated surrogate recoveries of 4.84 % to 3730 % (Laboratory Limits 70 % to 130 %) and very low recoveries of the hydrocarbons ranges. All of the associated samples were re-extracted within holding time, except for samples: HSCNew-NMP-10-SD, HSCNew-NMP-11-SD, and HSCNew-NMP-12-SD, which were extracted 1 day outside of holding time. The surrogate, 1-chlorooctane, had low recoveries ranging from 46.8 % to 67.8 % (Laboratory Limits 70 % to 130 %) in samples: HSCNew-NMP-01-SD, HSCNew-NMP-02-SD, HSCNew-NMP-03-SD, HSCNew-NMP-05-SD, HSCNew-NMP-07-SD, and HSCNew-NMP-08-SD. However, the second surrogate, o-terphenyl, had acceptable recoveries of 91.7 % to 128 % (Laboratory Limits 70 % to 130 %). No significant bias was observed for the TPH results even though there was a low surrogate recovery for 1-chlooctane because all results were detected above the MDL for the C6 to C12 hydrocarbons.

3.2.3 Modified Elutriate

3.2.3.1 SVOC/PAH/PCP

The RL of 20 ug/L exceeded the TDL of 1 ug/L for benzidine for all the samples, however benzidine was not detected in any of the samples. Azobenzene was reported instead of 1,2-phenylhydrazine due to the degradation of 1,2-phenylhydrazine in the injection port of the GC/MS. The WG1175786-4 MS recoveries, performed on HSCNew-NMP-03-DUP-EL (L1844499-12), were outside the acceptance criteria of 40 % to 140 % for acenaphthene (36 %); however, the associated MSD and LCS/LCSD recoveries are within overall method allowances. No significant bias was observed for the results of acenaphthene.

3.2.3.2 Pesticides

One of the CCV standards had low recoveries of 83.3 % and 82.9 % for 4,4'-DDT and oxychlordane, respectively (Project Limits 85 % to 115 %). These analytes were within DOD QSM 5.1 limits of 80 % to 120 %. The ICV had a slightly elevated recovery of 127 % (Project limits 80 % to 120 %) for delta-BHC; however, delta-BHC was not detected in any of the samples. The results of toxaphene in the ICV was not reportable. The ICV is a second source standard that did not match the pattern of the standard used for the calibration. SW846 states that some toxaphene components, particularly the more heavily chlorinated components, are subject to dechlorination reactions. As a result, standards from different vendors may exhibit differences, which could lead to possible false negative results or large differences in quantitative results. No bias was observed for the pesticide results based on the quality control samples.

3.2.3.3 PCBs

The laboratory originally analyzed PCBs congeners on December 9, 2018 but due to failing CCVs the data was not reportable. Originally, the PCBs were not detected in any of the samples. After multiple re-

analyses of the extracts, acceptable CCVs recoveries were achieved based on the project limits of 85 % to 115 %; however, it was 7 days outside of the analytical holding time. PCBs were still not detected in the final analysis of the samples. The surrogate, PCB 198, had a low recovery in one of the LCS at 28.9 % (Project Limit 30 % to 150 %). However, the other surrogate, TMX, had an acceptable recovery of 87 %. No bias was observed for the PCB congeners even though the final analysis was outside of holding time the results confirmed those from the first analysis which was within holding times.

3.2.3.4 Dioxins and Furans

The peak detected for octa CDD does not meet ratio criteria and has resulted in an elevated detection limit of 29.6 pg/L for sample HSCNew-NMP-03-EL. The peak detected for 2,3,7,8-tetra CDF does not meet ratio criteria and has resulted in an elevated detection limit of 1.33 pg/L for sample HSCNew-NMP-03-EL. The peak detected for total tetra CDF does not meet ratio criteria and has resulted in an elevated detection limit of 1.33 pg/L for sample HSCNew-NMP-03-EL. The peak detected for total hepta CDD does not meet ratio criteria and has resulted in an elevated detection limit of 2.57 pg/L for sample HSCNew-NMP-10-EL. Potential low bias was observed for dioxins and furans based on the quality control parameters.

3.2.3.5 Metals

One of the two matrix spike duplicates had a low recovery of 57.8 % (Project Limits 70 % to 130 %) for zinc. The recoveries for the LCSs and MS and MS/MSD were within the acceptable project limits for zinc. No bias was observed for the metal results based on the quality control samples.

3.2.3.6 Cyanide

Residual chlorine or other oxidizing agents were detected in the container of all the elutriates. Chlorine is an interference that can decompose cyanides; therefore, the results may have a low bias.

3.2.3.7 Petroleum Hydrocarbons

The RL of 5,000 ug/L to 10,000 ug/L exceeded the TDL of 100 µg/L for TPH by TCEQ (TNRRC) 1005. The hydrocarbon ranges were not detected above the RL for all of the samples. Potential low bias was observed for the TPH samples since the RL was an order of magnitude greater than the TDL.

4.0 Results and Discussion

This section contains a description of field observation and analytical results. Tables 2 through 4 summarize the water quality parameters, particle size analysis, and physical properties, respectively. Summaries of detections in chemical analyses for site water, sediment, and elutriate are in Tables 5 through 7. Consistent analytical data sets were collected so that site waters, sediment, and elutriate samples had consistent analyte lists for comparative purposes. All-inclusive data tables for site water, sediment, and elutriate can be found in Appendix 5. Results of the bioassays are summarized in Sections 4.6 and in Appendix 8.

Tables 1A and 1B summarize sample IDs, proposed sample location coordinates, final sample location coordinates and media type collected. The summary of lithologic logs including sample date and time,

water depth, core length, recovery, number of pushes, and other sample descriptions is included in the field report (Appendix 2).

4.1 Field Data and In Situ Measurements

Water column parameters (i.e., temperature, pH salinity, ORP, DO, turbidity, specific conductance) were recorded at each sample location along with Global Positioning System (GPS) coordinates (Table 2). Water temperatures ranged from 19.3 °C to 23.1 °C with a mean of 21.2 °C. The mean pH was 7.69 and ranged from 7.47 to 8.06, and the mean salinity was 2.64 parts per thousand (ppt) with a range of 1.13 ppt to 4.59 ppt. The oxidation reduction potential (ORP) ranged from -41.6 mV to 26.3 mV with a mean of 11.0 mV. The dissolved oxygen ranged from 2.74 mg/L to 5.63 mg/L with a mean of 4.06 mg/L. The mean turbidity was 11.0 nephelometric turbidity units (NTU) with a range from 7.6 NTU to 26.3 NTU. The conductivity ranged from 2.29 milisiemens per centimeter (mS/cm) to 8.12 mS/cm with a mean of 4.88 mS/cm.

4.2 Physical Testing Data

4.2.1 Particle Size Distribution

The particle size distribution for the 12 samples in the NMP section of the HSC were dominated by clay type materials and are shown in Table 3. The unified soil classification (USCS) system was used to determine the particle size distribution and corrected for material that passed 100 % through a 3" sieve. Four of the 12 samples (HSCNew-NMP-03, -NMP-04, -NMP-05, and -NMP-06) contained fine gravel in a small fraction ranging from 0.3 % to 1.5 %. All of the samples contained a sand fraction divided between coarse, medium, and fine sand. The total sand fraction ranged from 8.6 % to 51 % with a mean of 26 % and median of 21 %. The silt fraction for all of the samples ranged from 18 % to 39 % with a mean of 27 % and median of 24.6 %. The clay fraction for all of the samples ranged from 26 % to 73 % with a mean of 48 % and a median of 41 %. Four of the 12 (HSCNew-NMP-04, -NMP-08, -NMP-09, -NMP-10) samples were classified as fat clays. HSCNew-NMP-01 was the only sample classified as a fat clay with sand. HSCNew-NMP-02 and -NMP-06 were classified as lean clay with sand. Four of the 12 samples (HSCNew-NMP-03, -NMP-05, -NMP-07, -NMP-11) were classified as sandy lean clay.

One field duplicate was taken for the NMP section of the HSC. The field duplicate was taken at sample location HSCNew-NMP-03 and identified as HSCNew-NMP-03-SD-Field Dup. The mean gravel fraction between the two samples was 0.65 %. The mean of the total sand fraction was 46 %. The mean of the silt fraction was 27 % with 27 % as the mean for the clay fraction. HSCNew-NMP-03-Field Dup was classified as a clayey sand.

4.2.2 Specific Gravity and Atterburg Limits

The specific gravity of the 12 samples ranged from 2.64 g/cm^3 to 2.69 g/cm^3 with a mean and median of 2.66 g/cm^3. The specific gravity results are shown in Table 4 and were corrected to report values at 20 °C.

The Atterburg limits for the 12 samples in the NMP section of the HSC were identified as lean and fat clays and are shown in Table 4. Five of the 12 (HSCNew-NMP-01, -NMP-04, -NMP-08, -NMP-09, -NMP-10) samples were identified as fat clays and 7 of the 12 (HSCNew-NMP-02, -NMP-03, -NMP-03-Field Dup, -NMP-05, -NMP-06. -NMP-07, -NMP-11) samples were identified as lean clays. The USCS classification for the Atterburg limits was given to material that passes through a #40 sieve; any material retained by a #40 sieve was not included. The liquid limit of the 12 samples ranged from 23 % to 74 % with a mean of 48 % and median of 46 %. The plastic limit of the 12 samples ranged from 11 % to 23 % with a mean of 17 % and median of 17 %. The plasticity index (PI) for the 12 samples NMP ranged from 11 to 53 with a mean of 30 and median of 30.

4.2.3 Percent Solids

Percent solids for HSCNew-NMP-01-SD through HSCNew-NMP-011-SD, including HSCNew-NMP-03-SD-Field Dup, ranged from 50 % to 81 % solids, with a mean of 67% solids. The percent solids results are summarized in Table 6.

4.3 Site Water Chemistry

A full chemical analysis for site water, as well as sediment and modified elutriate samples, were required in Section 2.5 of the USACE SAP (2018). A data summary of detections within the chemical analyses for site water samples are presented in Table 5 and are compared to published water quality criteria as defined in Section 5.2.1 of the SAP. An all-inclusive data summary table with comparisons to water quality criteria is presented in Appendix 5 (Table 5A). The prioritization of the screening criteria are as follows: (1) TSWQS (marine - acute); (2) USEPA WQC (marine – acute); (3) NOAA (marine – acute); (4) USEPA Region 6 (marine). One exception to this prioritization, copper was first screened against the USEPA Region 6 marine chronic criteria for copper (3.6 ug/L) which is protective of oyster waters then followed by TSWQS.

4.3.1 VOCs

Of the 51 volatile organic compounds (VOCs) analyzed for in each sample, three compounds (chloroform, chloromethane, bromodichloromethane) were detected in one or more samples. Chloroform was detected in all of the samples except HSCNew-NMP-01-SW, which was “U” qualified (i.e., not detect) and reported at the RL. Chloromethane was detected in three samples, HSCNew-NMP-03-SW, -NMP-09-SW, and -NMP-03-SW-Field Dup, and was “U” qualified in all other samples and reported at the RL. Bromodichlormethane was detected in one sample, HSCNew-NMP-04-SW, and was “U” qualified in all other samples and reported at the RL. The remaining analytes in all samples were below the MDL, qualified “U”, and reported at the RL; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. The dilution factor for all VOC analytes was 1. There are no exceedances of the surface water screening criteria for VOCs.

4.3.2 SVOCs

Of the 43 semi-volatile organic compounds (SVOCs) analyzed for in each sample, two compounds (bis(2-ethylhexyl) phthalate and di-n-butyl phthalate) were detected in one or more samples. Bis(2-ethylhexyl) phthalate was detected and qualified "J" (i.e., detected below the reporting limit; estimated concentration) in 4 of the 12 samples, HSCNew-NMP-01-SW, -NMP-02-SW, -NMP-03-SW, and –NMP-04-SW. Bis(2-ethylhexyl) phthalate was not detected, qualified "U", and reported at the RL in all other samples. Di-n-butyl phthalate was detected and qualified "J" in 2 of the 12 samples, HSCNew-NMP-06-SW and HSCNew-NMP-08-SW. Di-n-butyl phthalate was not detected, qualified "U", and reported at the RL in all other samples. The remaining analytes in all samples were below the MDL, qualified "U", and reported at the RL; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. The dilution factor for all SVOC analytes was 1. There is an overall potential low bias of the data for SVOCs due to low surrogate recoveries, however due to all detections being "J" qualified, and significantly below the screening criteria the data is deemed useable. USEPA Region 6 surface water screening criteria was exceeded for hexachlorobutadiene and hexachlorocyclopentadiene, however, all results for all samples for hexachlorobutadiene and hexachlorocyclopentadiene were below the MDL, qualified "U", and reported at the RL which was above the screening criteria for these 2 analytes. There were no other exceedances of any screening criteria for SVOCs.

4.3.3 PAHs

Of the 17 PAHs analyzed for in each sample, 14 compounds (acenaphthene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(e)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene, pyrene) were detected in one or more samples. Acenaphthylene, anthracene, and fluorene were non-detects in all samples, qualified "U", and reported at the RL. All PAH analytes had a dilution factor of 1; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. There is an overall potential low bias of the data for PAHs due to low surrogate recoveries, however due to all detections being "J" qualified, and significantly below the screening criteria the data is deemed useable.

Acenaphthene was detected in one sample, HSCNew-NMP-04-SW, and was "J" qualified. The remaining samples were non-detects, qualified "U", and reported at the RL.

Benzo(a)anthracene was detected in 3 samples, HSCNew-NMP-09-SW, -NMP-10-SW, -NMP-11-SW, and was "J" qualified. The remaining samples were non-detects, qualified "U", and reported at the RL.

Benzo(a)pyrene, benzo(b)fluoranthene, and benzo(e)pyrene were detected in 8 samples, HSCNew-NMP-03-SW, -NMP-05-SW, -NMP-06-SW, -NMP-07-SW, -NMP-09-SW, -NMP-10-SW, -NMP-11-SW, -NMP-03-SW-Field Dup, and was "J" qualified. The remaining samples were non-detects, qualified "U", and reported at the RL.

Benzo(g,h,i)perylene was detected in all samples except HSCNew-NMP-02-SW, -NMP-04-SW, and -NMP-08-SW. The detected concentrations were all qualified "J". The remaining samples were non-detects, qualified "U", and reported at the RL.

Benzo(k)fluoranthene was detected in 7 samples, HSCNew-NMP-03-SW, -NMP-05-SW, --NMP-06-SW, -NMP-07-SW, -NMP-09-SW, -NMP-10-SW, -NMP-11-SW and was "J" qualified. The remaining samples were non-detects, qualified "U", and reported at the RL.

Chrysene was detected in all of the samples except, HSCNew-NMP-01-SW and HSCNew-NMP-02-SW, and was "J" qualified. The two remaining samples were non-detects, qualified "U", and reported at the RL.

Dibenz(a,h)anthracene was detected in one sample, HSCNew-NMP-04-SW, and was qualified "J". The remaining samples were non-detects, qualified "U", and reported at the RL.

Fluoranthene was detected in all of the samples except, HSCNew-NMP-04-SW and HSCNew-NMP-03-SW-Field Dup, and was "J" qualified. The remaining two samples were non-detects, "U" qualified, and reported at the RL.

Indeno(1,2,3-c,d)pyrene was detected in all 12 samples and "J" qualified, except for HSCNew-NMP-01-SW and HSCNew-NMP-11-SW which did not have a qualifier.

Naphthalene was detected in all of the samples except, HSCNew-NMP-09-SW and HSCNew-NMP-10-SW which were "U" qualified and reported at the RL. Samples HSCNew-NMP-01-SW and HSCNew-NMP-02-SW had detected concentrations of naphthalene that were unqualified. The remaining samples with detections were "J" qualified.

Phenanthrene was detected in 5 samples, HSCNew-NMP-07-SW, -NMP-09-SW, -NMP-10-SW, -NMP-11-SW, -NMP-03-SW-Field Dup and was "J" qualified. The remaining samples were non-detect, qualified "U", and reported at the RL.

Pyrene was detected in all of the samples except, HSCNew-NMP-03-SW, and was "J" qualified. The non-detect was qualified "U" and reported at the RL.

The calculated total PAHs was determined by summing the detections (i.e., non-"U" qualified results). Total PAHs (calculated) ranged from 0.020 ug/L to 0.059 ug/L with a mean of 0.037 ug/L.

None of the screening criteria were exceeded for individual PAHs in the 12 samples. However, PAHs were detected in the field equipment blank. Table 5B in Appendix 5 compares the PAH concentrations from the field equipment blank to the channel samples. The total PAH for the field equipment blank was 0.13 ug/L which was greater than the maximum of 0.059 ug/L for the channel samples. The laboratory blanks did not have any detectable levels of PAHs. Since there were no exceedances of screening criteria in the channel samples and there were no detections of PAHs in the laboratory blanks; PAHs are not a COC that will require further evaluation due to a detection in the field blank for the site water samples.

4.3.4 Pesticides

Of the 22 pesticides analyzed for in each sample none of the analytes were detected and all results were below the MDL, qualified "U", and reported at the RL. All dilution factors were 1 and no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. All screening criteria were exceeded for toxaphene in all samples. However, toxaphene was non-detect in all samples, qualified "U", and reported at the RL which exceeded all screening criteria. USEPA Region 6 screening criteria was exceeded for 4,4'-DDT, dieldrin, endrin, endrin aldehyde, heptachlor, and heptachlor epoxide in all samples; however each of these analytes were non-detect in all samples, qualified "U", and reported at the RL which exceeded the screening criteria.

4.3.5 PCBs

Of the 18 PCBs analyzed for in each sample, none were detected, and all results were qualified "U" and reported at the RL. All dilution factors were 1 and no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. Total PCBs were not calculated due to all results being qualified "U".

4.3.6 Dioxins and Furans

Of the 25 dioxins and furans analyzed for in each sample, 4 compounds were detected; 1,2,3,4,6,7,8 hepta CDD, OCDD, total hepta CDD, and total hexa CDF. 1,2,3,4,6,7,8 hepta CDD was only detected in 1 of the 12 samples, HSCNew-NMP-11-SW and was qualified "J". OCDD was detected in 5 of the 12 samples, HSCNew-NMP-01-SW, -NMP-05-SW, -NMP-06-SW, -NMP-07-SW, -NMP-08-SW, and was qualified "J". Total hepta CDD was detected in 4 of the 12 samples, HSCNew-NMP-05-SW, -NMP-09-SW, -NMP-10-SW, -NMP-11-SW, and was qualified "J". Total hexa CDF was only detected in 1 of the 12 samples, HSCNew-NMP-011-SW, and was qualified "J". The remaining analytes for the rest of the samples were below the MDL, qualified "U", and reported at the RL. All dilution factors were 1 and no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range.

The total toxic equivalency (TEQ) value for dioxins and furans was calculated by using the 2005 World Health Organization (WHO) (Toxic Equivalency Factors (TEF) values (Van den Berg et al; 2006). Concentrations for detected analytes were multiplied by the TEF (where applicable) to calculate a TEQ (Table 5C of Appendix 5). The total TEQ was calculated as the sum of all individual TEQs for each sample. The samples that were detected for total hepta CDD and total hexa CDF were not included in the TEQ calculation due to the lack of a published TEF value. The total TEQ ranged from 0 pg/L to 0.094 pg/L with a mean of 0.011 pg/L. There are no screening criteria for dioxins and furans.

4.3.7 Metals

Of the 16 metals analyzed for in each sample, 3 analytes (cadmium, selenium, and thallium) were non-detects (below the MDL), qualified "U" and reported at the RL in all samples. The remaining 13 analytes (antimony, arsenic, barium, beryllium, chromium (total), chromium (3+), chromium (6+), copper, lead, mercury, nickel, silver, and zinc) were detected above the MDL in one or more site water samples. Three of the 16 analytes (copper, silver and zinc) exceeded published screening criteria and are discussed

below. Samples were diluted 10X for analysis of antimony, arsenic, barium, beryllium, cadmium, chromium (total), copper, lead, nickel, selenium, silver, thallium, zinc, 1X for chromium (3+), and 2X for chromium (6+) and mercury.

Copper was detected in all 12 samples and was "J" qualified in all samples. The detected concentration for HSCNew-NMP-11-SW (4.6 ug/L) exceeded the USEPA Region 6 screening criteria of 3.6 ug/L. All remaining samples were below the USEPA Region 6 screening criteria. TSWQS, USEPA WQC, and NOAA screening criteria were not exceeded by any of the samples.

Silver was detected in 6 of the 12 samples; HSCNew-NMP-01-SW, -NMP-02-SW, -NMP-03-SW, -NMP-09-SW, -NMP-10-SW, -NMP-03-SW-Field Dup. Detections were above the MDL but below the RL and qualified "J", except for sample HSCNew-NMP-01-SW which did not have a qualifier. Detected concentrations ranged from 0.9 ug/L to 9.2 ug/L with a mean of 2.8 ug/L. Detected silver concentrations in two samples, HSCNew-NMP-01-SW (9.2 ug/L) and HSCNew-NMP-09-SW (3.2 ug/L), exceeded the screening criteria for TSWQS (2 ug/L) and USEPA WQC (1.9 ug/L). Detected silver concentrations in 5 samples, HSCNew-NMP-01-SW (9.2 ug/L), -NMP-02-SW (1.3 ug/L), -NMP-09-SW (3.1 ug/L), -NMP-10-SW (1.2 ug/L), -NMP-03-SW-Field Dup (1.3 ug/L), exceeded the screening criteria for NOAA (0.95 ug/L). Reported concentrations of silver for non-detect samples were qualified "U", and reported at the RL (5 ug/L) which exceeded the TSWQS, USEPA WQC, and NOAA screening criteria.

Zinc was detected in all 12 samples and was above the MDL and not qualified in any sample. None of the samples exceeded the TSWQS screening criteria of 92.7 ug/L. HSCNew-NMP-06-SW (91 ug/L) exceeded the screening criteria for both USEPA WQC (90 ug/L) and NOAA (90 ug/L). The detected concentration for 3 samples, HSCNew-NMP-06-SW (91 ug/L), -NMP-07-SW (88 ug/L), -NMP-11-SW (86 ug/L), exceed the screening criteria for USEPA Region 6 (84.2 ug/L).

4.3.8 Miscellaneous

Cyanide was non-detect, qualified "U", and reported at the RL (10 ug/L) for all 12 samples; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. The dilution factor was 1 for all samples. Chlorine was identified as an interference in the samples that can decompose cyanides; therefore, the results may have a low bias. The reported concentrations exceeded the screening criteria for USEPA WQC (1.0 ug/L), NOAA (1.0 ug/L), and USEPA Region 6 (5.6 ug/L). There is not a TSWQS for cyanide.

Dissolved organic carbon (DOC) was non-detect, qualified "U", and reported at the RL of 0.01% for all 4 replicates for all samples except HSCNew-NMP-04-SW. The DOC of the 1st replicate for HSCNew-NMP-04-SW was 0.039 % and qualified "J". There are no screening criteria for DOC. The dilution factor for DOC was 100 in all samples.

The total suspended solids (TSS) concentrations ranged from 6,400 ug/L to 18,700 ug/L with a mean of 10,827 ug/L. There are no screening criteria for TSS.

Total organic carbon (TOC) in each sample was analyzed in 4 replicates with the individual replicates and mean reported in the summary tables. The range of the mean was 0.0038 % to 0.010 % with an overall mean of 0.0090 %. Replicates that were non-detect were qualified "U" and reported at the RL (0.010%). All detections were qualified "J". There are no screening criteria for TOC. The dilution factor for TOC was 100 in all samples.

Ammonia (NH_3-N) was detected in every sample with a range of 115 ug/L to 320 ug/L. The mean ammonia concentration was 254 ug/L. There are no screening criteria for ammonia. The dilution factor was 1 for all samples; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range.

Sulfide was detected in two of the 12 samples, HSCNew-NMP-03-SW (5.26 ug/L) and HSCNew-NMP-03-SW-Field Dup (2.62 ug/L) and qualified "J". The remaining samples were non-detect, qualified "U", and reported at the RL (10 ug/L). There are no screening criteria for sulfide. The dilution factor was 1 for all samples; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range.

4.3.9 Petroleum Hydrocarbons

Petroleum hydrocarbons were analyzed using method TNRRC 1005 which has a MDL of 5000 ug/L and did not meet the TDL of 100 ug/L. The analysis included 4 groups of hydrocarbons: C6-C35, C6-C12, >C12-C28, and >C28-C35. Each group is reported in the summary table (Table5A of Appendix 5). The only detected hydrocarbons were for C6-C12 hydrocarbons in samples HSCNew-NMP-01-SW, -NMP-10-SW, and -NMP-03-SW-Field Dup and were "J" qualified. All other samples and analytes were non-detect, qualified "U", and reported at the RL. The dilution factor was 1 for all samples; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. Potential low bias was observed for the TPH samples since the RL was an order of magnitude greater than the TDL.

4.3.10 Summary

Below is a brief summary of the chemical analysis for the NMP site water samples.

- Screening criteria were not exceeded in any of the samples for VOCs, PAHs, and PCBs.
- USEPA Region 6 screening criteria was exceeded by all samples for 2 compounds, hexachlorobutadiene and hexachlorocyclopentadiene. Results for both compounds were below the MDL, qualified, "U", and reported at the RL, which exceeded screening criteria. There were no other exceedances of screening criteria for SVOCs.
- There were no pesticides detected in any of the samples. All analytical results for pesticides were below the MDL, qualified "U", and reported at the RL for all samples. USEPA Region 6 screening criteria was exceeded by 7 compounds, 4,4'-DDT, dieldrin, endrin, endrin aldehyde, heptachlor, heptachlor epoxide and toxaphene, in all samples which were qualified "U" and reported at the RL. Screening criteria for toxaphene for TSWQS, USEPA WQC, and NOAA was exceeded by all samples which were qualified "U" and reported at the RL.

- Dioxins and furans were detected in 8 samples. Total TEQ was calculated using results from non-"U" qualified data and ranged from 0.010 pg/L to 0.094 pg/L. There are no screening criteria for dioxins and furans.
- USEPA Region 6 screening criteria was exceeded by 1 sample for copper and 3 samples for zinc. NOAA screening criteria was exceeded by 11 samples for silver and 1 sample for zinc. USEPA WQC was exceeded by 8 samples for silver and 1 sample for zinc. TSWQS screening criteria was exceeded by 8 samples for silver. Screening criteria for antimony, arsenic, barium, beryllium, cadmium, chromium (total), chromium (3+), chromium (6+), lead, mercury, nickel, selenium, and thallium was not exceeded by any of the samples.
- Cyanide was not detected in any of the samples, qualified, "U", and reported at the RL. The RL exceeded the screening criteria for USEPA WQC, NOAA, and USEPA Region 6. There are no TSWQS for cyanide.

4.4 Sediment Chemistry

A full chemical analysis for sediment, as well as site water and modified elutriate samples, were required as discussed in Section 2.5 of the USACE SAP (2018). A data summary of detections within the chemical analyses for sediment samples are presented in Table 6 and are compared to published screening criteria as defined in Section 5.2.2 of the SAP. The prioritization of the screening criteria are as follows: (1) NOAA Marine ER-L, (2) NOAA Marine ER-M, and (3) USEPA Region 6 Marine. An all-inclusive data summary table with comparisons to screening criteria is presented in Table 5D of Appendix 5.

4.4.1 VOCs

Of the 51 VOCs analyzed for in each sample, 8 compounds (1,3-dichlorobenzene, acetone, benzene, ethylbenzene, methylcyclohexane, o-xylene, m&p-xylene, toluene) were detected in one or more samples. There were no detections of VOCs for 4 samples, HSCNew-NMP-01-SD, -NMP-03-SD, -NMP-10-SD, and -NMP-03-SD-Field Dup. 1,3-Dichlorobenzene was detected in 2 of the 12 samples, HSCNew-NMP-02-SD and HSCNew-NMP-04-SD, and "U" qualified and reported at the RL in all other samples. Eight samples had detections for acetone, HSCNew-NMP-02-SD, -NMP-04-SD, -NMP-05-SD, -NMP-06-SD, -NMP-07-SD, -NMP-08-SD, -NMP-09-SD, -NMP-11-SD, and the remaining samples were "U" qualified and reported at the RL. Benzene was detected in 3 of the 12 samples, HSCNew-NMP-02-SD, -NMP-04-SD, and -NMP-08-SD. Benzene was not detected, "U" qualified, and reported at the RL in all other samples. Ethylbenzene was detected in 4 of the 12 samples, HSCNew-NMP-02-SD, -NMP-04-SD, -NMP-07-SD and- NMP-08-SD. Ethylbenzene was not detected, "U" qualified, and reported at the RL in all other samples. HSCNew-NMP-08-SD was the only sample with detections of methylcyclohexane and o-xylene. Two of the 12 samples, HSCNew-NMP-04-SD and HSCNew-NMP-08-SD, had detections for m&p xylene, and the remaining samples were "U" qualified and reported at the RL. Toluene was detected in 2 of the 12 samples, HSCNew-NMP-02-SD and HSCNew-NMP-08-SD. Toluene was not detected, "U" qualified, and reported at the RL in all other samples. For all other VOCs, the concentrations were non-detect, "U" qualified, and reported at the RL and below the TDL. The dilution factor for all samples was 1; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. None of the screening criteria were exceeded for VOCs.

4.4.2 SVOCs

Of the 43 SVOCs analyzed for in each sample, 6 compounds (1,3-dichlorobenzene, bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, diethyl phthalate, di-methyl phthalate, and hexachlorobutadiene) were detected in the samples. 1,3-Dichlorobenzene was only detected in one sample, HSCNew-NMP-02-SD, and was "J" qualified. In the remaining 11 samples, 1,3-Dichlorobenzene was not detected, "U" qualified, and reported at the RL. Bis(2-ethylhexyl) phthalate was detected in all 12 samples, and was "J" qualified in samples HSCNew-NMP-03-SD and HSCNew-NMP-03-SD-Field Dup. Bis(2-ethylhexyl) phthalate was above the USEPA Region 6 marine screening criteria (182 ug/kg) for 10 of the 12 samples with a concentration range of 229 ug/kg to 2,240 ug/kg. Butyl benzyl phthalate was detected in 2 of the 12 samples, HSCNew-NMP-09-SD and HSCNew-NMP-11-SD, and was "J" qualified. Butyl benzyl phthalate was not detected, "U" qualified, and reported at the RL in the remaining 10 samples. Diethyl phthalate was only detected in one sample, HSCNew-NMP-09-SD and was "J" qualified, and the remaining samples were non-detect, "U" qualified, and reported at the RL. Di-methyl phthalate was only detected in one sample, HSCNew-NMP-11-SD, and was "J" qualified, and the remaining samples were non-detect, "U" qualified, and reported at the RL. Hexachlorobutadiene was detected in 2 of the 12 samples, HSCNew-NMP-01-SD and HSCNew-NMP-02-SD. Hexachlorobutadiene was not detected, "U" qualified, and reported at the RL in the remaining 10 samples. All remaining SVOCs in all samples were below the MDL, "U" qualified, and reported at the RL. The dilution factor for all samples was 1; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. Low bias was suspected for aniline due to matrix interferences based on the quality control samples however, aniline was non-detect in all samples. The only screening criteria exceeded for SVOCs was the USEPA Region 6 criteria for bis(2-ethylhexyl) phthalate as discussed above.

4.4.3 PAHs

All 17 PAHs were detected in one or more samples. The reported concentrations for 13 of the 17 analytes exceeded the NOAA ER-L and USEPA Region 6 marine screening criteria for at least one of the samples. The reported concentrations for 3 of the analytes (acenaphthene, fluorene, phenanthrene) exceeded the screening criteria for NOAA ER-M marine screening levels, in addition to NOAA ER-L and USEPA Region 6 criteria. A discussion of each exceedance is provided below. The dilution factor for all samples was 1; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range.

Acenaphthene was detected in all samples except HSCNew-NMP-03-SD which was below the MDL, "U" qualified, and reported at the RL. Detected concentrations ranged from 5.7 ug/kg to 683 ug/kg with a mean of 216 ug/kg. Detected concentrations exceeded the NOAA ER-L and USEPA Region 6 marine screening criteria of 16 ug/kg for 9 samples: HSCNew-NMP-02-SD, -NMP-04-SD, -NMP-05-SD, -NMP-06-SD, -NMP-07-SD, -NMP-08-SD, -NMP-09-SD, -NMP-10-SD, and -NMP-11-SD. HSCNew-NMP-08-SD exceeded the NOAA ER-M screening criteria of 500 ug/kg with a detected concentration of 683 ug/kg.

Acenaphthylene was detected in all 12 samples and was "J" qualified in HSCNew-NMP-03-SD and HSCNew-NMP-03-SD-Field Dup. Detected concentrations ranged from 2.2 ug/kg to 92 ug/kg with a mean

of 38 ug/kg. Detected concentrations exceeded the NOAA ER-L and USEPA Region 6 marine screening criteria of 44 ug/kg in 4 samples: HSCNew-NMP-02-SD, -NMP-04-SD, -NMP-08-SD, and -NMP-011-SD.

Anthracene was detected in all samples except HSCNew-NMP-03-SD which was below the MDL, "U" qualified, and reported at the RL. Detected concentrations ranged from 12 ug/kg to 733 ug/kg with a mean of 194 ug/kg. Detected concentrations exceeded the NOAA ER-L and USEPA Region 6 marine screening criteria of 85.3 ug/kg for 6 samples: HSCNew-NMP-04-SD, -NMP-07-SD, -NMP-08-SD, -NMP-09-SD, -NMP-10-SD, and -NMP-11-SD.

Benzo(a)anthracene was detected in all 12 samples. Detected concentrations ranged from 8.0 ug/kg to 902 ug/kg with a mean of 357 ug/kg. Detected concentrations exceeded the NOAA ER-L and USEPA Region 6 marine screening criteria of 261 ug/kg for 7 samples: HSCNew-NMP-04-SD, -NMP-06-SD, -NMP-07-SD, -NMP-08-SD, -NMP-09-SD, -NMP-10-SD, and -NMP-11-SD.

Benzo(a)pyrene was detected in all 12 samples. Detected concentrations ranged from 8.9 ug/kg to 709 ug/kg with a mean of 269 ug/kg. Detected concentrations exceeded the NOAA ER-L and USEPA Region 6 marine screening criteria of 430 ug/kg for 3 samples: HSCNew-NMP-04-SD, -NMP-07-SD, and -NMP-10-SD.

Benzo(b)fluoranthene, benzo(e)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, and indeno(1,2,3-c,d)pyrene were detected in one or more samples. These analytes were detected with no qualifier in all samples and do not have NOAA or USEPA Region 6 marine screening criteria for comparison.

Chrysene was detected in all 12 samples. Detected concentrations of chrysene ranged from 7.0-ug/kg to 850-ug/kg with a mean of 337 ug/kg. Detected concentrations exceeded the NOAA ER-L and USEPA Region 6 marine screening criteria of 384 ug/kg in 5 samples: HSCNew-NMP-04-SD, -NMP-07-SD, -NMP-08-SD, -NMP-10-SD, and -NMP-11-SD.

Dibenzo(a,h)anthracene was detected in all of the samples except HSCNew-NMP-03-SD which was below the MDL, "U" qualified, and reported at the RL. Reported concentrations for samples HSCNew-NMP-01-SD, -NMP-02-SD, and -NMP-03-SD-Field Dup were detected above the MDL and "J" qualified. Detected concentrations ranged from 4.1 ug/kg to 153 ug/kg with a mean of 58 ug/kg. Dibenzo(a,h,)anthracene was above the NOAA ER-L and USEPA Region 6 marine screening criteria of 63.4 ug/kg for 4 samples: HSCNew-NMP-04-SD, -NMP-06-SD, -NMP-07-SD and –NMP-10-SD.

Fluoranthene was detected in all 12 samples. Detected concentrations of fluoranthene ranged from 14 ug/kg to 1830 ug/kg with a mean of 861 ug/kg. The NOAA ER-L and USEPA Region 6 marine screening criteria of 600 ug/kg was exceeded in 7 samples: HSCNew-NMP-04-SD, -NMP-06-SD, -NMP-07-SD, -NMP-08-SD, -NMP-09-SD, -NMP-10-SD, and -NMP-11-SD.

Fluorene was detected in all 12 samples except for HSCNew-NMP-03-SD which was below the MDL, "U" qualified, and reported at the RL. Detected concentrations of fluorene ranged from 5.3 ug/kg to 614 ug/kg with a mean of 220 ug/kg. The NOAA ER-L and USEPA Region 6 marine screening criteria of 19 ug/kg was

exceeded in 9 samples: HSCNew-NMP-02-SD, -NMP-04-SD, -NMP-05-SD, -NMP-06-SD, -NMP-07-SD, -NMP-08-SD, -NMP-09-SD, -NMP-10-SD, and -NMP-11-SD. The NOAA ER-M of 540 ug/kg was exceeded in 2 samples, HSCNew-NMP-08-SD and HSCNew-NMP-09-SD.

Naphthalene was detected in all 12 samples except for HSCNew-NMP-03-SD-Field Dup which was below the MDL, "U" qualified, and reported at the RL. Naphthalene was detected and "J" qualified in sample HSCNew-NMP-03-SD. The detected concentrations for naphthalene ranged from 2.1 ug/kg to 463 ug/kg with a mean of 81 ug/kg. The NOAA ER-L and USEPA Region 6 marine screening criteria of 160 ug/kg was exceeded in sample HSCNew-NMP-10-SD.

Phenanthrene was detected in all 12 samples and was "J" qualified in HSCNew-NMP-03-SD. Detected concentrations of phenanthrene ranged from 4.6 ug/kg to 1860 ug/kg with a mean of 665 ug/kg. The NOAA ER-L and USEPA Region 6 marine screening criteria of 240 ug/kg was exceeded in 7 samples: HSCNew-NMP-04-SD, -NMP-06-SD, -NMP-07-SD, -NMP-08-SD, -NMP-09-SD, -NMP-10-SD, -NMP-11-SD. Samples HSCNew-NMP-08-SD and -NMP-09-SD exceeded the NOAA ER-M marine screening criteria of 1500 ug/kg.

Pyrene was detected in all 12 samples. Detected concentrations ranged from 19 ug/kg to 1,480 ug/kg with a mean of 798 ug/kg. The NOAA ER-L and USEPA Region 6 marine screening criteria of 665 ug/kg was exceeded in 7 samples: HSCNew-NMP-02-SD, -NMP-04-SD, -NMP-07-SD, -NMP-08-SD, -NMP-09-SD, -NMP-10-SD, and -NMP-11-SD.

Total PAHs were calculated by the laboratory and concentrations ranged from. 108 ug/kg to 11,200 ug/kg with a mean of 5,378 ug/kg. The NOAA ER-L and USEPA Region 6 marine screening criteria of 4,022 ug/kg was exceeded in 7 samples: HSCNew-NMP-04-SD, -NMP-06-SD, -NMP-07-SD, -NMP-08-SD, -NMP-09-SD, -NMP-10-SD, and -NMP-11-SD.

4.4.4 Pesticides

Out of the 22 individual pesticides analyzed for in each sample, 11 analytes were detected in one or more samples. The eleven detected analytes were 4,4'-DDD, 4-4'-DDE, 4,4'-DDT, Aldrin, alpha-BHC, dieldrin, gamma-BHC, alpha-chlordane, gamma-chlordane, oxychlordane, and trans-nonachlor. The remaining 12 analytes were below the MDL, "U" qualified, and reported at the RL for all samples. Detections and exceedances are discussed below. The dilution factor for all samples was 1.27.

4,4'-DDD was detected in all 12 samples. Detected concentrations ranged from 0.59 ug/kg to 10 ug/kg with a mean of 3.6 ug/kg. The NOAA ER-L (2 ug/kg) and USEPA Region 6 (1.22 ug/kg) marine screening criteria were exceeded in 9 samples: HSCNew-NMP-02-SD, -NMP-04-SD, -NMP-05-SD, -NMP-06-SD, -NMP-07-SD, -NMP-08-SD, -NMP-10-SD, -NMP-11-SD, and -NMP-03-SD-Field Dup. Sample HSCNew-NMP-10-SD, 1.8 ug/kg, was the only sample to exceed the USEPA Region 6 marine screening criteria and not the NOAA ER-L screening criteria.

4,4'-DDE was detected in all 12 samples. Detected concentrations ranged from 0.30 ug/kg to 15 ug/kg with a mean of 5.0 ug/kg. The NOAA ER-L (2.2 ug/kg) and USEPA Region 6 (2.07 ug/kg) marine screening

criteria were both exceeded in 7 samples: HSCNew-NMP-02-SD, -NMP-04-SD, -NMP-05-SD, -NMP-06-SD, -NMP-07-SD, -NMP-08-SD, -NMP-11-SD.

4,4'-DDT was detected in 4 samples. Samples, HSCNew-NMP-01-SD, -NMP-02-SD, -NMP-06-SD, -NMP-07-SD, -NMP-09-SD, -NMP-10-SD, -NMP-11-SD, and -NMP-03-SD-Field Dup were below the MDL, "U" qualified, and reported at the RL. Sample HSCNew-NMP-03-SD was the only sample with a "J" qualified detected concentration. Detected concentrations ranged from 0.082 ug/kg to 9.3 ug/kg with a mean of 4.2 ug/kg. Samples HSCNew-NMP-04-SD, -NMP-05-SD, and -NMP-08-SD exceeded the NOAA ER-L and USEPA Region 6 marine screening criteria of 1 ug/kg and 1.19 ug/kg, respectively. Sample HSCNew-NMP-04 (9.27 ug/kg) was the only sample above the NOAA ER-M of 7 ug/kg.

Dieldrin was only detected in 1 sample, HSCNew-NMP-03-SD-Field Dup (0.79 ug/kg). All remaining samples were below the MDL, "U" qualified, and reported at the RL. The RL for dieldrin was above the NOAA ER-L of 0.02 ug/kg but below the USEPA Region 6 marine screening criteria of 0.715 ug/kg. Sample HSCNew-NMP-03-SD-Field Dup was above both the NOAA ER-L and USEPA Region 6 marine screening criteria.

Gamma-BHC was detected in 4 samples, HSCNew-NMP-02-SD, -NMP-05-SD, -NMP-06-SD, and -NMP-07-SD. All remaining samples were below the MDL, "U" qualified, and reported at the RL. The detected concentrations ranged from 0.42 ug/kg to 0.86 ug/kg with a mean of 0.71 ug/kg. All detections were all above the USEPA Region 6 marine screening criteria of 0.32 ug/kg.

Alpha-chlordane was detected in 7 samples and was "J" qualified for 1 sample HSCNew-NMP-01-SD. The remaining 5 samples were below the MDL, "U" qualified, and reported at the RL. The detected concentrations ranged from 0.045 ug/kg to 1.9 ug/kg with a mean of 1.1 ug/kg. Six of these detections, HSCNew-NMP-06-SD, -NMP-07-SD, -NMP-08-SD, -NMP-09-SD, -NMP-10-SD, and -NMP-11-SD exceeded the NOAA ER-L screening criteria of 0.5 ug/kg.

Gamma-chlordane was detected in 3 samples, HSCNew-NMP-02-SD, -NMP-03-SD, and -NMP-09-SD, and was "J" qualified in HSCNew-NMP-03-SD. The remaining 9 samples were below the MDL, "U" qualified, and reported at the RL. The NOAA ER-L marine screening criteria of 0.5 ug/kg was exceeded by both HSCNew-NMP-02-SD and HSCNew-NMP-09-SD with concentrations of 2.2 ug/kg and 1.2 ug/kg, respectively.

Oxychlordane was only detected in 1 sample, HSCNew-NMP-02-SD, and was "U" qualified and reported at the RL for the remaining samples. The NOAA ER-L (0.5 ug/kg) and USEPA Region 6 (2.26 ug/kg) marine screening criteria were exceeded with a concentration of 3.61 ug/kg.

Trans-nonachlor was detected in 4 samples, HSCNew-NMP-06-SD, -NMP-09-SD, -NMP-10-SD, and -NMP-11-SD. The remaining samples were not detected, "U" qualified, and reported at the RL. The detected concentrations ranged from 0.61 ug/kg to 1.4 ug/kg with a mean of 1.0 ug/kg. The NOAA ER-L screening criteria of 0.5 ug/kg was exceed by all 4 samples..

4.4.5 PCBs

Of the 18 PCB congeners analyzed for in each sample, there were detections of each in at least 1 sample, expect for PCB 169 which was below the MDL, "U" qualified, and reported at the RL in all samples. The dilution factor for all samples was 1.27. Total calculated PCB congeners was determined and calculated by the laboratory. The total calculated PCB congeners concentration ranged from 2.7 ug/kg to 74 ug/kg with a mean concentration of 34 ug/kg. The NOAA ER-L and USEPA Region 6 marine screening criteria of 22.7 ug/kg was exceed in 7 of the samples: HSCNew-NMP-02-SD, NMP-04-SD, -NMP-05-SD, -NMP-06-SD, -NMP-07-SD, -NMP-08-SD, and -NMP-11-SD.

4.4.6 Dioxins and Furans

All 25 dioxins and furans were detected in one or more samples. The dilution factor for all samples was 1; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. Potential low bias was observed for dioxins and furans based on the quality control parameters. The total TEQ for dioxins and furans was calculated by using the 2005 WHO TEF values (Van den Berg et al; 2006) (Appendix 5 Table 5E). The concentrations for detected analytes were multiplied by the TEF and converted TEF values were summed to calculate a total TEQ. The total TEQ ranged from 2.8 pg/g to 1,370 pg/g with a mean of 161 pg/g.

4.4.7 Metals

Each of the 16 metals were detected in every sample. Chromium(+6) was the only analyte to be "J" qualified for all 12 samples. Six of the 16 analytes (cadmium, copper, lead, mercury, nickel, and zinc) exceeded published screening criteria for NOAA ER-L and USEPA Region 6 and are discussed below. No samples exceeded the NOAA ER-M marine screening criteria. Barium was qualified "MB-02" and "B" for all 12 samples and silver was qualified "B" for all 12 samples. MB-02 is defined as "the method blank contains the analyte at a concentration above the method reporting limit (MRL) due to memory interferences." The "B" qualifier is defined as "analyte is detected in the associated laboratory blank as well as in the sample." More detail on the laboratory qualifiers and the impacts on the data was addressed in Section 3.2.2.6. Some low bias was possibly observed for the results of antimony due to matrix interferences. There could be a potential for high bias for silver in the sediment samples due to an elevated RPD value. Dilution factors for chromium (3+) and chromium 6(+) were 1. All other dilution factors were greater than 1.

Cadmium was detected in all 12 samples. Detected concentrations ranged from 0.058 mg/kg to 2.1 mg/kg with a mean of 0.61 mg/kg. The highest concentration was in sample HSCNew-NMP-04-SD and exceeded the NOAA ER-L and USEPA Region 6 marine screening criteria of 1.2 mg/kg. All other samples had detections below screening criteria.

Copper was detected in all 12 samples. Detected concentrations ranged from 4.6 mg/kg to 40 mg/kg with a mean of 19 mg/kg. The highest concentration was in sample HSCNew-NMP-04-SD and exceeded the NOAA ER-L and USEPA Region 6 marine screening criteria of 34 mg/kg. All other samples had detections below screening criteria.

Lead was detected in all 12 samples. Detected concentrations ranged from 8.4 mg/kg to 81 mg/kg with a mean of 39 mg/kg. The highest concentration was in sample HSCNew-NMP-04-SD. The NOAA ER-L and USEPA Region 6 marine screening criteria of 46.7 mg/kg was exceeded by 4 samples, HSCNew-NMP-04-SD, -NMP-06-SD, -NMP-07-SD, and -NMP-08-SD. All other samples had detections below screening criteria.

Mercury was detected in all 12 samples. Detected concentrations ranged from 0.012 mg/kg to 0.41 mg/kg with a mean of 0.15 mg/kg. The highest concentration was in sample HSCNew-NMP-04-SD. The NOAA ER-L and USEPA Region 6 marine screening criteria of 0.15 mg/kg was exceeded by 5 samples, HSCNew-NMP-01-SD, -NMP-02-SD, -NMP-04-SD, -NMP-07-SD, and -NMP-08-SD. All other samples had detections below screening criteria.

Nickel was detected in all 12 samples. Detected concentrations ranged from 7.0 mg/kg to 26 mg/kg with a mean of 15 mg/kg. The highest concentration was in sample HSCNew-NMP-04-SD. The NOAA ER-L and USEPA Region 6 marine screening criteria of 20.9 mg/kg was exceeded by 2 samples, HSCNew-NMP-04-SD and HSCNew-NMP-09-SD. All other samples had detections below screening criteria.

Zinc was detected in all 12 samples. Detected concentrations ranged from 20 mg/kg to 237 mg/kg with a mean of 107 mg/kg. The NOAA ER-L and USEPA Region 6 marine screening criteria of 150 mg/kg was exceeded in 2 samples, HSCNew-NMP-04-SD and HSCNew-NMP-07-SD. All other samples had detected concentrations below the screening criteria.

4.4.8 Miscellaneous

Cyanide was non-detect, qualified “U”, and reported at the RL for all 12 samples. The dilution factor for all samples was 1; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range.

Acid volatile sulfide was detected in all 12 samples with a concentration range of 27 mg/kg to 1,130 mg/kg. The mean sulfide concentration was 320 mg/kg and the maximum concentration was in sample HSCNew-NMP-04-SD. The dilution factor for all samples was 100.

Volatile solids were detected in all 12 samples with a concentration range from 10,600 mg/kg to 62,600 mg/kg with a mean of 39,050 mg/kg. The maximum concentration was in sample HSCNew-NMP-04-SD.

TOC in each sample was analyzed in four replicates with the minimum, maximum, and mean reported in the summary tables. The range of the mean was 0.15 % to 0.61 % with an overall mean of 0.38 %. The dilution factor for samples HSCNew-NMP-01-SD , -NMP-02-SD, and -NMP-04-SD was 10. The dilution factor for sample HSCNew-NMP-03-SD was 4 and the dilution factor for the remaining 8 samples was 5. There is a possible high bias for the TOC data due to the elevated MS/MSD recoveries.

Ammonia (NH_3-N) was detected in every sample with a concentration range of 13 mg/kg to 235 mg/kg. The mean ammonia concentration was 124 mg/kg, and the maximum concentration was in sample HSCNew-NMP-07-SD. The dilution factor for all samples was 10.

4.4.9 Petroleum Hydrocarbons

Petroleum hydrocarbons were analyzed using method TNRRC 1005, which has a MDL of 9 mg/kg and did not meet the TDL of 5 mg/kg. The analysis included 4 groups of hydrocarbons (C6-C35, C6-C12, >C12-C28, and >C28-C35), and each group is reported in the summary table (Table 5D of Appendix 5). All four hydrocarbon groups were detected in all samples. The range of concentrations for C6-C35 was 24 mg/kg to 1,133 mg/kg with a mean of 237 mg/kg. The range of concentrations for C6-C12 was 7.3 mg/kg to 94 mg/kg with a mean of 23 mg/kg. The range of concentrations for >C28-C35 was 11 mg/kg to 140 mg/kg with a mean of 49 mg/kg. The range of concentrations for >C12-C28 was 7.3 mg/kg to 870 mg/kg with a mean of 168 mg/kg.

4.4.10 Summary

Below is a brief summary of the chemical analysis for the NMP sediment samples.

- Screening criteria was not exceeded by any of the samples for VOCs.
- USEPA Region 6 screening criteria was exceeded by 8 samples for bis(2-ethylhexyl) phthalate. No other screening criteria were exceeded for SVOCs.
- NOAA ER-L and USEPA Region 6 screening criteria were exceeded by 1 or more samples for all analytes except, benzo(b)fluoranthene, benzo(e)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, and indeno(1,2,3-c,d)pyrene which do not have screening criteria. NOAA ER-M screening criteria was exceeded by 1 or more samples for acenaphthene, fluorene, and phenanthrene. All PAHs were detected in 1 or more samples.
- NOAA ER-L and USEPA Region 6 screening criteria were exceeded by 1 or more samples for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin. In addition, UEPA Region 6 screening criteria was exceeded for gamma-BHC (lindane) in 1 or more samples. NOAA ER-M screening criteria was exceeded for 4,4'-DDT for one or more samples.
- NOAA ER-L and USEPA Region 6 screening criteria for total PCB congeners was exceeded by 7 samples.
- NOAA ER-L and USEPA Region 6 screening criteria were exceeded by 1 or more samples for cadmium, copper, lead, mercury, nickel and zinc.

4.5 Modified Elutriate Chemistry

A full chemical analysis for modified elutriate, as well as sediment and site water samples were analyzed as required in Section 2.5 of the USACE SAP (2018). A data summary of detections within the chemical analyses for modified elutriate samples are presented in Table 7 and are compared to published water quality criteria as defined in Section 5.2.1 of the SAP. An all-inclusive data summary table with comparisons to water quality criteria is presented in Appendix 5 Table 5F. The prioritization of the screening criteria are as follows: (1) TSWQS (marine - acute); (2) USEPA WQC (marine – acute); (3) NOAA

(marine – acute); (4) USEPA Region 6 (marine). One exception to this prioritization, copper was, first screened against the USEPA Region 6 marine chronic criteria for copper (3.6 ug/L) which is protective of oyster waters then followed by TSWQS. The TSWQS (2014) are the primary screening criteria used for the modified elutriate samples since the state of Texas is the regulatory authority granting the water quality certification for the placement area (PA) discharge.

4.5.1 VOCs

Of the 51 VOCs analyzed for in each sample, 10 compounds (1,3-dichlorobenzene, 2-butanone, acetone, benzene, chloroform, chloromethane, methylcyclohexane, methylene chloride, o-xylene, and m&p-xylene) were detected in one or more samples. At least one of the previously listed VOCs was detected in each sample. All remaining analytes were non-detect, "U" qualified, and reported at the RL; no, matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. The dilution factor for all samples was 1. None of the screening criteria were exceeded in any of the modified elutriate samples. Detections are summarized below.

1,3-Dichlorobenzene was only detected in 1 sample, HSCNew-NMP-04-EL (0.47 ug/L), and was "J" qualified. All other samples were non-detect, qualified "U", and reported at the RL.

2-Butanone was detected in 6 samples, HSCNew-NMP-04-EL, -NMP-05-EL, -NMP-06-EL, -NMP-07-EL, -NMP-08-EL, -NMP-11-EL. Detected concentrations were "J" qualified in all samples, ranged from 3.2 ug/L to 5.6 ug/L with a mean of 4.1 ug/L. All other samples were non-detect, qualified "U", and reported at the RL.

Acetone was detected in all 12 samples except for HSCNew-NMP-03-EL, which was "U" qualified and reported at the RL. Detected concentrations of acetone ranged from 19 ug/L to 74 ug/L with a mean concentration of 45 ug/L.

Benzene was only detected in 1 sample, HSCNew-NMP-04-EL (0.47 ug/L), and was "J" qualified. All other samples were non-detect, qualified "U", and reported at the RL.

Chloroform was detected in only 1 sample, HSCNew-NMP-11-EL (0.50 ug/L). All other samples were non-detect, qualified "U", and reported at the RL.

Chloromethane was detected in 4 samples, HSCNew-NMP-06-EL, -NMP-07-EL, -NMP-09-EL, and -NMP-03-EL-Field Dup. Detected concentrations ranged from 2.1 ug/L to 3.4 ug/L with a mean of 2.8 ug/L. All other samples were non-detect, qualified "U", and reported at the RL.

Methylcyclohexane was detected in only 1 sample, HSCNew-NMP-08-EL (1.2 ug/L). All other samples were non-detect, qualified "U", and reported at the RL.

Methylene chloride was detected in all 12 samples, except HSCNew-NMP-11-EL, which was "U" qualified and reported at the RL. Detected concentrations ranged from 4.0 ug/L to 16 ug/L with a mean of 8.3 ug/L.

o-Xylene was detected in 3 samples, HSCNew-NMP-04-EL, -NMP-07-EL, and -NMP-08-EL. Detected concentrations ranged from 0.43 ug/L to 2.0 ug/L with a mean of 1.1 ug/L. o-Xylene was "J" qualified in samples HSCNew-NMP-04-EL and -NMP-07-EL. All other samples were non-detect, qualified "U", and reported at the RL.

m&p-Xylene was detected in 2 samples, HSCNew-NMP-04-EL (0.98 ug/L) and HSCNew-NMP-08-EL (0.9 ug/L), and both "J" qualified. All other samples were non-detect, qualified "U", and reported at the RL.

4.5.2 SVOCs

Of the 43 SVOCs that were analyzed for in each sample, 3 compounds were detected (1,3-dichlorobenzene, bis(2-ethylhexyl) phthalate, and di-n-butyl phthalate). All other compounds were non-detect, "U" qualified, and reported at the RL; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. The dilution factor for all samples was 1. USEPA Region 6 surface water screening criteria was exceeded for hexachlorobutadiene and hexachlorocyclopentadiene. All results for hexachlorobutadiene and hexachlorocyclopentadiene in all samples were below the MDL, qualified "U", and reported at the RL which was above the screening criteria. There were no other exceedances of any screening criteria for SVOCs. Detections are summarized below.

1,3-Dichlorobenzene was detected and "J" qualified in 2 of the 12 samples, HSCNew-NMP-02-EL (0.10 ug/L) and HSCNew-NMP-04-EL (0.15 ug/L). All other samples were non-detect, qualified "U", and reported at the RL.

Bis(2-ethylhexyl) phthalate was detected in all 12 samples and was "J" qualified in all except HSCNew-NMP-07-EL. Detected concentrations ranged from 0.1 ug/L to 1.7 ug/L with a mean of 0.27 ug/L.

Di-n-butyl phthalate was detected in all 12 samples and was "J" qualified in all except HSCNew-NMP-01-EL. Detected concentrations ranged from 0.15 ug/L to 0.68 ug/L with a mean of 0.28 ug/L.

4.5.3 PAHs

All 17 PAHs were detected in one or more modified elutriate samples. Descriptions of the detections for each analyte are provided below. Any concentrations below the MDL were qualified "U" and reported at the RL; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. All PAH analytes had a dilution factor of 1. USEPA Region 6 screening criteria was exceeded for 2 analytes, anthracene and pyrene, and exceedances are discussed below. There were no exceedances of TSWQS, USEPA WQC, or NOAA screening criteria.

Acenaphthene was detected in all 12 samples. Detected concentrations ranged from 0.0099 ug/L to 5.89 ug/L with a mean of 0.85 ug/L.

Acenaphthylene was detected in all samples except for HSCNew-NMP-03-EL, which was non-detect, qualified "U", and reported at the RL. Detected concentrations ranged from 0.0033 ug/L to 0.087 ug/L with a mean of 0.022 ug/L. Three samples, HSCNew-NMP-01-EL, -NMP-06-EL, and -NMP-03-EL-Field Dup, with detections had "J" qualified results.

Anthracene was detected in all 12 samples. Detected concentrations ranged from 0.0045 ug/L to 0.85 ug/L with a mean of 0.17 ug/L. One of the 12 detections, HSCNew-NMP-03-EL, was "J" qualified. USEPA Region 6 screening criteria of 0.18 ug/L was exceeded by two samples, HSCNew-NMP-08-EL (0.62 ug/L) and HSCNew-NMP-09-EL (0.85 ug/L).

Benzo(a)anthracene was detected in all samples except HSCNew-NMP-03-EL, which was non-detect, qualified "U", and reported at the RL. Detected concentrations ranged from 0.0022 ug/L to 0.029 ug/L with a mean of 0.015 ug/L. Four detections, HSCNew-NMP-01-EL, -NMP-02-EL, -NMP-05-EL, and -NMP-03-EL-Field Dup, were "J" qualified.

Benzo(a)pyrene was detected in all samples except HSCNew-NMP-03-EL and HSCNew-NMP-03-EL-Field Dup, which were non-detect, qualified "U", and reported at the RL. Detected concentrations range from 0.0012 ug/L to 0.0060 ug/L with a mean of 0.0032 ug/L. All detections were "J" qualified.

Benzo(b)fluoranthene was detected in 8 samples. The four samples that were non-detect, HSCNew-NMP-01-EL, -NMP-02-EL, -NMP-03-EL, and -NMP-03-EL-Field Dup, were qualified "U" and reported at the RL. Detected concentrations ranged from 0.0027 ug/L to 0.0072 ug/L with a mean of 0.0040 ug/L. All detected results were "J" qualified.

Benzo(e)pyrene was detected in all 12 samples except for HSCNew-NMP-03-EL and HSCNew-NMP-03-EL-Field Dup which were non-detect, "U" qualified, and reported at the RL. Detected concentrations ranged from 0.0018 ug/L to 0.070 ug/L with a mean of 0.0037 ug/L. All detected results were "J" qualified.

Benzo(g,h,i)perylene was detected in 7 samples. The 5 samples that were non-detect, HSCNew-NMP-03-EL, -NMP-08-EL, -NMP-09-EL, -NMP-10-EL, -NMP-03-EL-Field Dup, were "U" qualified and reported at the RL. Detected concentrations ranged from 0.0017 ug/L to 0.0031 ug/L with a mean of 0.0024 ug/L. All detected concentrations were qualified "J".

Benzo(k)fluoranthene was detected in 8 samples. The 4 samples that were non-detect, HSCNew-NMP-01-EL, -NMP-02-EL, -NMP-03-EL, and -NMP-03-EL-Field Dup, were "U" qualified and reported at the RL. Detected concentrations ranged from 0.0018 ug/L to 0.0040 ug/L with a mean of 0.0026 ug/L. All detected concentrations were "J" qualified.

Chrysene was detected in all samples. Detected concentrations ranged from 0.0014 ug/L to 0.026 ug/L with a mean of 0.014 ug/L. Samples HSCNew-NMP-01-EL, -NMP-02-EL, -NMP-03-EL, and -NMP-03-EL-Field Dup were "J" qualified.

Dibenz(a,h)anthracene was detected in one sample, HSCNew-NMP-07-EL (0.00076 ug/L) and was qualified "J". The remaining samples were non-detect, qualified "U", and reported at the RL.

Fluoranthene was detected in all 12 samples. Detected concentrations ranged from 0.017 ug/L to 0.61 ug/L with a mean of 0.21 ug/L.

Fluorene was detected in all 12 samples. Detected concentrations ranged from 0.0060 ug/L to 3.8 ug/L with a mean of 0.60 ug/L. Only 1 sample, HSCNew-NMP-03-EL, was qualified "J".

Indeno(1,2,3-c,d)pyrene was detected in all 12 samples and qualified "J". Detected concentrations ranged from 0.0052 ug/L to 0.0077 ug/L with a mean of 0.0063 ug/L.

Naphthalene was detected in all 12 samples. Six of the 12 detections, HSCNew-NMP-01-EL, -NMP-03-EL, -NMP-04-EL, -NMP-05-EL, -NMP-06-EL, -NMP-11-EL, were qualified "J". Detected concentrations ranged from 0.0029 ug/L to 0.52 ug/L with a mean of 0.072 ug/L.

Phenanthrene was detected in all 12 samples. Three of the 12 samples, HSCNew-NMP-03-EL, -NMP-06-EL, and -NMP-11-EL, were qualified "J". Detected concentrations ranged from 0.0050 ug/L to 3.8 ug/L with a mean of 0.67 ug/L.

Pyrene was detected in all 12 samples. Detected concentrations ranged from 0.017 ug/L to 0.33 ug/L with a mean of 0.14 ug/L. USEPA Region 6 screening criteria of 0.24 ug/L was exceeded by 3 samples, HSCNew-NMP-02-EL (0.33 ug/L), -NMP-08-EL (0.25 ug/L), -NMP-09-EL (0.28 ug/L).

The calculated total PAHs was determined by the laboratory. Total PAHs (calculated) ranged from 0.073 ug/L to 16 ug/L with a mean of 2.8 ug/L.

4.5.4 Pesticides

Of the 22 pesticides analyzed for in each sample no analytes were detected except for heptachlor in sample HSCNew-NMP-05-EL at 0.0060 ug/L. All other results for all samples were below the MDL, qualified "U", and reported at the RL; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analysis instrument range. The dilution factor for all samples was 1. All screening criteria were exceeded for toxaphene in all samples. However, toxaphene was non-detect in all samples, qualified "U", and reported at the RL which exceeded all screening criteria. USEPA Region 6 screening criteria was exceeded for 4,4'-DDT, dieldrin, endrin, endrin aldehyde, heptachlor, and heptachlor epoxide in all samples; each of these analytes were non-detect in all samples, qualified "U", and reported at the RL which exceeded the screening criteria.

4.5.5 PCBs

Sample HSCNew-NMP-11-EL was the only sample to have any detections of PCBs. PCB 153 and PCB 52 were both "J" qualified and detected at 0.0020 ug/L and 0.0040 ug/L respectively. None of the other samples had detected levels of PCBs and all other results were qualified "U", and reported at the RL; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analysis instrument range. The dilution factor for all samples was 1. Total PCBs were not calculated due to all results being qualified "U" except for sample HSCNew-NMP-11-EL where the total is 0.0060 ug/L and did not exceed the NOAA screening criteria of 0.033 ug/L. All results were qualified "H" which is defined as

"this sample was extracted and/or analyzed outside of the USEPA recommended holding time" and was previously discussed in Section 3.2.3.3.

4.5.6 Dioxins and Furans

Of the 25 dioxins and furans analyzed for in each sample, 9 compounds were detected: 1,2,3,4,6,7,8--hepta CDD, 2,3,7,8-tetra CDF, 2,3,7,8 –tetra CDD, OCDD, OCDF, total hepta CDD, total hepta CDF, total tetra CDD, and total tetra CDF. 1,2,3,4,6,7,8- Hepta CDD was on only detected in two samples, HSCNew-NMP-01-EL and HSCNew-NMP-07-EL, and was qualified "J". 2,3,7,8-Tetra CDD was detected in 3 samples, HSCNew-NMP-04-EL, -NMP-07-EL, -NMP-03-EL-Field Dup, and was "J" qualified. 2,3,7,8- Tetra CDF was detected in 5 samples, HSCNew-NMP-02-EL, -NMP-04-EL, -NMP-05-EL, -NMP-07-EL, -NMP-03-EL-Field Dup, and was "J" qualified in all except HSCNew-NMP-04-EL which was not qualified. OCDD was detected in 3 samples, HSCNew-NMP-01-EL, -NMP-05-EL, -NMP-08-EL, and was "J" qualified. OCDF was detected in 1 sample, HSCNew-NMP-01-EL, and was "J" qualified. Total hepta CDD was detected in 3 samples, HSCNew-NMP-01-EL, -NMP-06-EL, -NMP-07-EL, and was qualified "J". Total hepta CDF was detected in 1 sample, HSCNew-NMP-07-EL, and was "J" qualified. Total tetra CDD was detected in 3 samples, HSCNew-NMP-04-EL, -NMP-07-EL, and –NMP-03-EL-Field Dup, and was qualified "J". Total tetra CDF was detected in 5 samples, HSCNew-NMP-02-EL, -NMP-04-EL, -NMP-05-EL, -NMP-07-EL, -NMP-03-EL-Field Dup, and was "J" qualified in all except HSCNew-NMP-04-EL which was not qualified. The remaining analytes for the rest of the samples were below the MDL, qualified "U", and reported at the RL; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analysis instrument range. The dilution factor for all samples was 1. Potential low bias was observed for dioxins and furans based on the quality control parameters.

The total TEQ for dioxins and furans was calculated by using the 2005 WHO TEF values (Van den Berg et al; 2006). Concentrations for detected analytes were multiplied by the TEF to calculate a total TEQ (Appendix 5 Table 5G). The samples that were detected for total hepta CDD, total hepta CDF, total tetra CDD, and total tetra CDF were not included in the TEQ calculation due to the lack of a published TEF value. The total TEQ ranged from 0 pg/L to 10 pg/L with a mean of 1.5 pg/L. There are no screening criteria for dioxins and furans.

4.5.7 Metals

Of the 16 metals analyzed for in each sample, 5 analytes (cadmium, chromium (total), chromium (+3), chromium (+6), and thallium) were non-detects (below the MDL), qualified "U" and reported at the RL in all samples. The remaining 11 analytes (antimony, arsenic, barium, beryllium, copper, lead, mercury, nickel, selenium, silver, and zinc) were detected above the MDL in one or more samples. Four of the 16 analytes, copper, lead, silver and zinc, exceeded published screening criteria in more than one sample and are discussed below. Samples were diluted 10X for analysis of antimony, arsenic, barium, beryllium, cadmium, chromium (total), copper, lead, nickel, selenium, silver, thallium, zinc, 1X for chromium (3+), and 2X for chromium (6+) and mercury.

Copper was detected in 3 samples, HSCNew-NMP-03-EL, -NMP-10-EL, -NMP-11-EL, and qualified "J". The remaining samples were non-detect, qualified "U", and reported at the RL of 5.0 ug/L. The non-detect,

"U" qualified, samples exceeded the USEPA Region 6 (3.6 ug/L), NOAA (4.8 ug/L), and USEPA WQC (4.8 ug/L) screening criteria. TSWQS screening criteria was not exceeded by any of the samples. All detected concentrations of copper were below screening criteria.

Lead was detected in 1 sample, HSCNew-NMP-10-EL (16 ug/L), and was above the USEPA Region 6 screening criteria of 5.3 ug/L. The remaining 11 samples were non-detect, qualified "U", and reported at the RL. None of the samples exceeded the TSWQS, USEPA WQC, or NOAA screening criteria.

Silver was detected in 5 samples: HSCNew-NMP-01-EL, -NMP-02-EL, -NMP-09-EL, -NMP-10-EL, and -NMP-03-EL-Field Dup. The samples with detections were above the MDL but below the RL and qualified "J", except for HSCNew-NMP-01-EL which was not qualified. Detections ranged from 1.1 ug/L to 8.8 ug/L with a mean of 3.1 ug/L. Detected concentrations in two samples, HSCNew-NMP-01-EL (8.8 ug/L) and HSCNew-NMP-09-EL (3.2 ug/L), exceeded the screening criteria for TSWQS (2 ug/L) and USEPA WQC (1.9 ug/L). All detected concentrations exceeded NOAA screening criteria of 0.95 ug/L. Reported concentrations for non-detect samples were below the MDL, qualified "U", and reported at the RL (5 ug/L) which exceeded all screening criteria.

Zinc was detected in all 12 samples. Reported concentrations for zinc ranged from 43.7 ug/L to 184 ug/L with a mean of 83.7 ug/L. Three samples, HSCNew-NMP-08-EL (162 ug/L), -NMP-11-EL (149 ug/L), and -NMP-03-EL-Field Dup (184 ug/L), exceeded the TSWQS (92.7 ug/L), USEPA WQC (90 ug/L), NOAA (90 ug/L), and USEPA Region 6 (84.2 ug/L) screening criteria. All other sample detections were below screening criteria.

4.5.8 Miscellaneous

Cyanide was non-detect, qualified "U", and reported at the RL 10 ug/L for all 12 samples; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range. The dilution factor was 1 for all samples. The reported concentrations exceeded the screening criteria for USEPA WQC (1.0 ug/L), NOAA (1.0 ug/L), and USEPA Region 6 (5.6 ug/L). There is not a TSWQS for cyanide. All 12 samples were qualified "Cl" which is defined as "residual chlorine or other oxidizing agent was detected in the container used to analyze this sample" and resulted in a possible low bias for the samples (Section 3.2.3.6).

DOC was non-detect, qualified "U", and reported at the RL of 0.01 % for all 4 replicates for 7 of the 12 samples; HSCNew-NMP-02-EL, -NMP-04-EL, -NMP-05-EL, -NMP-06-EL, -NMP-08-EL, -NMP-11-EL, and -NMP-03-EL-Field Dup. The other five samples had at least one detection in the 4 replicates for the DOC analysis. All detected results were "J" qualified. The overall mean DOC concentration for these 5 samples was below the calculated MDL, "U" qualified, and reported at the RL. The only sample with a calculated mean DOC was HSCNew-NMP-09-EL at 0.0035 % which was "J" qualified. There are no screening criteria for DOC. The dilution factor for DOC was 100 in all samples.

The total suspended solids (TSS) concentrations ranged from 5,710 ug/L to 43,000 ug/L with a mean of 16,784 ug/L. The maximum concentration was 43,000 ug/L in sample HSCNew-NMP-04-EL.

TOC in each sample was analyzed in 4 replicates with the individual replicates and mean reported in the summary table (Table 5G of Appendix 5). The range of the mean was 0.0035 % to 0.010 % with an overall mean of 0.0069 %. Replicates that were non-detect were qualified "U" and reported at the RL, 0.01 %. All samples with detections were qualified "J". There are no screening criteria for TOC. The dilution factor for TOC was 100 in all samples.

Ammonia (NH_3-N) was detected in every sample with a concentration range of 1,530 ug/L to 27,800 ug/L. The mean concentration was 13,599 ug/L, and the maximum concentration was in sample HSCNew-NMP-07-EL at 27,800 ug/L. There are no screening criteria for ammonia. The dilution factor was 20 for all samples.

Sulfide was detected in two of the 12 samples, HSCNew-NMP-04-EL (4.4 ug/L) and HSCNew-NMP-07-EL (3.0 ug/L). The remaining samples were non-detect, qualified "U", and reported at the RL (10 ug/L). There are no screening criteria for sulfide. The dilution factor was 1 for all samples; no matrix effects or other analytical artifacts caused the samples to require dilution to be within the analytical instrument range.

4.5.9 Petroleum Hydrocarbons

Petroleum hydrocarbons were analyzed using method TNRRC 1005, which has a MDL of 5,000 ug/L and did not meet the TDL of 100 ug/L. The analysis included 4 groups of hydrocarbons; C6-C35, C6-C12, >C12-C28, and >C28-C35, each group is reported in the summary table (Table 5G of Appendix 5). All samples were non-detect, qualified "U", and reported at the RL. Potential low bias was observed for the TPH samples since the RL was an order of magnitude greater than the TDL.

4.5.10 Summary

Below is a brief summary of the chemical analysis for the NMP site water samples.

- Screening criteria was not exceeded by any of the samples for VOCs and PCBs.
- USEPA Region 6 screening criteria was exceeded by all samples for two compounds, hexachlorobutadiene and hexachlorocyclopentadiene. Results for both compounds were below the MDL, qualified, "U", and reported at the RL which exceeded screening criteria. There were no other exceedances of screening criteria for SVOCs.
- USEPA Region 6 screening criteria was exceeded by two samples for anthracene and three samples for pyrene. The remaining samples were below screening criteria for USEPA Region 6. There were no exceedances of TSWQS, USEPA WQC, or NOAA screening criteria for any PAH samples.
- HSCNew-NMP-05-EL was the only sample to have a detection for pesticides with a detection for gamma-BHC. All remaining analytical results for pesticides were below the MDL, qualified "U", and reported at the RL for all samples. USEPA Region 6 screening criteria was exceeded by seven compounds, 4,4'-DDT, dieldrin, endrin, endrin aldehyde, heptachlor, heptachlor epoxide and toxaphene, in all samples which were qualified "U" and reported at the RL. Screening criteria for toxaphene for TSWQS, USEPA WQC, and NOAA was exceeded by all samples which were qualified "U" and reported at the RL.

- Dioxins and furans were detected in 8 samples. Total TEQ was calculated using results from non-"U" qualified data and ranged from 0.00035 pg/L to 10 pg/L. There are no screening criteria for dioxins and furans.
- USEPA Region 6 screening criteria was exceeded by nine samples for copper, one sample for lead, and three samples for zinc. NOAA screening criteria was exceeded by nine samples for copper, all samples for silver, and three samples for zinc. USEPA WQC was exceeded by nine samples for copper, nine samples for silver and three samples for zinc. TSWQS screening criteria was exceeded by eight samples for silver and three samples for zinc. Screening criteria for antimony, arsenic, barium, beryllium, cadmium, chromium (total), chromium (3+), chromium (6+), mercury, nickel, selenium, and thallium was not exceeded by any of the samples.
- Cyanide was not detected in any of the samples, qualified, "U", and reported at the RL. The RL exceeded the screening criteria for USEPA WQC, NOAA, and USEPA Region 6. There are no TSWQS for cyanide.

4.6 Modified Elutriate Toxicity

Modified elutriate toxicity tests were conducted during the week of October 29, 2018 and are discussed in the following sections. The elutriates were prepared from project sediments within 3 weeks of compositing (October 9, 2018) at the initiation of the bioassays. All elutriate toxicity testing used a freshly prepared elutriate (aged <24-h). Additional details are included in the full Tier III Biological Report (Appendix 8).

4.6.1 Elutriate Bioassay: *Americamysis bahia*

Water quality parameters were within the acceptability ranges specified by testing guidance (USEPA/USACE, 1991; 1998; 2003). Survival in the laboratory performance control (96 %) met the ≥ 90 % requirement. The LC50 value for the KCl reference toxicity test conducted on October 29, 2018 was 0.61 g/L (range: 0.55 g/L to 0.69g/L). This value was within two standard deviations around the mean LC50 values from ERDC control chart data (range: 0.40 g/L to 0.82 g/L). This indicates that the test organisms were within the historic sensitivity range.

Survival was at least 86 % (range: 86 % to 100 %) in all eleven site waters. Survival in the undiluted (100 %) elutriates ranged from 25 % to 94 %. Survival was both reduced by at least 10 % and statistically significantly different (by one-tailed t-test) for HSCNew-NMP-01, -NMP-04, -NMP-07, and -NMP-08. There was no acute toxicity observed in the other elutriates.

For elutriates in which significant mortality was observed, multiple treatment comparisons using Dunnett's test were performed to determine NOEC and LOEC values. Mortality was only high enough in HSCNew-NMP-01 and HSCNew-NMP-07 to calculate LC50 values. For these types of bioassay determinations, the LC50 values are expressed in terms of fraction of 100% elutriate concentrations; for -NMP-01 and -NMP-07, LC50 values were 89 % and 79 %, respectively.

Total ammonia-N concentrations in the undiluted elutriates ranged from 1.4 mg/L to 20.7 mg/L and calculated un-ionized concentrations (range; 0.08 mg/L to 1.11 mg/L). The ammonia-N and un-ionized ammonia concentrations and comparison to known toxicity thresholds (Kennedy et al, 2015; Melby et al, 2018) are summarized in Appendix 8, Table 4. Since some of the ammonia levels were well above concentrations that are known to cause acute effects to this organism, there is a strong line of evidence that ammonia was high enough to cause mortality in all of the elutriates where acute toxicity was observed (HSCNew-NMP-01, -NMP-04, -NMP-07, and –NMP-08).

The *A. bahia* elutriate bioassay did not indicate acute toxicity for the 7 of the 11 tested sediment elutriates (HSCNew-NMP-02, -NMP-03, -NMP-05, -NMP-06, -NMP-09, -NMP-10, and –NMP-11). Statistically significant acute toxicity, greater than 10 % reduction in survival, was determined for HSCNew-NMP-01, -NMP-04, -NMP-07, and -NMP-08.

4.6.2 Elutriate Bioassay: *Menidia beryllina*

Water quality parameters were within the acceptability ranges specified by testing guidance (USEPA/USACE, 1991; 1998; 2003). Survival in the laboratory performance control (98 %) met the ≥ 90 % requirement. The LC50 value for the KCl reference toxicity test conducted on October 29, 2018 was 1.46 g/L (range: 1.34 g/L to 1.59 g/L). This value was within two standard deviations around the mean LC50 values from ERDC control chart data (range: 1.07 g/L to 1.52 g/L). This indicates that the test organisms were within the historic sensitivity range.

Survival was at least 94 % (range: 94 % to 100%) in all eleven site waters. Survival in the undiluted (100 %) elutriates ranged from 0 % to 100 %. Survival was both reduced by at least 10 % and statistically significantly different (by one-tailed t-test) for HSCNew-NMP-01, -NMP-04, -NMP-06, -NMP-07, -NMP-08, -NMP-10, and –NMP-11. There was no acute toxicity observed in the other elutriates.

For elutriates in which significant mortality was observed, multiple treatment comparisons using Dunnett's test were performed to determine NOEC and LOEC values. Mortality was only high enough in HSCNew-NMP-01, -NMP-06, and –NMP-07 to calculate LC50 values. For these types of bioassay determinations, the LC50 values are expressed in terms of fraction of 100% elutriate concentrations; for -NMP-01, -NMP-06, and –NMP-07, LC50 values were 88 %, 95 % and 59 %, respectively.

Total ammonia-N concentrations in the undiluted elutriates ranged from 1.29 mg/L to 23.5 mg/L and calculated un-ionized concentrations (range: 0.08 mg/L to 1.11 mg/L). The ammonia concentrations and comparison to known toxicity thresholds (Kennedy et al, 2015; Melby et al, 2018) are summarized in Appendix 8, Table 4. Since some of the ammonia levels were well above concentrations that are known to cause acute effects to this organism, there is a strong line of evidence that ammonia was high enough to cause mortality in all of the elutriates where acute toxicity was observed (HSCNew-NMP-01, -NMP-04, -NMP-06, -NMP-07, -NMP-08, -NMP-11).

The *M. beryllina* elutriate bioassay did not indicate acute toxicity for the 5 of the 11 tested elutriates (HSCNew-NMP-02, -NMP-03, -NMP-05, -NMP-09). Statistically significant acute toxicity, greater than 10 %

reduction in survival, was determined for HSCNew-NMP-01, -NMP-04, -NMP-06, -NMP-07, -NMP-08, -NMP-10, and –NMP-11.

4.6.3 Ammonia Toxicity Background

Ammonia is an important contaminant to consider in toxicity bioassays, especially when employing fish species (USEPA; 1999; 2009) or embryo development tests (Kennedy et al. 2015). The unionized fraction of ammonia, which is dependent on water temperature, pH and to a lesser extent salinity, is often most responsible for causing toxicity in elutriate testing (Kennedy et al., 2015).

Based on LC50 ranges for *A. bahia* (range: 0.23 mg/L UIA to 1.7 mg/L UIA) at similar temperatures and pH values taken from the literature (Miller et al, 1990; Boardman et al., 2004; Kennedy et al 2015) and a NOEC value reported in Melby et al, (2018) of 0.5 mg/L un-ionized ammonia (UIA). The un-ionized ammonia concentrations in the HSCNew-NMP-01, -NMP-04, and –NMP-07 elutriates were sufficiently high to cause toxicity to *A. bahia*. The HSCNew-NMP-05, -NMP-06, -NMP-08, -NMP-10, and –NMP-11 elutriates had elevated ammonia which may have caused some mortality.

Based on LC50 ranges for *M. beryllina* (range: 0.75 mg/L UIA to 1.94 mg/L UIA) taken from the literature (Boardman et al 2004, Miller et al 1990, Li 1997, Kennedy et al 2015) and NOEC values reported in Melby et al (2018) of 0.6 mg/L un-ionized ammonia. The un-ionized ammonia concentrations in the HSCNew-NMP-01, -NMP-04, and –NMP-07 elutriates were sufficiently high to cause toxicity to *M. beryllina*.

The HSCNew-NMP-05, -NMP-06, -NMP-08, -NMP-10 and –NMP-11 elutriates had elevated ammonia which may have caused some mortality.

In all of the elutriates in which acute toxicity was observed, there were high enough concentrations to cause mortality to the test organisms based on literature reported values for ammonia toxicity (Melby et al., 2018). Therefore, there is a line of evidence that ammonia was an important determinant of the toxicity observed in both test organisms.

4.7 Mixing Zone Results - CDFATE

Six CDFATE model runs were performed using the input outlined in Section 2.7. Results are provided below for New BW-8 PA, Filter Bed PA, and New E2-Clinton PA, and Glendale PA. For each PA, the dilution/mixing achieved within a given distance downstream from the discharge was compared to the dilutions required to achieve acute and chronic concentrations of COCs to determine distance required for the ZID and MZ. The final mixing zone distances required for each PA are provided in Appendix 7, Table 10.

As outlined in Section 2.7, modeling focused on the subset of the contaminants remaining after two elimination steps:

1) contaminants were not evaluated further when they were not detected in elutriate or receiving water (Section 2.7.4.1)

2) contaminants were not evaluated further if contaminant concentrations of the background water exceeded acute screening criteria; dilution cannot be achieved under such circumstances (Section 2.7.4.3)

4.7.1 Placement Area – New BW-8 PA

The model results for discharges from New BW-8 PA into Buffalo Bayou/HSC show dilution achieved with distance downstream from the discharge point. Two separate model runs were performed with different assumptions as to the length that the culvert extended into the channel, as the actual distance is unknown. The shorter length of the culvert provided greater dilution. The dilution values were sufficient to provide mixing to dilute the concentrations to within acute and chronic criteria. The greatest dilution requirements for the New BW-8 PA were for zinc which required a dilution factor of 6.9 for acute and 13.0 for chronic criteria. These dilution values can be met within 3.4 m (acute) and 11.0 m (chronic) for the longer culvert. Plume widths at these lengths are approximately 7 m and 13 m.

4.7.2 Placement Area – Filter Bed PA

Dilution was achieved with distance for the two scenarios that were modeled. Modeling assumed two pipe extensions for the Filter Bed PA discharged into Buffalo Bayou/HSC, since the actual discharge pipe length is not known. One scenario used a culvert that protruded 2.2 m into the channel, and the other used a culvert that protruded 15.2 m. Extending the pipe farther into the channel achieved less dilution as it pushed the plume up against the opposite bank. A mixing zone was not possible for meeting chronic requirements because the receiving water concentration of zinc was above the chronic criteria. To meet acute requirements for determination of a ZID, the greatest dilution required was for zinc, with a dilution factor of 13.4, which could be met within approximately 45 m if the culvert protruded only 2.2 m. The plume width at 45 m would be approximately 23 m. Dilution could not be achieved with the longer pipe length that reached a maximum dilution of approximately 3.0.

4.7.3 Placement Area – New E2-Clinton PA and Glendale

New E2-Clinton and Glendale PAs are considered together since both PAs discharge into Hunting Bayou from Turkey Run Gulley (Section 2.7.6.1.3). Dilution was achieved with distance downstream of the discharge into Hunting Bayou for effluent from New E2-Clinton PA and Glendale PA; note that the results are identical. The only difference for input parameters was a higher salinity assumption for New E2-Clinton PA, which did not impact the results. Very little dilution was achieved over approximately 18 m. Beyond 18.8 m, the plume interacted with the bottom and both banks. Additional dilution was not expected to occur under the modeled scenario. Therefore, the maximum dilution expected to occur within Hunting Bayou was 0.4.

The greatest dilution requirements for New E2-Clinton PA are 1 for acute conditions and 99 for chronic conditions, which were well above the predicted dilution in Hunting Bayou. For Glendale PA, the greatest dilution requirements were 6.7 for acute conditions and 168.5 for chronic criteria, which were also above that predicted. The predicted dilution of 0.4 was insufficient to achieve concentrations below acute

criteria for zinc or acute toxicity criteria based on bioassay results. Dilution of 0.4 was also insufficient to achieve concentrations below chronic criteria for anthracene, copper, lead, zinc, and chronic toxicity criteria from bioassay results.

The uncertainty within the input parameters should be evaluated and the model refined accordingly to determine if discharge to Hunting Bayou is a feasible alternative.

4.7.4 Placement Area - Summary

The CDFATE modeling exercise showed that a ZID and mixing zone could be applied to meet acute and chronic criteria for the New BW-8 PA discharge. A rather large ZID (45 m) would be required to meet acute toxicity at the Filter Bed PA discharge location, assuming the discharge pipe was near the shore. Dilution requirements cannot be met for chronic conditions due to zinc background concentrations. Modeling showed dilution to be insufficient for the New E2-Clinton and Glendale PAs to meet either chronic or acute conditions.

4.7.5 Uncertainty

Many of the input parameters for the preliminary CDFATE mixing zone calculation were not site-specific, which produced uncertainty in the results. The uncertainty associated with these parameters could be reduced through the refinement of the input parameters, making the mixing zone calculations more site-specific. Some suggested refinements are described below.

4.7.5.1 Chemistry, Toxicity, and Elutriate Uncertainty

A mixing zone evaluation was performed to determine the ZID and mixing zone lengths needed to meet the greatest dilution requirements for each PA based on conservative assumptions regarding chemistry and toxicity results. In the absence of site-specific information, assumptions were made with respect to both the chemistry and toxicity evaluations. Sources of uncertainty include:

1) Elutriate and Site Water RLs Above Criteria: instances where reporting limits exceed criteria forced the use of overly conservative assumptions for background concentrations
2) Lack of Receiving Water Chemistry and Characterization for Hunting Bayou (New E2-Clinton PA and Glendale PA receiving water): Use of alternate data from Buffalo Bayou may not be appropriate
3) Conservative AF: A less conservative value could be used to calculate chronic criteria for bioassays
4) Ammonia: Consideration of impacts of ammonia on bioassay results. A toxicity reduction evaluation (TRE) could potentially be performed to evaluate the effect that ammonia had on the resulting toxicity, or the application of a higher AF might be justifiable in light of the ammonia effects and the highly conservative nature of the selected AF
5) Length of the Dredging Event: Determination of whether chronic criteria are applicable based on the length of time that discharge is expected to occur at each PA
6) Exclusion of COCs: A number of COCs were excluded from the evaluation because background concentrations were either above criteria or the RLs were above criteria (Section 2.7.4.2 and

Section 4.2 of Appendix 8). It is currently not possible to show that water quality criteria can be met for these COCs

The uncertainties from (1) through (6) above were addressed in this preliminary mixing zone evaluation by making conservative assumptions. Additional data collection or refinements would produce more site-specific results and reduce uncertainty for the factors listed above.

4.7.5.2 Modeling Uncertainty

In the preliminary CDFATE modeling, several non-site specific conservative initial assumptions were made that would influence the model output and could be refined:

1) Non-Site Specific Input Parameters: Details pertaining to many of the CDFATE model input parameters were not available, requiring assumptions for which the introduced bias (positive or negative) is not fully understood
2) Discharge/Velocity Data: These data were not available in the near vicinity of any of the discharge locations and had to be extrapolated from distant gauges or report figures
3) Discharge Point Characteristics: The size and orientation of the culverts leading from New BW-8 PA and Filter Bed PA to Buffalo Bayou/HSC were not known, requiring assumptions to be made for water depth, culvert width, depth, slope and protruding distance into the channel
4) Bathymetry: Bathymetry data for Hunting Bayou and geometry of Turkey Run Gulley where it discharges to Hunting Bayou were estimated
5) Site Receiving Water Conditions: Site receiving waters were, in many instances, estimated
6) Salinity: Salinity/conductivity profiles with depth taken during several years showed a steep increase in salinity with depth in some years, and less stratification in drier years when overall salinity was higher. Salinity gradients within Buffalo Bayou were estimated based on a published figure of conductivity gradients for several years; salinity data for Hunting Bayou was not available and was estimated.

In order to provide greater confidence in results, additional site-specific data could be collected to refine the mixing zone modeling and evaluation.

5.0 Conclusions and Recommendations

5.1 Summary

Sampling, analysis, and evaluation of sediment, water, and elutriate for the HSC Expansion Channel Improvement Project north of Morgan's Point were conducted to evaluate the potential for adverse environmental effects associated with dredging and placement of new work sediments. A total of 12 sediment and site water samples were collected, 11 channel locations and 1 duplicate location.

Although a few deviations from the SAP occurred during field sampling, these deviations did not compromise the overall representativeness of the samples for purposes of decision making with regard

to sediment quality of proposed dredged materials. Similarly, minor analytical QC deviations occurred, but the overall usability and representativeness of the data was not compromised.

For site water samples, screening criteria were exceeded by all samples for two SVOC compounds, hexachlorobutadiene and hexachlorocyclopentadiene. Results for both compounds were below the MDL, qualified, "U", and reported at the RL which exceeded screening criteria. Seven pesticides (4,4'-DDT, dieldrin, endrin, endrin aldehyde, heptachlor, heptachlor epoxide and toxaphene) exceeded screening criteria in all samples, results were qualified "U" and reported at the RL. Screening criteria was exceeded by one sample for copper, three samples for zinc, and 11 samples for silver. Results for silver in 6 of the 12 samples were below the MDL, qualified, "U", and reported at the RL, but the RL exceeded both applicable screening criteria and the project TDL. Cyanide was not detected in any of the samples, qualified, "U", and reported at the RL which exceeded applicable screening criteria.

For sediment samples, screening criteria was exceeded by 8 samples for bis(2-ethylhexyl) phthalate. All PAHs were detected in one or more samples and screening criteria was exceeded for 12 analytes; acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene. Five pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, and gamma-BHC (lindane)) exceeded screening criteria in one or more sediment samples. Screening criteria for total PCB congeners was exceeded by 7 samples. Screening criteria were exceeded by one sample for cadmium and copper, four samples for lead, five samples for mercury, and two samples for nickel.

For elutriate samples, screening criteria were exceeded by all samples for two compounds, hexachlorobutadiene and hexachlorocyclopentadiene. Results for both compounds were below the MDL, qualified, "U", and reported at the RL which exceeded screening criteria. Screening criteria were exceeded by two samples for anthracene and three samples for pyrene. Seven pesticides (4,4'-DDT, dieldrin, endrin, endrin aldehyde, heptachlor, heptachlor epoxide and toxaphene) exceeded screening criteria in all samples. Results for the analytes were qualified "U" and reported at the RL, which was above the screening criteria. Dioxins and furans were detected in 8 samples, the total TEQ was calculated using results from non-"U" qualified data and ranged from 0.00035 pg/L to 10 pg/L. Screening criteria were exceeded by one sample for lead and three samples for zinc. Nine samples exceeded screening criteria for copper, but all were non-detect, qualified "U", and reported at the RL, which exceeded applicable screening criteria. Silver exceeded screening criteria in all 12 samples, 7 of the samples were non-detect, qualified "U", and reported at the RL which exceeded applicable screening criteria. Cyanide was not detected in any of the samples, qualified, "U", and reported at the RL which exceeded applicable screening criteria.

Elutriate acute toxicity was not observed to the two species tested in four of the eleven sample locations; HSCNew-NMP-02, -NMP-03, -NMP-05, and –NMP-09. Sediment bioassays indicated acute toxicity for *A. bahia* in four samples and for *M.* beryllina in seven samples. In all of the elutriates toxicity tests for which acute toxicity was observed, ammonia concentrations were high enough to cause mortality to the

test organisms. Therefore, there is a line of evidence that ammonia was an important determinant of the toxicity observed in both test organisms.

Elutriate and site water chemistry was evaluated for ten sediment samples along Segments 4 – 6 of the HSC-NMP for the mixing zone modeling. Some of the site waters also represented receiving water for the four proposed PAs. COCs that were detected in at least one of the media were retained for evaluation. Several COCs were eliminated from the evaluation because their RLs were above criteria and they were not detected in any of the elutriate, site water or sediment samples. For instances when the background concentration exceeded criteria, dilution could not be evaluated. The contaminants that could not be fully evaluated for a mixing zone for this reason included hexachlorobutadiene, 4,4'-DDT, dieldrin, heptachlor, and silver, therefore, it could not be demonstrated that they would not violate water quality criteria. Required dilutions to meet chronic and acute water quality criteria were calculated for the contaminants remaining (i.e., anthracene, pyrene, copper, lead and zinc) after the preliminary COCs were evaluated/excluded.

The CDFATE model was used to complete a preliminary mixing zone evaluation of each PA effluent into the receiving waters. Due to the unknown length of the actual pipe, model runs were performed for two scenarios, each with different protruding pipe distances, for New BW-8 PA and Filter Bed PA. Although the discharge parameters were identical for PAs discharging into Hunting Bayou (New E2-Clinton and Glendale), two model runs were performed based on the different salinity assumptions for the bottom salinity ranges of Buffalo Bayou/HSC and Sims Bayou.

The chemistry data were compared to dilution requirements at each PA to estimate required ZID and mixing zone lengths for each PA. For New BW-8 PA, results showed that for the evaluated COCs and toxicity requirements, a ZID of 2.0 m – 3.4 m (depending on the actual pipe protruding distance, 46 m or 60 m) was required and a mixing zone length between 5.9 m and 11.0 m would be required. For Filter Bed PA, modeling showed that a ZID of 45 m would be required to achieve acute criteria if the pipe was near the shore; dilution would not be possible if the culvert extended 15 m into the channel. It would also not be possible to meet chronic criteria because zinc concentrations in the receiving water exceed chronic criteria. Modeling results for E2-Clinton PA and Glendale PA discharges into Hunting Bayou showed that a maximum dilution of 0.4 would be reached before the channel is completely mixed. This was insufficient to meet acute or chronic criteria for the COCs or toxicity requirements for either PA.

5.2 Conclusions

Although some environmental media screened above water quality and sediment screening values, the primary lines-of-evidence used in screening for the suitability of new work dredge materials for placement are the elutriate and the CDFATE modelling.

Using the chemistry data from the elutriate test and a combination of site-specific data when available and conservative worst-case assumptions when it was not, CDFATE modeling for evaluation of mixing zones at 4 placement areas selected in the Dredged Material Management Plan (DMMP) (USACE, 2019b) showed the following:

- Buffalo Bayou/HSC: sufficient mixing can be achieved in Buffalo Bayou/HSC to dilute the effluent from dredged material placement into the New BW-8 PA to within acute and chronic criteria, requiring a ZID of up 2.0 to 3.4 m and a mixing zone length of 5.9 m to 11.0 m
- Hunting Bayou: based on the modeling at Hunting Bayou, sufficient dilution is not available to achieve either acute or chronic criteria for effluent discharging from either the New E2-Clinton PA or the Glendale PA
- Filter Bed PA: mixing is insufficient and it is not possible to dilute effluent discharges from the Filter Bed PA to chronic criteria for zinc as receiving water (background) concentrations were shown to be above criteria. CDFATE modeling suggested that a ZID of 45 m would be required for sufficient mixing to achieve acute criteria for zinc
- Background: verification of the ability to meet water quality for several COCs (hexachlorobutadiene, 4,4'-DDT, dieldrin, heptachlor, and silver) that were dropped from the evaluation due to background concentrations above criteria was not possible with the available data

5.3 Recommendations

The preliminary CDFATE modeling results used several assumptions that were not site-specific. Refinements to the mixing zone calculations can be made with the addition of more site-specific data. Areas where data collection would be particularly helpful include:

- bathymetry and flow data at Hunting Bayou
- geometry of Turkey Run Gulley where it discharges to Hunting Bayou
- flow data at New BW-8 PA and Filter Bed PA discharge locations
- culvert geometries and orientation
- salinity distributions within each channel
- receiving water contaminant concentrations at Hunting Bayou
- alternate data for Buffalo Bayou receiving water COCs with RLs greater than criteria, and
- alternate AF for chronic criteria

6.0 References

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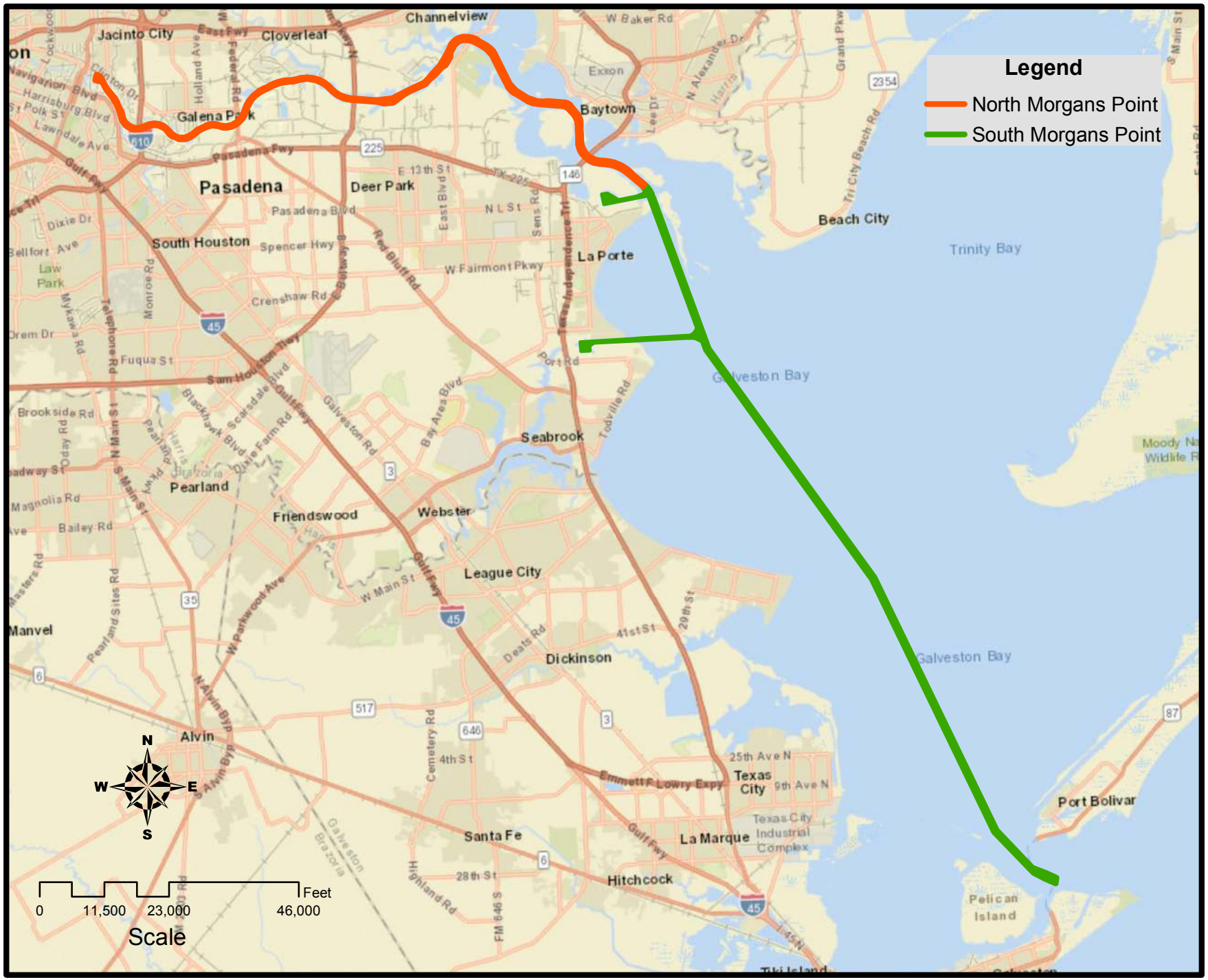
FIGURES

Figure 1: Project Area - Bayou Reach North of Morgan's Point
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) - New Work, Houston Ship Channel, TX



Imagery: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC,
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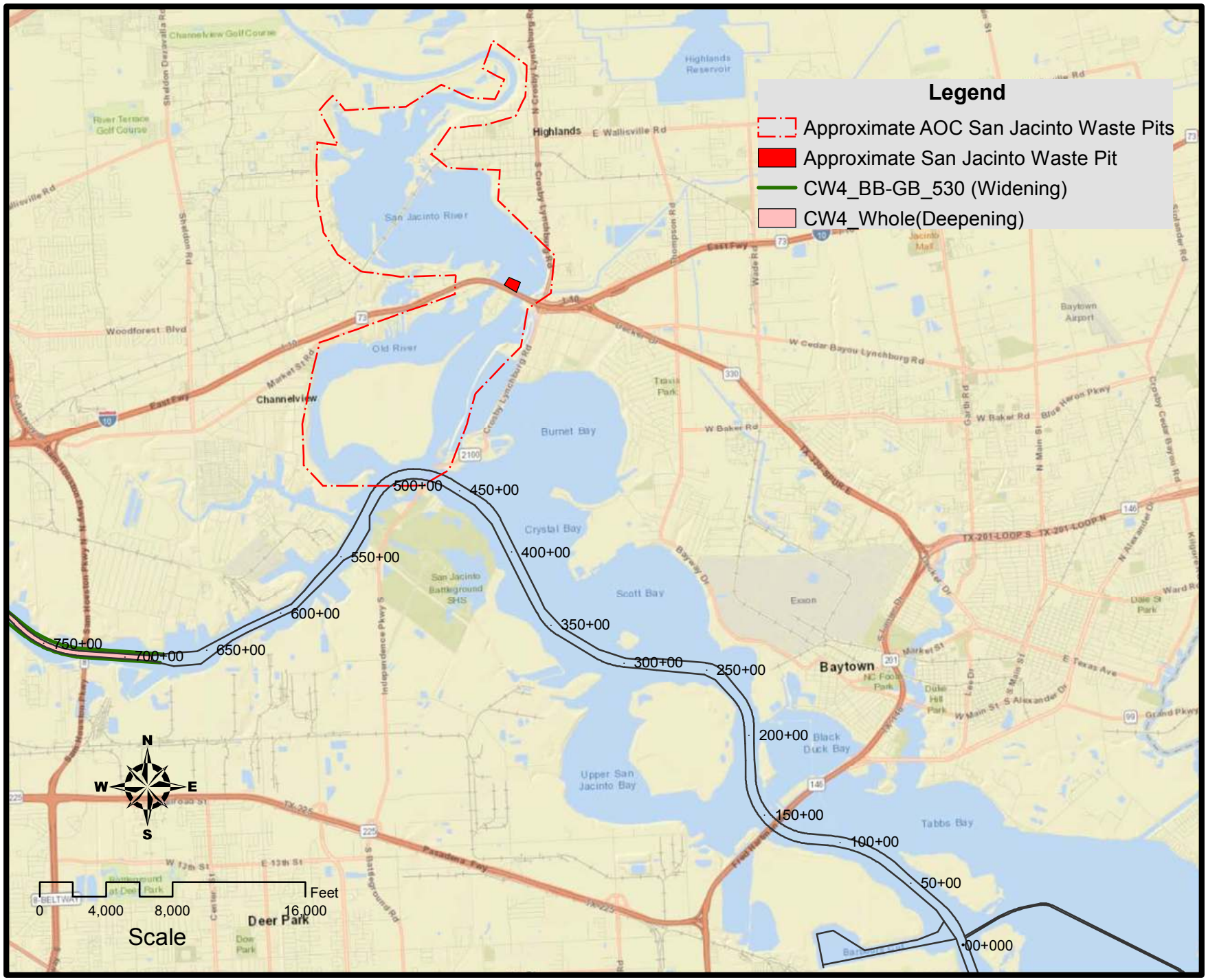
Figure 2: San Jacinto Waste Pit and Approximate Area of Concern
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) - New Work, Houston Ship Channel, TX



Imagery: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC,
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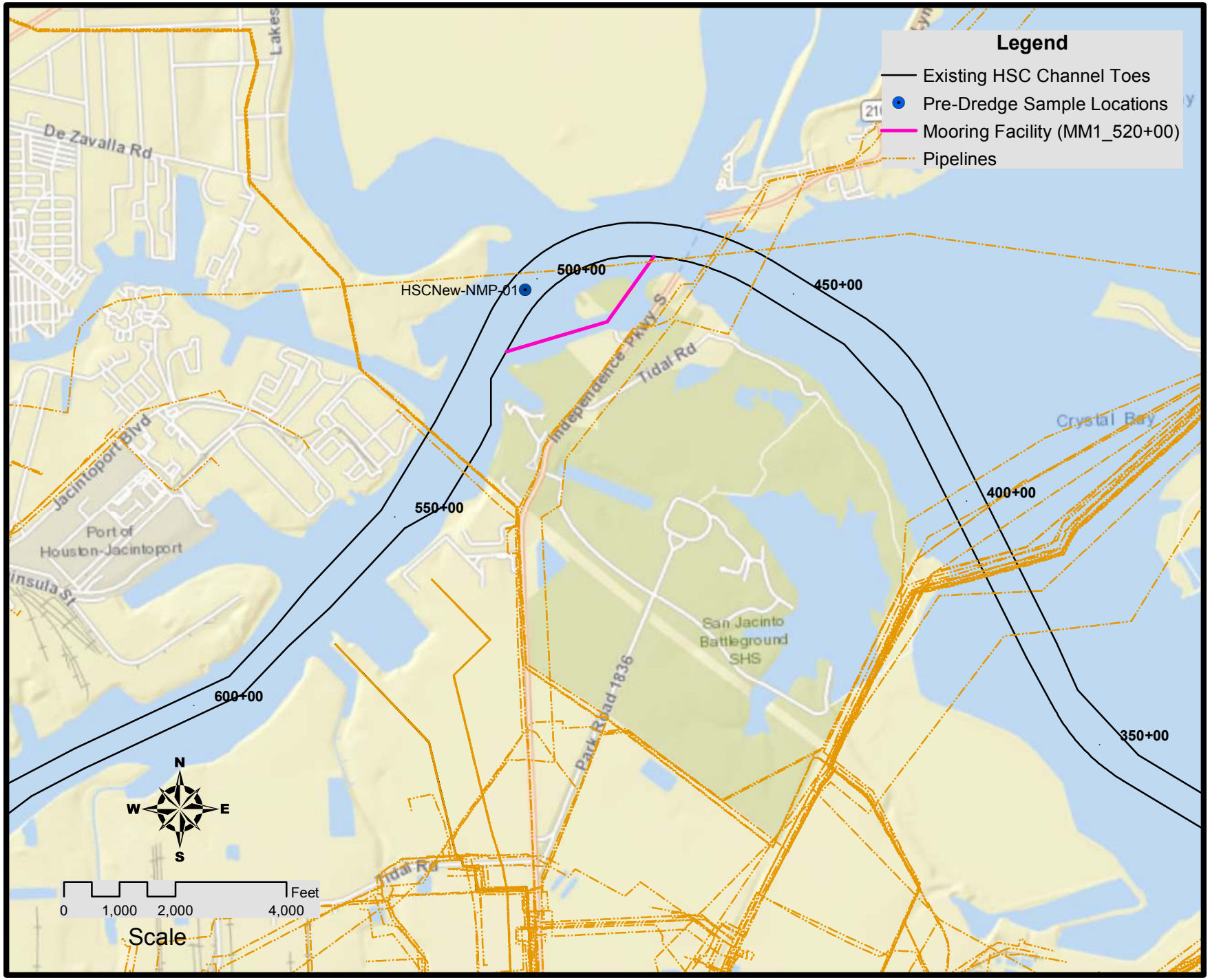
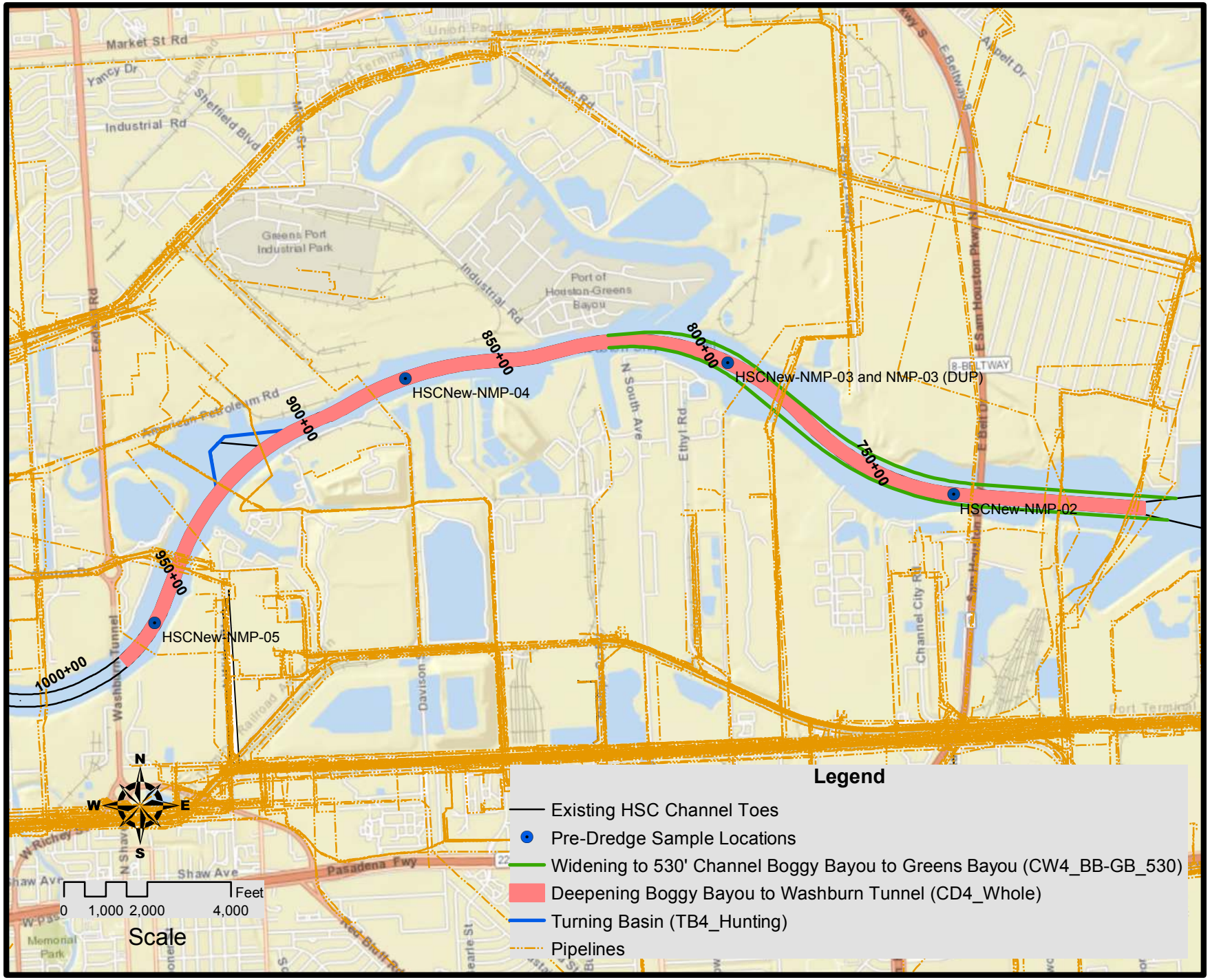
Figure 3: Pre-Dredging Sample Locations North of Morgans Point - Segment 1 Bayou
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) - New Work, Houston Ship Channel, TX



Imagery: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Figure 4: Pre-Dredging Sample Locations North of Morgans Point - Segment 4
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) - New Work, Houston Ship Channel, TX



Imagery: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC,
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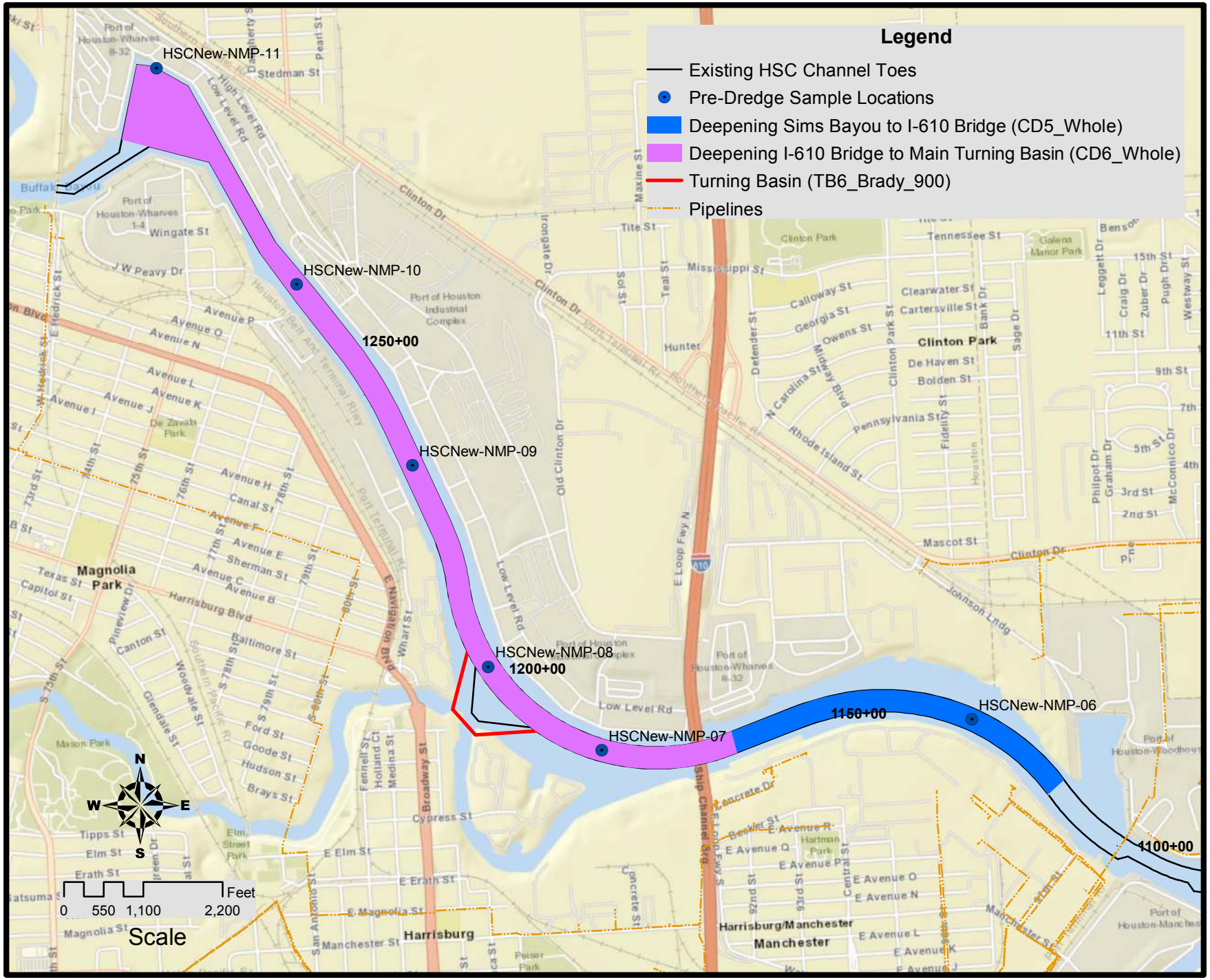
Figure 5: Pre-Dredging Sample Locations North of Morgans Point - Segments 5 & 6
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) - New Work, Houston Ship Channel, TX



Imagery: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC,
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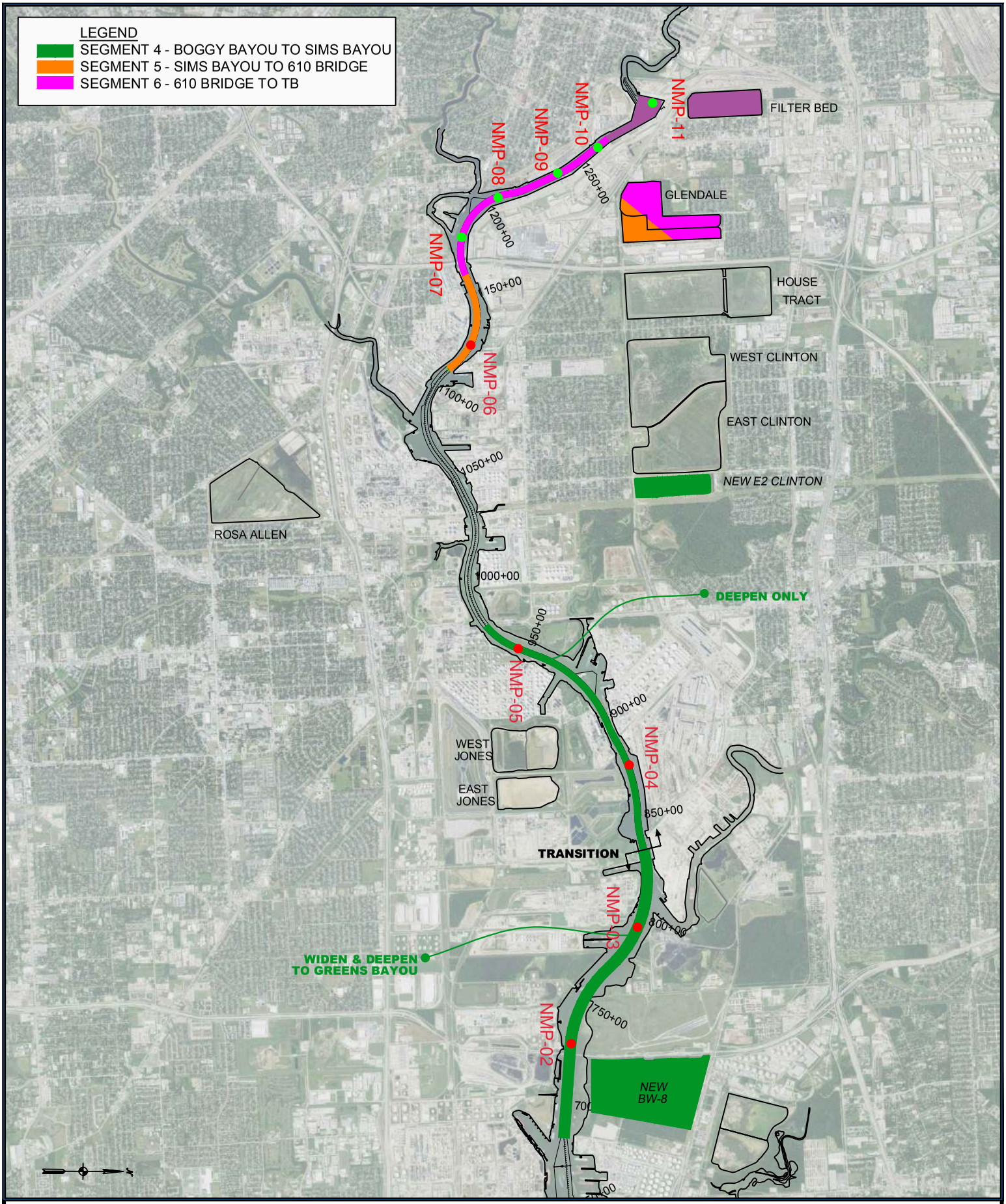

FIGURE 6 - DMMP NW DREDGING & PLACEMENT LOCATIONS

SEGMENTS 4, 5, & 6

0 3,000' 6,000'

FEET

Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) - New Work
Houston Ship Channel, Texas

TABLES

Table 1A: Summary of Site Water Sample Collection Sites
Houston Ship Channel (HSC) Expansion Channel Improvement Project (ECIP) - North of Morgan's Point
Houston Ship Channel, TX

Sample ID	Coordinates[1]		Coordinates		Channel Station[2]
	X - Easting (ft)	Y -Northing (ft)	LAT	LONG	
HSCNew-NMP-01-SW	3,209,747	13,844,644	29.75999587	-95.08712336	503+00
HSCNew-NMP-02-SW	3,190,661	13,835,567	29.73678924	-95.1481858	730+00
HSCNew-NMP-03-SW	3,185,287	13,837,835	29.74350819	-95.1648778	794+00
HSCNew-NMP-04-SW	3,177,594	13,837,940	29.74448783	-95.18909561	873+00
HSCNew-NMP-05-SW	3,171,799	13,832,335	29.72960272	-95.20792127	961+00
HSCNew-NMP-06-SW	3,157,170	13,830,865	29.72685819	-95.25413926	1127+00
HSCNew-NMP-07-SW	3,151,909	13,829,784	29.72434705	-95.2708183	1180+00
HSCNew-NMP-08-SW	3,150,587	13,831,357	29.72878903	-95.27482279	1200+00
HSCNew-NMP-09-SW	3,149,158	13,833,963	29.73607502	-95.27906155	1230+00
HSCNew-NMP-10-SW	3,148,043	13,836,483	29.74310064	-95.2823204	1260+00
HSCNew-NMP-11-SW	3,145,766	13,839,567	29.75177505	-95.28918276	024+00

Footnote:
(1) Coordinates reported in NAD83 State Plane, Texas South Central, US Feet
(2) All stationing shown are Houston Ship Channel (HSC) stations.

Table 1B: Summary of Sediment Sample Collection Sites
Houston Ship Channel (HSC) Expansion Channel Improvement Project (ECIP) - North of Morgan's Point
Houston Ship Channel, TX

Sample ID	Sub-sample Locations	Coordinates[1]		Coordinates		Channel Station[2]
		X - Easting (ft)	Y - Northing (ft)	LAT	LONG	
HSCnew-NMP-01AH3	HSCNew-NMP-01AH3-1	3,209,399	13,844,992	29.76098545	-95.08818212	503+00
	HSCNew-NMP-01AH3-2	3,209,391	13,845,001	29.76101121	-95.08820617	
	HSCNew-NMP-01AH3-3	3,209,382	13,844,988	29.76097396	-95.08823598	
	HSCNew-NMP-01AH3-4	3,209,370	13,844,967	29.76091829	-95.08827502	
HSCNew-NMP-02	HSCNew-NMP-02A-1	3,190,669	13,835,075	29.73543624	-95.14821161	730+00
	HSCNew-NMP-02A-2	3,190,674	13,835,065	29.73540826	-95.14819752	
	HSCNew-NMP-02C-1	3,190,740	13,835,560	29.73676370	-95.14793893	
HSCNew-NMP-03	HSCNew-NMP-03A-1	3,185,272	13,837,839	29.74352150	-95.16492461	794+00
	HSCNew-NMP-03A-1(DUP)	3,185,291	13,837,849	29.74354802	-95.16486444	
	HSCNew-NMP-03C-1	3,185,164	13,838,758	29.74605715	-95.16516982	
	HSCNew-NMP-03C-1(DUP)	3,185,164	13,838,762	29.74606814	-95.16516941	
HSCNew-NMP-04	HSCNew-NMP-04A-1	3,177,578	13,837,883	29.74433300	-95.18915260	873+00
	HSCNew-NMP-04A-2	3,177,560	13,837,887	29.74434626	-95.18920932	
	HSCNew-NMP-04C-1	3,177,446	13,838,353	29.74563853	-95.18952001	
	HSCNew-NMP-04C-2	3,177,448	13,838,374	29.74569561	-95.18951197	
	HSCNew-NMP-04C-3	3,177,473	13,838,383	29.74571765	-95.18943260	
	HSCNew-NMP-04C-4	3,177,493	13,838,377	29.74569936	-95.18937022	
	HSCNew-NMP-04C-5	3,177,357	13,838,356	29.74565383	-95.18980073	
HSCNew-NMP-05	HSCNew-NMP-05A-1	3,171,789	13,832,332	29.72959489	-95.20795212	961+00
	HSCNew-NMP-05A-2	3,171,785	13,832,337	29.72960811	-95.20796574	
	HSCNew-NMP-05A-3	3,171,778	13,832,329	29.72958708	-95.20798814	
	HSCNew-NMP-05C-1	3,171,351	13,832,522	29.73015513	-95.20931390	
	HSCNew-NMP-05C-2	3,171,367	13,832,517	29.73014022	-95.20926415	
	HSCNew-NMP-05C-3	3,171,393	13,832,512	29.73012307	-95.20918258	
HSCNew-NMP-06	HSCNew-NMP-06A-1	3,157,010	13,830,360	29.72548387	-95.25469401	1127+00
	HSCNew-NMP-06A-2	3,156,997	13,830,374	29.72552285	-95.25473475	
	HSCNew-NMP-06A-3	3,156,993	13,830,383	29.72554794	-95.25474644	
	HSCNew-NMP-06C-1	3,157,267	13,830,791	29.72664661	-95.25384324	
	HSCNew-NMP-06C-2	3,157,252	13,830,786	29.72663213	-95.25388940	
HSCNew-NMP-07	HSCNew-NMP-07A-1	3,151,931	13,829,808	29.72441121	-95.27074500	1180+00
	HSCNew-NMP-07 (ALT 1-1)	3,151,936	13,829,813	29.72442555	-95.27072884	
	HSCNew-NMP-07 (ALT 1-2)	3,151,936	13,829,809	29.72441456	-95.27072925	
	HSCNew-NMP-07 (ALT 1-3)	3,151,924	13,829,798	29.72438512	-95.27076800	
	HSCNew-NMP-07 (ALT 1-4)	3,151,916	13,829,792	29.72437015	-95.27079239	
	HSCNew-NMP-07 (ALT 1-5)	3,151,921	13,829,775	29.72432229	-95.27077984	
HSCNew-NMP-08	HSCNew-NMP-08A-1	3,149,974	13,831,274	29.72861350	-95.27676215	1200+00
	HSCNew-NMP-08A-2	3,150,021	13,831,253	29.72855041	-95.27661364	
	HSCNew-NMP-08C-1	3,150,638	13,831,379	29.72884340	-95.27465819	
	HSCNew-NMP-08C-2	3,150,649	13,831,382	29.72885070	-95.27462545	
	HSCNew-NMP-08C-3	3,150,637	13,831,389	29.72887201	-95.27466122	
	HSCNew-NMP-08C-4	3,150,629	13,831,393	29.72888159	-95.27468662	
HSCNew-NMP-09	HSCNew-NMP-09A-1	3,149,149	13,833,987	29.73614245	-95.27908828	1230+00
	HSCNew-NMP-09A-2	3,149,153	13,833,975	29.73610792	-95.27907446	
	HSCNew-NMP-09A-3	3,149,159	13,833,976	29.73611062	-95.27905544	
	HSCNew-NMP-09C-1	3,149,514	13,834,136	29.73652023	-95.27792173	
	HSCNew-NMP-09C-2	3,149,510	13,834,140	29.73653052	-95.27793365	
	HSCNew-NMP-09C-3	3,149,513	13,834,137	29.73652329	-95.27792696	
	HSCNew-NMP-09C-4	3,149,511	13,834,149	29.73655598	-95.27792939	
HSCNew-NMP-10	HSCNew-NMP-10A-1	3,147,880	13,836,082	29.74201267	-95.28287514	1260+00
	HSCNew-NMP-10A-2	3,147,882	13,836,063	29.74195908	-95.28287006	
	HSCNew-NMP-10A-3	3,147,894	13,836,050	29.74192182	-95.28283159	
	HSCNew-NMP-10A-4	3,147,894	13,836,063	29.74195833	-95.28283174	
	HSCNew-NMP-10C-1	3,147,863	13,836,670	29.74362808	-95.28286768	
	HSCNew-NMP-10C-2	3,147,862	13,836,675	29.74364408	-95.28287223	
HSCNew-NMP-11	HSCNew-NMP-11A-1	3,145,331	13,838,513	29.74891756	-95.29065964	024+00
	HSCNew-NMP-11A-2	3,145,340	13,838,513	29.74891419	-95.29063264	
	HSCNew-NMP-11C-1	3,145,773	13,839,568	29.75177651	-95.28916034	
	HSCNew-NMP-11C-2	3,145,774	13,839,559	29.75175263	-95.28915869	
	HSCNew-NMP-11C-3	3,145,774	13,839,567	29.75177408	-95.28915755	

Footnotes:
(1) Coordinates reported in NAD83 State Plane, Texas South Central, US Feet
(2) All stationing shown are Houston Ship Channel (HSC) stations.

Table 2: Summary of In Situ Water Parameters [1]
Houston Ship Channel (HSC) Expansion Channel Improvement Project (ECIP) - North of Morgan's Point
Houston Ship Channel, TX

Sample ID	Station	Date	Sample Time		Water Depth	Sample Depth	Water Temperature	Salinity	pH	Conductivity	ORP	Turbidity	Dissolved Oxygen	Air Temperature	Wind	GPS Coordinates [3]		Time Sample Placed in Refrigerated Truck
			Start	Finish	ft	ft	°C	ppt	su	mS/cm	mV	NTU	mg/L	°F		Easting	Northing	
HSCNew-NMP-01-SW	503+00	10/22/18	1000	1025	8	4	19.3	4.03	7.62	7.301	45.3	9	4.57	57.9	6 mph NNE	3209746.795	13844644	1500
HSCNew-NMP-02-SW	730+00	10/22/18	1002	1016	7.9	3.5	22.8	4.59	7.56	8.123	-7.6	8	4.61	56	6 mph NE	3190661.487	13835566.8	1500
HSCNew-NMP-03-SW [2]	794+00	10/22/18	1053	1128	30.2	15	19.9	3.93	7.72	7.05	50.1	8.2	5.63	59	6 mph N	3185287.003	13837834.7	1500
HSCNew-NMP-04-SW	873+00	10/22/18	1030	1100	25.3	12.5	22.7	3.61	7.62	6.587	-41.6	8.4	4.5	58	5 mph NNE	3177594.445	13837939.5	1500
HSCNew-NMP-05-SW	961+00	10/22/18	1200	1221	31	15.5	19.7	2.84	7.82	5.221	48.5	8.6	3.68	64	5 mph NNE	3171799.17	13832335.5	1500
HSCNew-NMP-06-SW	1127+00	10/22/18	1125	1150	10.3	5.1	22.9	1.76	7.59	3.345	-23.4	9.8	4.02	61	2 mph NNE	3157170.354	13830865.4	1500
HSCNew-NMP-07-SW	1180+00	10/22/18	1240	1304	20.2	10	19.4	1.18	8.06	2.289	62.0	9.5	3.55	66	6 mph NNE	3151908.532	13829783.6	1500
HSCNew-NMP-08-SW	1200+00	10/22/18	1200	1225	40.2	20.1	23.1	1.81	7.47	3.476	-30.2	7.6	3.56	62	2 mph NNE	3150586.751	13831357.5	1500
HSCNew-NMP-09-SW	1230+00	10/22/18	1310	1330	40.1	20	20.2	2.32	7.71	4.458	55.0	12.1	2.74	64	5 mph NNE	3149157.868	13833962.8	1500
HSCNew-NMP-10-SW	1260+00	10/22/18	1230	1255	32.6	16	23.1	1.8	7.5	3.44	-32.0	12.9	3.93	64	0 mph	3148042.984	13836483.3	1500
HSCNew-NMP-11-SW	024+00	10/22/18	1340	1400	40.3	20.1	19.5	1.13	7.91	2.37	445.4	26.3	3.89	65	6 mph NNE	3145766.366	13839566.9	1500

Footnotes:

1) Full In Situ Water Parameters are included in the Field Report as Appendix 2

2) Duplicate sample taken with NMP-003 at 1130

3) Coordinates reported in NAD83 State Plane, Texas South Central, US Feet

Table 3: Summary of Particle Size Analysis
Houston Ship Channel (HSC) Expansion Channel Improvement Project (ECIP) - North of Morgan's Point
Houston Ship Channel, TX

			Gravel			Sand				Fines		
Sample ID	Station	Units	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
HSCNEW-NMP-01-SD	503+00	%	0	0	0	0.4	0.5	19.3	20.2	20.7	59.1	79.8
HSCNEW-NMP-02-SD	730+00	%	0	0	0	0.4	1.4	19.7	21.5	38.7	39.8	78.5
HSCNEW-NMP-03-SD	794+00	%	0	1.3	1.3	0.7	0.8	39.6	41.1	29.6	28	57.6
HSCNEW-NMP-03-SD-DUP	794+00	%	0	0	0	0.6	1.1	48.8	50.5	23.4	26.1	49.5
HSCNEW-NMP-04-SD	873+00	%	0	0.3	0.3	0.4	0.9	11.6	12.9	28.7	58.2	86.9
HSCNEW-NMP-05-SD	961+00	%	0	0.3	0.3	2.8	3.3	28.3	34.4	25.8	39.5	65.3
HSCNEW-NMP-06-SD	1127+00	%	0	1.5	1.5	0.1	1.3	16.7	18.1	38.1	42.3	80.4
HSCNEW-NMP-07-SD	1180+00	%	0	0	0	0.2	1.7	28.4	30.3	30.6	39.1	69.7
HSCNEW-NMP-08-SD	1200+00	%	0	0	0	0.1	0.6	13.5	14.2	17.7	68	85.7
HSCNEW-NMP-09-SD	1230+00	%	0	0	0	0.4	0.5	7.7	8.6	18.3	73.1	91.4
HSCNEW-NMP-10-SD	1260+00	%	0	0	0	0.2	0.4	12.4	13	23	63.9	86.9
HSCNEW-NMP-11-SD	024+00	%	0	0	0	0.4	0.6	41.4	42.4	23	34.7	57.7

Footnotes:

1) Full particle size analysis reports are included as Appendix 4

2) USCS Soil Classificaiton; corrected for 100% passing a 3" sieve

Table 4: Summary of Specific Gravity and Atterburg Limits Analysis [1]
Houston Ship Channel (HSC) Expansion Channel Improvement Project (ECIP) - North of Morgan's Point
Houston Ship Channel, TX

Sample ID	Station	Specific Gravity [2]	Atterburg Limits			
			Liquid Limit	Plastic Limit	Plasticity Index	USCS Group
		g/cm^3	%	%	PI	Name [3]
HSCNEW-NMP-01-SD	503+00	2.68	74	21	53	Fat Clay
HSCNEW-NMP-02-SD	730+00	2.67	44	17	27	Lean Clay
HSCNEW-NMP-03-SD	794+00	2.64	23	12	11	Lean Clay
HSCNEW-NMP-03-SD-DUP	794+00	2.69	25	11	14	Lean Clay
HSCNEW-NMP-04-SD	873+00	2.65	70	23	47	Fat Clay
HSCNEW-NMP-05-SD	961+00	2.67	47	16	31	Lean Clay
HSCNEW-NMP-06-SD	1127+00	2.65	42	17	25	Lean Clay
HSCNEW-NMP-07-SD	1180+00	2.66	45	16	29	Lean Clay
HSCNEW-NMP-08-SD	1200+00	2.64	57	19	38	Fat Clay
HSCNEW-NMP-09-SD	1230+00	2.65	55	21	34	Fat Clay
HSCNEW-NMP-10-SD	1260+00	2.69	56	20	36	Fat Clay
HSCNEW-NMP-11-SD	024+00	2.66	32	14	18	Lean Clay

Footnotes:

1) Full specific gravity and Atterburg limtis analysis reports are included as Appendix 4

2) Specific gravity results corrected for reporting at 20 ^{o}C

3) USCS Group Name given to material that passes through a #40 sieve; all material retained by #40 sieve not included

Table 5: Site Water Analytical Results and Screening, Detections and Exceedances[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria				No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SW		HSCNew-NMP-02-SW		HSCNew-NMP-03-SW		HSCNew-NMP-04-SW		HSCNew-NMP-05-SW		HSCNew-NMP-06-SW		HSCNew-NMP-07-SW		HSCNew-NMP-08-SW		HSCNew-NMP-09-SW		HSCNew-NMP-10-SW		HSCNew-NMP-11-SW		HSCNew-NMP-03-SW-Field Dup	
				TSWQS (Acute) (b)	EPA WQC (Acute) (c)	NOAA (Marine Acute) (d)	Region 6 (Marine					10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018	
VOCs																																	
Bromodichloromethane	75-27-4	ug/L	-	-	-	-	-	12	0.50	0.58	0.51	0.50	Ua	0.50	Ua	0.50	Ua	**0.58**	-	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.5	Ua	0.50	Ua	0.50	Ua
Chloroform	67-66-3	ug/L	2	-	-	-	4100	12	0.5	2.24	1.75	0.5	Ua	**1.6**	-	**1.0**	-	**1.7**	-	**1.9**	-	**2.2**	-	**2.2**	-	**2.2**	-	**1.9**	-	**2.0**	-	**2.2**	-	**1.5**	-
Chloromethane	74-87-3	ug/L	-	-	-	-	13500	12	1.0	2.26	1.22	1.0	Ua	1.0	Ua	**2.3**	-	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	**1.9**	-	1.0	Ua	1.0	Ua	**1.5**	-
SVOCs																																	
Bis[2-ethylhexyl] Phthalate	117-81-7	ug/L	2 (g)	-	-	400	-	12	0.17	0.51	0.40	**0.20**	**Jb**	**0.19**	**Jb**	**0.17**	**Jb**	**0.21**	**Jb**	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Di-n-butyl Phthalate	84-74-2	ug/L	1 (g)	-	-	2944	NA	12	0.11	0.51	0.44	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	**0.12**	**Jb**	0.51	Ub	**0.11**	**Jb**	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Hexachlorobutadiene	87-68-3	ug/L	0.9 (g)	-	-	32	0. 32	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Hexachlorocyclopentadiene	77-47-4	ug/L	3.0 (g)	-	-	7	0. 07	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
PAHs																																	
Acenaphthene	83-32-9	ug/L	0.75 (g)	-	-	970	40.4	12	0.0020	0.010	0.0094	0.010	Ub	0.010	Ub	0.010	Ub	**0.0020**	**Jb**	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub
Benzo(a)anthracene	56-55-3	ug/L	0.4 (g)	-	-	300	-	12	0.0018	0.010	0.0080	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	**0.0018**	**Jb**	**0.0018**	**Jb**	**0.0019**	**Jb**	0.010	Ub
Benzo(a)pyrene	50-32-8	ug/L	0.3 (g)	-	-	300	-	12	0.00093	0.010	0.0047	0.010	Ub	0.010	Ub	**0.0015**	**Jb**	0.010	Ub	**0.0020**	**Jb**	**0.0012**	**Jb**	**0.0022**	**Jb**	0.010	Ub	**0.0026**	**Jb**	**0.0024**	**Jb**	**0.0027**	**Jb**	**0.00093**	**Jb**
Benzo(b)fluoranthene	205-99-2	ug/L	0.6 (g)	-	-	300	-	12	0.0015	0.010	0.0057	0.010	Ub	0.010	Ub	**0.0026**	**Jb**	0.010	Ub	**0.0034**	**Jb**	**0.0019**	**Jb**	**0.0040**	**Jb**	0.010	Ub	**0.0045**	**Jb**	**0.0040**	**Jb**	**0.0060**	**Jb**	**0.0015**	**Jb**
Benzo(e)pyrene	192-97-2	ug/L	-	-	-	-	-	12	0.0015	0.010	0.0054	0.010	Ub	0.010	Ub	**0.0025**	**Jb**	0.010	Ub	**0.0031**	**Jb**	**0.0018**	**Jb**	**0.0035**	**Jb**	0.010	Ub	**0.0040**	**Jb**	**0.0035**	**Jb**	**0.0045**	**Jb**	**0.0015**	**Jb**
Benzo[g,h,i]perylene	191-24-2	ug/L	1.2 (g)	-	-	300	-	12	0.0014	0.010	0.0046	**0.0014**	**Jb**	0.010	Ub	**0.0026**	**Jb**	0.010	Ub	**0.0031**	**Jb**	**0.0017**	**Jb**	**0.0035**	**Jb**	0.010	Ub	**0.0039**	**Jb**	**0.0034**	**Jb**	**0.0044**	**Jb**	**0.0014**	**Jb**
Benzo(k)fluoranthene	207-08-9	ug/L	0.6 (g)	-	-	300	-	12	0.0015	0.010	0.0058	0.010	Ub	0.010	Ub	**0.0020**	**Jb**	0.010	Ub	**0.0025**	**Jb**	**0.0015**	**Jb**	**0.0032**	**Jb**	0.010	Ub	**0.0034**	**Jb**	**0.0026**	**Jb**	**0.0035**	**Jb**	0.010	Ub
Chrysene	218-01-9	ug/L	0.3 (g)	-	-	300	-	12	0.0011	0.010	0.0037	0.010	Ub	0.010	Ub	**0.0021**	**Jb**	**0.0013**	**Jb**	**0.0027**	**Jb**	**0.0017**	**Jb**	**0.0032**	**Jb**	**0.0011**	**Jb**	**0.0038**	**Jb**	**0.0033**	**Jb**	**0.0045**	**Jb**	**0.0012**	**Jb**
Dibenzo[a,h]anthracene	53-70-3	ug/L	1.3 (g)	-	-	300	-	12	0.010	0.010	0.010	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub
Fluoranthene	206-44-0	ug/L	0.9 (g)	-	-	40	2.96	12	0.0020	0.0083	0.0039	**0.0023**	**Jb**	**0.0020**	**Jb**	**0.0032**	**Jb**	**0.0024**	**Jb**	**0.0044**	**Jb**	**0.0031**	**Jb**	**0.0060**	**Jb**	**0.0025**	**Jb**	**0.0049**	**Jb**	**0.0053**	**Jb**	**0.0083**	**Jb**	**0.0024**	**Jb**
Indeno[1,2,3-c,d]pyrene	193-39-5	ug/L	1.2 (g)	-		300	-	12	0.0074	0.014	0.0092	**0.014**	-	**0.0074**	**Jb**	**0.0088**	**Jb**	**0.0077**	**Jb**	**0.0089**	**Jb**	**0.0081**	**Jb**	**0.0097**	**Jb**	**0.0079**	**Jb**	**0.0096**	**Jb**	**0.0095**	**Jb**	**0.010**	-	**0.0082**	**Jb**
Naphthalene	91-20-3	ug/L	0.8 (g)	-	-	-	250	12	0.0019	0.024	0.0077	**0.024**	-	**0.012**	-	**0.0036**	**Jb**	**0.0076**	**Jb**	**0.0019**	**Jb**	**0.0051**	**Jb**	**0.0019**	**Jb**	**0.0061**	**Jb**	0.010	Ub	0.010	Ub	**0.0032**	**Jb**	**0.0077**	**Jb**
Phenanthrene	85-01-8	ug/L	0.5 (g)	7.7	-	7.7	4.6	12	0.0019	0.010	0.0067	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	**0.0023**	**Jb**	0.010	Ub	**0.0022**	**Jb**	**0.0020**	**Jb**	**0.0019**	**Jb**	**0.0020**	**Jb**
Pyrene	129-00-0	ug/L	1.5 (g)	-	-	300	0. 24	12	0.0024	0.0079	0.0049	**0.0037**	**Jb**	**0.0024**	**Jb**	**0.0048**	**Jb**	**0.0028**	**Jb**	**0.0066**	**Jb**	**0.0032**	**Jb**	**0.0079**	**Jb**	**0.0026**	**Jb**	**0.0071**	**Jb**	**0.0068**	**Jb**	**0.0077**	**Jb**	**0.0035**	**Jb**
PAH (Total) calculated (h)	130498-29-2	ug/L	-	-	-	-	-	12	0.020	0.059	0.037	**0.046**	-	**0.023**	-	**0.034**	-	**0.024**	-	**0.039**	-	**0.029**	-	**0.047**	-	**0.020**	-	**0.048**	-	**0.045**	-	**0.059**	-	**0.030**	-
Pesticides																																	
4,4'-DDT	50-29-3	ug/L	0.1	0.13	0.13 (G, ii)	0.065	0. 001	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Dieldrin	60-57-1	ug/L	0.03	0.71	0.71 (G)	0.355	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endrin	72-20-8	ug/L	0.1	0.037	0.037 (G)	0.0185	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endrin Aldehyde	7421-93-4	ug/L	0.1	-	0.037 (G)	0.0185	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Heptachlor	76-44-8	ug/L	0.1	0.053	0.053 (G)	0.0265	0. 004	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Heptachlor Epoxide	1024-57-3	ug/L	0.1	-	0.053 (G)	0.0265	0. 004	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Toxaphene	8001-35-2	ug/L	0.5	0.21	0.21	0.21	0. 0002	12	0.30	0.30	0.30	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U
Dioxins and Furans																																	
Total TEQ (j)	-	pg/L	-	-	-	-	-	12	0	0.094	0.011	**0.0085**	-	0	-	0	-	0	-	**0.0094**	(o)	**0.0038**	-	**0.0080**	-	**0.0032**	-	0	(o)	**0.010**	-	**0.094**	(o, p)	0	-
Metals (z, l)																																	
Antimony	7440-36-0	ug/L	3 (0.03) (m)	-	-	1500	500	12	1.2	5.0	4.4	**4.6**	**J**	**1.6**	**J**	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**1.2**	**J**	5.0	U	5.0	U	5.0	U
Arsenic	7440-38-2	ug/L	(m)	149	69 (A, D)	69	78	12	1.9	3.2	2.5	**1.9**	**J**	**2.5**	**J**	**2.1**	**J**	**3.1**	**J**	**2.8**	**J**	**2.5**	**J**	**2.5**	**J**	**2.1**	**J**	**3.2**	**J**	**2.3**	**J**	**2.3**	**J**	**3.1**	**J**
Barium	7440-39-3	ug/L	-	-	-	1000	-	12	64	82	74	**74**	-	**80**	-	**73**	-	**72**	-	**74**	-	**64**	-	**67**	-	**71**	-	**77**	-	**79**	-	**73**	-	**82**	-
Beryllium	7440-41-7	ug/L	0.2	-	-	1500	-	12	0.20	5.0	3.8	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**0.30**	**J**	**0.20**	**J**	5.0	U	**0.30**	**J**	5.0	U
Chromium (total)	7440-47-3	ug/L	1	-	-	-	103	12	0.80	5.0	2.2	**1.3**	**J**	**0.80**	**J**	**1.1**	**J**	5.0	U	**2.8**	**J**	5.0	U	**0.90**	**J**	5.0	U	**1.2**	**J**	**0.80**	**J**	**1.6**	**J**	**1.4**	**J**
Chromium (3+)	7440-47-3 (III)	ug/L	1	-	-	103000	-	12	0.30	2.0	0.78	**0.50**	**J**	**0.30**	**J**	**0.90**	**J**	1.0	U	**2.0**	-	**0.40**	**J**	**0.40**	**J**	1.0	U	**0.70**	**J**	**0.30**	**J**	**1.0**	-	**0.90**	**J**
Chromium (6+)	7440-47-3 (Cr6+)	ug/L	1	1090	1,100 (D)	1100	49.6	12	0.80	2.0	1.9	**0.80**	**Z-03, J**	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U
Copper	7440-50-8	ug/L	1 (0.1) (m)	13.5	4.8 (D, cc)	4.8	3.6	12	2.1	4.6	2.9	**2.5**	**J**	**2.4**	**J**	**3.0**	**J**	**2.2**	**J**	**3.0**	**J**	**2.3**	**J**	**3.3**	**J**	**2.1**	**J**	**3.4**	**J**	**2.5**	**J**	**4.6**	**J**	**3.2**	**J**
Lead	7439-92-1	ug/L	1 (0.03) (m)	133	210 (D)	210	5.3	12	0.80	5.0	2.4	**1.3**	**J**	5.0	U	**1.0**	**J**	5.0	U	**1.0**	**J**	5.0	U	**1.1**	**J**	5.0	U	**1.2**	**J**	**0.90**	**J**	**1.5**	**J**	**0.80**	**J**
Mercury	7439-97-6	ug/L	0.2 (0.0003) (m)	2.1	-	1.8	1.1	12	0.0020	0.020	0.015	0.020	U	0.020	U	0.020	U	0.020	U	**0.0020**	**J**	**0.013**	**J**	0.020	U	0.020	U	0.020	U	**0.0030**	**J**	0.020	U	**0.0030**	**J**
Nickel	7440-02-0	ug/L	1 (0.1) (m)	118	74 (D)	74	13.1	12	1.3	2.6	1.8	**1.3**	**J**	**1.8**	**J**	**1.7**	**J**	**1.3**	**J**	**2.5**	**J**	**1.4**	**J**	**1.7**	**J**	**1.4**	**J**	**1.4**	**J**	**1.8**	**J**	**2.6**	**J**	**2.1**	**J**
Silver	7440-22-4	ug/L	1 (0.1) (m)	2	1.9 (D)	0.95	-	12	0.90	9.2	3.9	**9.2**	-	**1.3**	**J**	**0.90**	**J**	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**3.1**	**J**	**1.2**	**J**	5.0	U	**1.3**	**J**
Zinc	7440-66-6	ug/L	1 (0.5) (m)	92.7	90 (D)	90	84.2	12	57	91	74	**57**	-	**77**	-	**78**	-	**79**	-	**62**	-	**91**	-	**88**	-	**83**	-	**58**	-	**65**	-	**86**	-	**68**	-
Miscellaneous Parameters																																	
Cyanide	57-12-5	ug/L	100 (n)	-	1 (Q)	1	5.6	12	10	10	10	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U
DOC rep1	NA	%	-	-	-	-	-	12	0.0039	0.010	0.0095	0.010	U	0.010	U	0.010	U	**0.0039**	**J**	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Total Suspended Solids	NA	ug/L	NA	-	-	-	-	12	6400	18700	10458	**11200**	-	**7600**	-	**8000**	-	**6400**	-	**7200**	-	**12700**	-	**8800**	-	**8800**	-	**9200**	-	**17300**	-	**18700**	-	**9600**	-
TOC rep1	NA	%	-	-	-	-	-	12	0.0046	0.010	0.0096	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0046**	**J**	0.01	U	0.010	U
TOC rep2	NA	%	-	-	-	-	-	12	0.0044	0.010	0.0087	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0055**	**J**	0.010	U	0.010	U	**0.0044**	**J**	**0.0044**	**J**
TOC rep3	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0095	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.00356**	**J**	0.010	U	0.010	U	0.010	U
TOC rep4	NA	%	-	-	-	-	-	12	0.0038	0.010	0.0066	**0.0038**	**J**	0.010	U	**0.0043**	J	0.010	U	**0.0038**	**J**	**0.0043**	**J**	0.010	U	**0.0047**	**J**	**0.0039**	**J**	**0.0041**	**J**	0.010	U	0.010	U
Total Organic Carbon	NA	%	0.1	-	-	-	-	12	0.0038	0.010	0.0090	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0041**	**J**	0.010	U	**0.0038**	**J**	0.010	U	0.010	U
Ammonia as N, filtered	7664-41-7	ug/L	30	-	-	-	-	12	115	320	254	**115**	-	**205**	-	**230**	-	**320**	-	**290**	-	**290**	-	**281**	-	**272**	-	**266**	-	**272**	-	**302**	-	**207**	-
Sulfide	184-96-258	ug/L	1	-	-	-	-	12	2.6	10	9.0	10	U	10	U	**5.3**	**J**	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	**2.6**	**J**
Petroleum Hydrocarbons																																	
C6-C12	NA	ug/L	-	-	-	-	-	12	1900	4600	4000	**2600**	**Jd**	4600	Uc	4600	Uc	4600	Uc	4600	Uc	4600	Uc	4500	Uc	4600	Uc	4600	Uc	**1900**	**Jd**	4600	Uc	**2200**	**Jd**

Table 5: Site Water Analytical Results and Screening, Detections and Exceedances[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

FOOTNOTES- lowercase footnotes were created by the table generator

a) The primary sources for this table were: TDLs - EPA 823-B-95-001, QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations. USEPA/USACE, Regional Implementation Agreement, July 2003; US EPA SW-846 http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm;

b) TSWQS Rule 307.6- (2014) https://www.tceq.texas.gov/waterquality/standards ; **NOTE**2018 TSWQSs were adopted by the commision on February 7, 2018, these Standards are effective for all state permits; however, until approved by USEPA, the 2014 Standards apply to federal permits.

c) EPA WQC- http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm; see EPA footnote section below for individual EPA value

d) NOAA- http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

e) Region 6 screening benchmarks come from TCEQ's ecological benchmarks for water,

f) Azobenzene is reported by the laboratory instead of 1,2-diphenylhydrazine. 1,2-diphenylhydrazine is rapidly oxidized into azobenzene during analysis.

g) These values are based on recommendations from the EPA Region 6 laboratory in Houston; these values were based on data or other technical basis;

h) PAHs did not have any elevated RL. PAH (total) calculated was determined by summing all non-U qualified data.

i) Total PCBs were not calculated since all analytes were nondetect, U qualified, and there were no elevated RL.

j) Total TEQ was calculated using 2005 WHO TEF values from Van den Berg et al; 2006 (doi:10.1093/toxsci/kfl055) and https://clu-in.org/download/contaminantfocus/dioxins/Dioxin_TEFs_for_TEQs.pdf. Total TEQ was calculacted by summing all TEF adjusted non-U qualified data.

l) Samples for metals analysis were diluted 10X for antimony, arsenic, barium, beryllium, cadmium, chromium (total), copper, lead, nickel, selenium, silver, thallium and zinc, 1X for chromium (3+), 2X for chromium (6+) and mercury

m) The values in parentheses are based on EPA "clean techniques", (EPA 1600 series methods) which are applicable in instances where other TDLs are inadequate to assess EPA water quality criteria;

n) This value recommended by Houston lab using colorimetric method. This value is based upon FREE cyanide, not complexed as the method is designed to analyze for. If free cyanide is expected, consult the laboratory as to the best method for quantifying free cyanide;

o) Total TEQ does not include J qualified result for Total Hepta CDD since there is no reported TEF for Total Hepta CDD.

p) Total TEQ does not include J qualified result for Total Hexa CDF since there is no reported TEF for Total Hexa CDF.

z) Metals are expressed as Dissolved values in water samples, except for mercury and selenium, which are reported as Total Recoverable Concentrations;

EPA WQC footnotes- uppercase and double-lettered footnotes are directly from the NRWQC footnotes; only footnotes for constituents of concern are retained in this table

A) This recommended water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive. Please consult the criteria document for details.

D) Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column. See "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic life Metals Criteria (PDF)," (49 pp, 3MB) October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available on NSCEP's web site and 40CFR§131.36(b)(1). Conversion Factors applied in the table can be found in Appendix A to the Preamble- Conversion Factors for Dissolved Metals.

G) This Criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (PDF) (153 pp, 7.3MB) (EPA 440/5-80-019), Chlordane (PDF) (68 pp, 3.1MB) (EPA 440/5-80-027), DDT (PDF) (175 pp, 8.3MB) (EPA 440/5-80-038), Endosulfan (PDF) (155 pp, 7.3MB) (EPA 440/5-80-046), Endrin (PDF) (103 pp, 4.6MB) (EPA 440/5-80-047), Heptachlor (PDF) (114 pp, 5.4MB) (EPA 440/5-80-052), Hexachlorocyclohexane (PDF) (109 pp, 4.8MB) (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines (PDF) (104 pp, 3.3MB). If evaluation is to be done using an averaging period, the acute criteria values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

Q) This recommended water quality criterion is expressed as ug free cyanide (as CN)/l.

Y) This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.

cc) When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be appropriate.

dd) Selenium criteria document (EPA 440/5-87-006, September 1987)states that if selenium is as toxic to saltwater fishes in the field as it is to freshwater fishes in the field, the status of the fish community should be monitored whenever the conc.of selenium exceeds 5.0 µg/l in salt water because the saltwater CCC does not take into account uptake via the food chain.

ii)This criterion applies to DDT and its metabolites (i.e., the total conc. DDT plus metabolites should not exceed this value).

Laboratory Qualifer

Cl	Residual Chlorine or other oxidizing agent was detected in the container used to analyze this sample.
J	Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.
Jb	Estimated value less than RL
Jd	Used for Pesticides, PCBs, Herbicides, Formaldehyde, Explosives and Method 504.1 analytes when there is a greater than 40 % difference for detected concentrations between the two GC columns.
U	Analyte included in the analysis, but not detected
Ua	Analyte included in the analysis, but not detected at or above the Reporting Limit
Ub	Compound was analyzed for but was not detected (non-detect)
Uc	Indicates the compound was analyzed for but not detected above the specified level.
Z-03	See case narrative.

Samples with Detections are BOLD

One or more sample concentrations exceed screening criteria

Sample concentration exceeds screening criteria

Table 6: Sediment Analytical Results, Detections and Exceedances[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Sediment Screening Criteria			No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SD		HSCNew-NMP-02-SD		HSCNew-NMP-03-SD		HSCNew-NMP-04-SD		HSCNew-NMP-05-SD		HSCNew-NMP-06-SD		HSCNew-NMP-07-SD		HSCNew-NMP-08-SD		HSCNew-NMP-09-SD		HSCNew-NMP-10-SD		HSCNew-NMP-11-SD		HSCNew-NMP-03-SD-Field Dup	
				NOAA (Marine-ERL) (b)	NOAA (Marine-ERM) (c)	Region 6 (Marine) (d)					10/6/2018		10/6/2018		10/5/2018		10/5/2018		10/4/2018		10/4/2018		10/3/2019		10/3/2018		10/2/2018		10/2/2018		10/2/2018		10/5/2018	
VOCs																																		
1,3-Dichlorobenzene	541-73-1	mg/kg	0.02	-	-	0.32	12	0.0024	0.015	0.0042	0.0035	Ua	**0.0079**	-	0.0024	Ua	**0.015**	-	0.003	Ua	0.0028	Ua	0.0029	Ua	0.0029	Ua	0.0028	Ua	0.0026	Ua	0.0027	Ua	0.0025	Ua
Acetone	67-64-1	mg/kg	-	-	-	167.23	12	0.059	0.26	0.13	0.086	Ua	**0.079**	-	0.059	Ua	**0.26**	-	**0.13**	-	**0.21**	-	**0.12**	-	**0.13**	-	**0.15**	-	**0.19**	-	**0.078**	-	0.062	Ua
Benzene	71-43-2	mg/kg	0.01	-	-	-	12	0.0024	0.047	0.0091	0.0035	Ua	**0.011**	-	0.0024	Ua	**0.047**	-	0.0025	Ua	0.0028	Ua	0.0029	Ua	**0.026**	-	0.0028	Ua	0.0026	Ua	0.0027	Ua	0.0025	Ua
Ethylbenzene	100-41-4	mg/kg	0.01	-	-	0.65	12	0.0024	0.042	0.0072	0.0035	Ua	**0.015**	-	0.0024	Ua	**0.0043**	-	0.0025	Ua	0.0028	Ua	**0.0037**	-	**0.042**	-	0.0028	Ua	0.0026	Ua	0.0027	Ua	0.0025	Ua
Methylcyclohexane	108-87-2	mg/kg	-	-	-	-	12	0.030	0.14	0.044	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	**0.14**	-	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
o-Xylene	95-47-6	mg/kg	-	-	-	-	12	0.030	0.075	0.039	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	**0.075**	-	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
m&p-Xylene	179601-23-1	mg/kg	-	-	-	-	12	0.030	0.078	0.039	0.043	Ua	0.036	Ua	0.030	Ua	**0.047**	-	0.032	Ua	0.036	Ua	0.037	Ua	**0.078**	-	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Toluene	108-88-3	mg/kg	0.01	-	-	0.94	12	0.0024	0.015	0.0041	0.0035	Ua	**0.0064**	-	0.0024	Ua	0.0037	Ua	0.0025	Ua	0.0028	Ua	0.0029	Ua	**0.015**	-	0.0028	Ua	0.0026	Ua	0.0027	Ua	0.0025	Ua
SVOCs																																		
1,3-Dichlorobenzene	541-73-1	ug/kg	20	-	-	-	12	36	78	50	78	Ub	**36**	**Jc**	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
Bis[2-ethylhexyl] Phthalate	117-81-7	ug/kg	50	-	-	182 (i)	12	22	2240	789	**100**	-	**229**	-	**22**	**Jc**	**2240**	-	**1020**	-	**1800**	-	**1250**	-	**598**	-	**293**	-	**1160**	-	**726**	-	**26**	**Jc**
Butyl Benzyl Phthalate	85-68-7	ug/kg	50	-	-	-	12	16	78	46	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	**17**	**Jc**	51	Ub	**16**	**Jc**	42	Ub
Diethyl Phthalate	84-66-2	ug/kg	50	-	-	-	12	8.1	78	48	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	**8.1**	**Jc**	51	Ub	45	Ub	42	Ub
Dimethyl Phthalate	131-11-3	ug/kg	50	-	-	-	12	24	78	49	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	**24**	**Jc**	42	Ub
Hexachlorobutadiene	87-68-3	ug/kg	20	-	-	-	12	11	55	44	**32**	**Jc**	**11**	**Jc**	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
PAHs (g)																																		
Acenaphthene	83-32-9	ug/kg	20	16	500	16	12	4.7	683	198	**9.2**	-	**66**	-	4.7	Ub	**311**	-	**35**	-	**57**	-	**206**	-	**476**	-	**683**	-	**410**	-	**118**	-	**5.7**	-
Acenaphthylene	208-96-8	ug/kg	20	44	640	44	12	2.2	92	38	**12**	-	**89**	-	**2.2**	**Jc**	**92**	-	**23**	-	**21**	-	**39**	-	**55**	-	**21**	-	**39**	-	**57**	-	**3.2**	**Jc**
Anthracene	120-12-7	ug/kg	20	85.3	1100	85.3	12	4.7	733	178	**20**	-	**56**	-	4.7	Ub	**162**	-	**35**	-	**44**	-	**179**	-	**733**	-	**465**	-	**288**	-	**136**	-	**12**	-
Benzo(a)anthracene	56-55-3	ug/kg	20	261	1600	261	12	8.0	902	357	**45**	-	**82**	-	**8.0**	-	**745**	-	**201**	-	**390**	-	**902**	-	**640**	-	**351**	-	**524**	-	**381**	-	**21**	-
Benzo(a)pyrene	50-32-8	ug/kg	20	430	1600	430	12	8.9	709	269	**63**	-	**159**	-	**8.9**	-	**539**	-	**166**	-	**327**	-	**709**	-	**292**	-	**187**	-	**434**	-	**324**	-	**22**	-
Benzo(b)fluoranthene	205-99-2	ug/kg	20	-	-	-	12	6.7	1110	346	**61**	-	**76**	-	**6.7**	-	**471**	-	**230**	-	**502**	-	**1110**	-	**406**	-	**263**	-	**604**	-	**405**	-	**23**	-
Benzo(e)pyrene	192-97-2	ug/kg	-	-	-	-	12	6.8	810	306	**64**	-	**132**	-	**6.8**	-	**670**	-	**227**	-	**361**	-	**810**	-	**360**	-	**201**	-	**488**	-	**335**	-	**20**	-
Benzo[g,h,i]perylene	191-24-2	ug/kg	20	-	-	-	12	7.0	671	284	**108**	-	**526**	-	**7.0**	-	**510**	-	**180**	-	**307**	-	**671**	-	**222**	-	**149**	-	**420**	-	**290**	-	**21**	-
Benzo(k)fluoranthene	207-08-9	ug/kg	20	-	-	-	12	5.2	545	203	**46**	-	**45**	-	**5.2**	-	**238**	-	**108**	-	**270**	-	**545**	-	**250**	-	**164**	-	**439**	-	**311**	-	**17**	-
Chrysene	218-01-9	ug/kg	20	384	2800	384	12	7.0	850	337	**53**	-	**76**	-	**7.0**	-	**651**	-	**210**	-	**370**	-	**850**	-	**536**	-	**291**	-	**585**	-	**389**	-	**23**	-
Dibenzo[a,h]anthracene	53-70-3	ug/kg	20	63.4	260	63.4	12	4.1	153	54	**8.2**	**Jc**	**4.6**	**Jc**	4.7	Ub	**153**	-	**41**	-	**66**	-	**147**	-	**41**	-	**32**	-	**80**	-	**62**	-	**4.1**	**Jc**
Fluoranthene	206-44-0	ug/kg	20	600	5100	600	12	14	1830	861	**126**	-	**543**	-	**14**	-	**1240**	-	**307**	-	**739**	-	**1830**	-	**1800**	-	**1120**	-	**1580**	-	**990**	-	**49**	-
Fluorene	86-73-7	ug/kg	20	19	540	19	12	4.7	614	202	**10**	-	**51**	-	4.7	Ub	**200**	-	**49**	-	**77**	-	**252**	-	**614**	-	**602**	-	**436**	-	**126**	-	**5.3**	-
Indeno[1,2,3-c,d]pyrene	193-39-5	ug/kg	20	-	-	-	12	7.3	563	206	**58**	-	**171**	-	**7.3**	-	**246**	-	**136**	-	**283**	-	**563**	-	**181**	-	**142**	-	**393**	-	**268**	-	**18**	-
Naphthalene	91-20-3	ug/kg	20	160	2100	160	12	2.1	463	74	**8.9**	-	**78**	-	**2.1**	**Jc**	**108**	-	**94**	-	**9.2**	-	**26**	-	**61**	-	**18**	-	**463**	-	**20**	-	5.0	Ub
Phenanthrene	85-01-8	ug/kg	20	240	1500	240	12	4.6	1860	665	**45**	-	**239**	-	**4.6**	**Jc**	**888**	-	**213**	-	**317**	-	**952**	-	**1860**	-	**1620**	-	**1300**	-	**528**	-	**20**	-
Pyrene	129-00-0	ug/kg	20	665	2600	665	12	19	1480	798	**211**	-	**1160**	-	**19**	-	**1480**	-	**378**	-	**644**	-	**1430**	-	**1430**	-	**865**	-	**1160**	-	**752**	-	**53**	-
PAH (Total) calculated	130498-29-2	ug/kg	20	4022	44792	4022	12	108	11220	5378	**948**	-	**3554**	-	**108**	-	**8704**	-	**2632**	-	**4783**	-	**11220**	-	**9957**	-	**7173**	-	**9643**	-	**5491**	-	**317**	-
Pesticides																																		
4,4'-DDD	72-54-8	ug/kg	5 (e)	2	20	1.22	12	0.59	10	3.6	**0.59**	-	**9.8**	-	**0.81**	-	**10**	-	**2.4**	-	**2.5**	-	**4.5**	-	**4.3**	-	**0.86**	-	**1.8**	-	**2.9**	-	**2.5**	-
4,4'-DDE	72-55-9	ug/kg	5 (e)	2.2	27	2.07	12	0.30	15	5.0	**0.30**	-	**3.4**	-	**0.40**	-	**9.2**	-	**5.1**	-	**8.9**	-	**15**	-	**7.2**	-	**1.6**	-	**2.0**	-	**5.7**	-	**1.6**	-
4,4'-DDT	50-29-3	ug/kg	5 (e)	1	7	1.19	12	0.082	9.3	1.5	0.29	U	0.23	U	**0.082**	**J**	**9.3**	-	**2.6**	-	0.21	U	0.21	U	**4.7**	-	0.23	U	0.18	U	0.21	U	0.18	U
Aldrin	309-00-2	ug/kg	3 (e)	-	-	-	12	0.17	0.47	0.24	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	**0.47**	-	0.18	U	0.21	U	0.18	U
Alpha-BHC	319-84-6	ug/kg	3 (e)	-	-	-	12	0.17	0.48	0.24	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	**0.48**	-	0.18	U	0.21	U	0.18	U
Dieldrin	60-57-1	ug/kg	5 (e)	0.02	8	0.715 (i)	12	0.17	0.79	0.27	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	**0.79**	-
Gamma-BHC (lindane)	58-89-9	ug/kg	3 (e)	-	-	0.32 (i)	12	0.17	0.86	0.38	0.29	U	**0.86**	-	0.19	U	0.26	U	**0.81**	-	**0.42**	-	**0.76**	-	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
alpha-Chlordane	5103-71-9	ug/kg	3 (e)	0.5	6	2.26 (i)	12	0.045	1.9	0.75	**0.045**	**J**	0.23	U	0.19	U	0.26	U	0.22	U	**1.9**	-	**1.9**	-	**1.1**	-	**0.71**	-	**0.76**	-	**1.6**	-	0.18	U
gamma-Chlordane	5566-34-7	ug/kg	3 (e)	0.5	6	2.26 (i)	12	0.10	2.2	0.45	0.29	U	**2.2**	-	**0.097**	**J**	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	**1.2**	-	0.18	U	0.21	U	0.18	U
Oxychlordane	26880-48-8	ug/kg	3 (e)	0.5	6	2.26 (i)	12	0.17	3.6	0.50	0.29	U	**3.6**	-	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
trans-Nonachlor	39765-80-5	ug/kg	3 (e)	0.5	6	2.26 (i)	12	0.17	1.4	0.48	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	**1.4**	-	0.21	U	0.17	U	**0.79**	-	**0.61**	-	**1.3**	-	0.18	U
PCBs																																		
PCB 101	37680-73-2	ug/kg	-	-	-	-	12	0.20	7.9	3.6	**0.50**	-	**5.1**	-	**0.20**	**J**	**7.9**	-	**2.1**	-	**5.7**	-	**6.7**	-	**3.8**	-	**1.6**	-	**2.3**	-	**5.2**	-	**1.5**	-
PCB 105	32598-14-4	ug/kg	-	-	-	-	12	0.050	1.7	0.78	0.50	U	**1.7**	-	**0.050**	**J**	**1.5**	-	**0.40**	-	**1.0**	-	**1.5**	-	**0.90**	-	**0.20**	**J**	**0.60**	-	**0.70**	-	**0.30**	-
PCB 118	31508-00-6	ug/kg	-	-	-	-	12	0.10	4.7	2.0	**0.20**	**J**	**2.8**	-	**0.10**	**J**	**4.7**	-	**1.3**	-	**3.3**	-	**3.8**	-	**2.6**	-	**0.90**	-	**1.1**	-	**2.2**	-	**1.1**	-
PCB 126	57465-28-8	ug/kg	-	-	-	-	12	0.20	0.40	0.31	**0.30**	**J**	0.40	U	0.30	U	0.40	U	0.40	U	0.30	U	0.30	U	0.30	U	**0.20**	**J**	0.30	U	0.30	U	**0.20**	**J**
PCB 128	38380-07-3	ug/kg	-	-	-	-	12	0.20	0.50	0.34	0.50	U	0.40	U	0.30	U	0.40	U	0.40	U	0.30	U	0.30	U	0.30	U	0.40	U	0.30	U	0.30	U	**0.20**	**J**
PCB 138	35065-28-2	ug/kg	-	-	-	-	12	0.10	7.0	3.2	**0.30**	**J**	**4.5**	-	**0.10**	**J**	**4.9**	-	**2.1**	-	**5.5**	-	**6.1**	-	**3.7**	-	**1.5**	-	**2.0**	-	**7.0**	-	**1.0**	-
PCB 153	35065-27-1	ug/kg	-	-	-	-	12	0.20	9.4	4.1	**0.50**	-	**4.8**	-	**0.20**	**J**	**6.3**	-	**2.8**	-	**6.9**	-	**7.3**	-	**4.4**	-	**2.0**	-	**2.7**	-	**9.4**	-	**1.3**	-
PCB 170	35065-30-6	ug/kg	-	-	-	-	12	0.30	3.0	1.2	0.50	U	**1.4**	-	0.30	U	**2.5**	-	**0.90**	-	**2.0**	-	**1.7**	-	**1.1**	-	**0.40**	-	**0.60**	-	**3.0**	-	**0.30**	-
PCB 18	37680-65-2	ug/kg	-	-	-	-	12	0.30	7.3	2.9	**0.60**	-	**5.5**	-	0.30	U	**6.3**	-	**2.1**	-	**3.1**	-	**7.3**	-	**3.0**	-	**1.1**	-	**1.7**	-	**2.2**	-	**1.2**	-
PCB 180	35065-29-3	ug/kg	-	-	-	-	12	0.060	5.9	1.8	**0.10**	**J**	**1.5**	-	**0.060**	**J**	**2.4**	-	**1.3**	-	**2.9**	-	**2.8**	-	**1.8**	-	**1.0**	-	**1.3**	-	**5.9**	-	**0.40**	-
PCB 187	52663-68-0	ug/kg	-	-	-	-	12	0.030	3.0	0.97	**0.090**	**J**	**1.0**	-	**0.030**	**J**	**1.7**	-	0.40	U	**1.5**	-	**1.5**	-	**0.90**	-	**0.60**	-	**0.60**	-	**3.0**	-	**0.30**	-
PCB 28	7012-37-5	ug/kg	-	-	-	-	12	0.30	13	3.5	**1.1**	-	**2.7**	-	**0.30**	-	**13**	-	**3.3**	-	**4.4**	-	**5.4**	-	**2.1**	-	**1.3**	-	**2.6**	-	**3.9**	-	**2.2**	-
PCB 44	41464-39-5	ug/kg	-	-	-	-	12	0.20	5.9	2.6	**0.70**	-	**5.1**	-	**0.20**	**J**	**5.9**	-	**1.8**	-	**4.0**	-	**4.9**	-	**2.0**	-	**1.1**	-	**1.5**	-	**2.5**	-	**1.2**	-
PCB 52	35693-99-3	ug/kg	-	-	-	-	12	0.20	7.6	3.1	**1.1**	-	**6.5**	-	**0.20**	**J**	**7.6**	-	**2.4**	-	**3.3**	-	**6.0**	-	**2.8**	-	**0.90**	-	**1.7**	-	**2.6**	-	**1.7**	-
PCB 66	32598-10-0	ug/kg	-	-	-	-	12	0.20	7.6	2.3	**0.60**	-	**4.8**	-	**0.20**	**J**	**7.6**	-	**2.1**	-	**2.7**	-	**3.4**	-	**1.5**	-	**0.50**	-	**0.80**	-	**1.9**	-	**1.2**	-
PCB 77	32598-13-3	ug/kg	-	-	-	-	12	0.08	1.1	0.46	**0.080**	**J**	**1.0**	-	0.30	U	**1.1**	-	**0.50**	-	**0.50**	-	**0.60**	-	**0.50**	-	**0.10**	**J**	**0.30**	-	**0.40**	-	**0.10**	**J**
PCB 8	34883-43-7	ug/kg	-	-	-	-	12	0.30	4.2	0.96	**0.70**	-	0.40	U	0.30	U	0.40	U	0.40	U	0.30	U	**4.2**	-	0.30	U	**0.50**	-	**1.4**	-	**1.6**	-	**1.0**	-

Table 6: Sediment Analytical Results, Detections and Exceedances[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Sediment Screening Criteria			No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SD		HSCNew-NMP-02-SD		HSCNew-NMP-03-SD		HSCNew-NMP-04-SD		HSCNew-NMP-05-SD		HSCNew-NMP-06-SD		HSCNew-NMP-07-SD		HSCNew-NMP-08-SD		HSCNew-NMP-09-SD		HSCNew-NMP-10-SD		HSCNew-NMP-11-SD		HSCNew-NMP-03-SD-Field Dup	
				NOAA (Marine-ERL) (b)	NOAA (Marine-ERM) (c)	Region 6 (Marine) (d)					10/6/2018		10/6/2018		10/5/2018		10/5/2018		10/4/2018		10/4/2018		10/3/2019		10/3/2018		10/2/2018		10/2/2018		10/2/2018		10/5/2018	
Total PCB Congeners calculated (h)	NA	ug/kg	1	22.7	180	22.7	12	2.7	74	34	**7.9**	J	**49**	-	**2.7**	J	**74**	-	**24**	-	**47**	-	**64**	-	**32**	-	**14**	-	**22**	-	**52**	-	**15**	-
Dioxins and Furans																																		
Total TEQ (j)	NA	pg/g	-	-	-	-	12	2.8	1370	161	**28**	-	**166**	-	**2.8**	-	**1370**	-	**108**	-	**34**	-	**76**	-	**65**	-	**5.5**	-	**15**	-	**8.3**	-	**54**	-
Metals (k)																																		
Antimony	7440-36-0	mg/kg	2.5	2	-	-	12	0.10	0.52	0.33	**0.27**	-	**0.19**	-	**0.10**	-	**0.42**	-	**0.28**	-	**0.37**	-	**0.50**	-	**0.43**	-	**0.41**	-	**0.52**	-	**0.32**	-	**0.14**	-
Arsenic	7440-38-2	mg/kg	0.3 (e)	8.2	70	8.2	12	1.9	6.2	3.62	**4.1**	-	**2.6**	-	**2.1**	-	**6.2**	-	**3.9**	-	**3.6**	-	**3.0**	-	**4.5**	-	**4.9**	-	**4.1**	-	**2.6**	-	**1.9**	-
Barium	7440-39-3	mg/kg	-	-	-	-	12	66	263	151	**129**	MB-02, B	**108**	MB-02, B	**66**	MB-02, B	**263**	MB-02, B	**137**	MB-02, B	**130**	MB-02, B	**140**	MB-02, B	**216**	MB-02, B	**211**	MB-02, B	**178**	MB-02, B	**124**	MB-02, B	**109**	MB-02, B
Beryllium	7440-41-7	mg/kg	1 (e)	-	-	-	12	0.41	1.8	0.83	**0.99**	-	**0.75**	-	**0.41**	-	**1.1**	-	**0.78**	-	**0.64**	-	**0.68**	-	**0.94**	-	**1.8**	-	**0.86**	-	**0.49**	-	**0.48**	-
Cadmium	7440-43-9	mg/kg	0.1	1.2	9.6	1.2	12	0.058	2.1	0.61	**0.18**	-	**0.30**	-	**0.058**	J	**2.1**	-	**0.56**	-	**0.95**	-	**0.82**	-	**0.77**	-	**0.39**	-	**0.64**	-	**0.50**	-	**0.13**	-
Chromium (total)	7440-47-3	mg/kg	1 (e)	81	370	81	12	10	66	28	**26**	-	**23**	-	**10**	-	**66**	-	**28**	-	**32**	-	**29**	-	**34**	-	**31**	-	**26**	-	**17**	-	**12**	-
Chromium (3+)	7440-47-3 (III)	mg/kg	1	-	-	-	12	10	66	28	**26**	-	**23**	-	**10**	-	**66**	-	**28**	-	**32**	-	**29**	-	**34**	-	**31**	-	**26**	-	**17**	-	**12**	-
Chromium (6+)	7440-47-3 (Cr6+)	mg/kg	1	-	-	-	12	0.014	0.022	0.018	**0.022**	J	**0.020**	J	**0.022**	J	**0.020**	J	**0.014**	J	**0.020**	J	**0.016**	J	**0.015**	J	**0.018**	J	**0.015**	J	**0.019**	J	**0.020**	J
Copper	7440-50-8	mg/kg	1 (e)	34	270	34	12	4.6	40	19	**14**	-	**11**	-	**4.6**	-	**40**	-	**19**	-	**23**	-	**27**	-	**25**	-	**19**	-	**25**	-	**14**	-	**7.0**	-
Lead	7439-92-1	mg/kg	0.3 (e)	46.7	218	46.7	12	8.4	81	39	**25**	-	**32**	-	**8.4**	-	**81**	-	**32**	-	**48**	-	**70**	-	**60**	-	**26**	-	**38**	-	**33**	-	**16**	-
Mercury	7439-97-6	mg/kg	0.2	0.15	0.71	0.15	12	0.012	0.41	0.15	**0.20**	-	**0.40**	-	**0.012**	-	**0.41**	-	**0.082**	-	**0.12**	-	**0.22**	-	**0.16**	-	**0.048**	-	**0.11**	-	**0.063**	-	**0.026**	-
Nickel	7440-02-0	mg/kg	0.5 (e)	20.9	51.6	20.9	12	7.0	26	15	**15**	-	**14**	-	**7.9**	-	**26**	-	**14**	-	**15**	-	**11**	-	**19**	-	**22**	-	**15**	-	**11**	-	**7.0**	-
Selenium	7782-49-2	mg/kg	0.5 (e)	-	-	-	12	2.2	11	3.9	**3.9**	-	**3.6**	-	**2.8**	-	**4.7**	-	**3.3**	-	**3.4**	-	**2.4**	-	**3.3**	-	**11**	-	**3.4**	-	**2.2**	-	**2.8**	-
Silver	7440-22-4	mg/kg	0.2	1	3.7	1	12	0.049	0.82	0.42	**0.23**	B	**0.14**	B	**0.049**	J, B	**0.70**	B	**0.40**	B	**0.77**	B	**0.82**	B	**0.62**	B	**0.32**	B	**0.53**	B	**0.36**	B	**0.11**	B
Thallium	7440-28-0	mg/kg	0.2	-	-	-	12	0.100	0.34	0.18	**0.23**	-	**0.17**	-	**0.10**	-	**0.34**	-	**0.17**	-	**0.15**	-	**0.15**	-	**0.21**	-	**0.24**	-	**0.17**	-	**0.11**	-	**0.10**	-
Zinc	7440-66-6	mg/kg	2 (e)	150	410	150	12	20	237	107	**90**	-	**59**	-	**20**	-	**237**	-	**99**	-	**122**	-	**168**	-	**133**	-	**96**	-	**139**	-	**91**	-	**36**	-
Miscellaneous Parameters																																		
Acid Volatile Sulfide	NA	mg/kg	0.1	-	-	-	12	27	1130	320	**169**	-	**567**	-	**27**	-	**1130**	-	**486**	-	**235**	-	**485**	-	**311**	-	**48**	-	**188**	-	**161**	-	**27**	-
Volatile Solids	NA	mg/kg	10000	-	-	-	12	10600	62600	39050	**35800**	-	**29600**	-	**10600**	-	**62600**	-	**39300**	-	**41800**	-	**45200**	-	**56800**	-	**50500**	-	**46300**	-	**32500**	-	**17600**	-
% Moisture	NA	%	-	-	-	-	12	19	50	33	**50**	-	**35**	-	**19**	-	**45**	-	**35**	-	**33**	-	**32**	-	**31**	-	**31**	-	**34**	-	**28**	-	**20**	-
% Solids	NA	%	0.10%	-	-	-	12	50	81	67	**50**	-	**65**	-	**81**	-	**55**	-	**66**	-	**68**	-	**68**	-	**69**	-	**69**	-	**66**	-	**72**	-	**80**	-
TOC Min	NA	%	-	-	-	-	12	0.12	0.55	0.34	0.34	Ua	**0.27**	-	**0.12**	-	**0.50**	-	**0.36**	-	**0.26**	-	**0.44**	-	**0.33**	-	**0.34**	-	**0.55**	-	**0.38**	-	**0.20**	-
TOC Max	NA	%	-	-	-	-	12	0.23	0.70	0.43	**0.58**	-	**0.31**	-	**0.24**	-	**0.56**	-	**0.41**	-	**0.38**	-	**0.56**	-	**0.40**	-	**0.42**	-	**0.70**	-	**0.41**	-	**0.23**	-
TOC Mean	NA	%	0.10%	-	-	-	12	0.15	0.61	0.38	**0.47**	-	**0.30**	-	**0.15**	-	**0.54**	-	**0.39**	-	**0.31**	-	**0.49**	-	**0.37**	-	**0.38**	-	**0.61**	-	**0.41**	-	**0.22**	-
Ammonia as N, filtered	7664-41-7	mg/kg	0.1	-	-	-	12	13	235	124	**123**	B	**114**	B	**13**	B	**139**	B	**117**	B	**149**	B	**235**	B	**165**	B	**110**	B	**170**	B	**133**	B	**22**	B
Petroleum Hydrocarbons																																		
>C12-C28	NA	mg/kg	-	-	-	-	12	7.3	870	168.2	**30**	Ja	**250**	-	**8.3**	Ja	**870**	-	**7.3**	Ja	**150**	-	**77**	-	**130**	-	**310**	-	**42**	Bb	**44**	Bb	**100**	-
>C28-C35	NA	mg/kg	-	-	-	-	12	11	140	49.1	**19**	Ja	**46**	Ja	**11**	Ja	**140**	-	**12**	Ja	**81**	Bb	**49**	Bb	**44**	Bb	**100**	-	**33**	Ja	**26**	Ja	**28**	Ja
C6-C12	NA	mg/kg	-	-	-	-	12	7.3	94	22.9	**19**	Ja	**41**	Ja	**7.8**	Ja	**94**	-	**7.3**	Ja	**15**	Ja	**12**	Ja	**17**	Ja	**23**	Ja	**12**	Ja	**11**	Ja	**16**	Ja
C6-C35	NA	mg/kg	-	-	-	-	12	24	1100	237	**62**	Ja	**340**	-	**24**	Ja	**1100**	-	**24**	Ja	**240**	-	**140**	Bb	**190**	-	**430**	-	**84**	Bb	**71**	Bb	**140**	Bb

FOOTNOTES- lowercase footnotes were created by the table generator

a) The primary sources for this table were: TDLs - EPA 823-B-95-001, QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations. USEPA/USACE, Regional Implementation Agreement, July 2003; US EPA SW-846 http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm;

b) NOAA- http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

c) These values are based on recommendations from the EPA Region 6 Laboratory in Houston; these values were based on data or other technical basis;

d) Region 6 screening benchmarks come from TCEQ's ecological benchmarks for sediment, http://www.tceq.state.tx.us/assets/public/remediation/eco/0106eragupdate.pdf; unless otherwise noted, benchmarks are Effects Range Low (ERL) from: Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder. 1995. Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. Environ. Manage. 19(1):81-97; see footnote (i)

e) These values are based on recommendations from the EPA Region 6 Laboratory in Houston; these values were based on data or other technical basis;

g) PAHs methylnapthalene and 2-methylnapthalene were not analyzed for by the laboratory

h) Total PCBs for Region 6 from "Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (revised) January 2006; Total PCBs for NOAA from Squirt Table for Organics in Sediment

i) Threshold Effects Level (TEL) from: Smith, S.L., D.D. MacDonald, K.A. Keenleyside, and C.L. Gaudet. 1996b. The Development and Implementation of Canadian Sediment Quality Guidelines. In: Development and Progress in Sediment Quality Assessment: Rationale, Challenges, Techniques & Strategies. Ecovision World Monograph Series. Munawar & Dave (Eds.). Academic Publishing, Amsterdam, The Netherlands.

j) Total TEQ was calculated using 2005 WHO TEF values from Van den Berg et al; 2006 (doi:10.1093/toxsci/kfl055) and https://clu-in.org/download/contaminantfocus/dioxins/Dioxin_TEFs_for_TEQs.pdf. Total TEQ was calculacted by summing all non-U qualified data.

k) Samples for metals analysis were diluted 4X for antimony, arsenic, barium, beryllium, cadmoum, chromium (total), copper, lead, nickel, selenium, silver, 1X for chromium (3+) and chromium (+6), 2X for zinc and mercury

Laboratory Qualifer

B	Analyte is found in the associated blank as well as in the sample.
Bb	Indicates the analyte was detected in the laboratory method blank analyzed concurrently with the sample.
J	Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.
Ja	Estimated value. This analyte was detected in the sample at a concentration less than the laboratory Limit of Quantitation, but above the Method Detection Limit.
Jc	Estimated value less than RL
MB-02	The method blank contains the analyte at a concentration above the MRL due to memory interferences.
U	Analyte included in the analysis, but not detected
Ua	Analyte included in the analysis, but not detected at or above the Reporting Limit
Ub	Compound was analyzed for but was not detected (non-detect)
Uc	Undetected at the limit of quantitation.

Samples with Detections are BOLD

One or more sample concentrations exceed criteria

Sample concentration exceeds criteria

Table 7: Modified Elutriate Testing Analytical Results, Detections and Exceedances[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria: TSWQS (Acute) (b)	EPA WQC (Acute) (o)	NOAA (Marine Acute) (p)	Region 6 (Marine Chronic) (q)	No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-EL 10/29/2018		HSCNew-NMP-02-EL 10/29/2018		HSCNew-NMP-03-EL 10/29/2018		HSCNew-NMP-04-EL 10/29/2018		HSCNew-NMP-05-EL 10/29/2018		HSCNew-NMP-06-EL 10/29/2018		HSCNew-NMP-07-EL 10/29/2018		HSCNew-NMP-08-EL 10/29/2018		HSCNew-NMP-09-EL 10/29/2018		HSCNew-NMP-10-EL 10/29/2018		HSCNew-NMP-11-EL 10/29/2018		HSCNew-NMP-03-EL-Field Dup 10/29/2018	
VOCs																																			
1,3-Dichlorobenzene	541-73-1	ug/L	0.9	-	-	1970	142	12	0.47	0.90	0.86	0.90	Ua	0.90	Ua	0.90	Ua	**0.47**	**Jc**	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua
2-Butanone	78-93-3	ug/L	-	-	-	-	-	12	3.2	10	7.1	10	Ua	10	Ua	10	Ua	**5.1**	**Jc**	**3.5**	**Jc**	**3.3**	**Jc**	**5.6**	**Jc**	**4.0**	**Jc**	10	Ua	10	Ua	**3.2**	**Jc**	10	Ua
Acetone	67-64-1	ug/L	-	-	-	-	282000	12	10	74	42	**33**	-	**19**	-	10	Ua	**49**	-	**74**	-	**42**	-	**45**	-	**46**	-	**46**	-	**60**	-	**54**	-	**27**	-
Benzene	71-43-2	ug/L	2	-	-	5100	109	12	0.47	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	**0.47**	**Jc**	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Chloroform	67-66-3	ug/L	2	-	-	-	4100	12	0.50	0.50	0.50	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	**0.50**	-	0.50	Ua
Chloromethane	74-87-3	ug/L	-	-	-	-	13500	12	1.0	3.4	1.6	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	**3.4**	-	**2.7**	-	1.0	Ua	**2.1**	-	1.0	Ua	1.0	Ua	**3.1**	-
Methylcyclohexane	108-87-2	ug/L	-	-	-	-	-	12	1.0	1.2	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	**1.2**	-	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Methylene chloride	75-09-2	ug/L	-	-	-	-	5420	12	4.0	16	8.3	**4.6**	-	**4.0**	**Jc**	**4.0**	**Jc**	**4.0**	-	**8.8**	-	**14**	-	**14**	-	**15**	-	**16**	-	**4.7**	-	4.0	Ua	**6.2**	-
o-Xylene	95-47-6	ug/L	-	-	-	-	-	12	0.43	2.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	**0.92**	**Jc**	1.0	Ua	1.0	Ua	**0.43**	**Jc**	**2.0**	-	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
m&p-Xylene	179601-23-1	ug/L	-	-	-	-	-	12	0.90	2.0	1.8	2.0	Ua	2.0	Ua	2.0	Ua	**0.98**	**Jc**	2.0	Ua	2.0	Ua	2.0	Ua	**0.90**	**Jc**	2.0	Ua	2.0	Ua	2.0	Ua	2.0	Ua
SVOCs																																			
1,3-Dichlorobenzene	541-73-1	ug/L	0.9 (g)	-	-	1970	142	12	0.10	0.52	0.44	0.50	Ub	**0.10**	**Jb**	0.50	Ub	**0.15**	**Jb**	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Bis[2-ethylhexyl] Phthalate	117-81-7	ug/L	2 (g)	-	-	400	-	12	0.10	1.7	0.27	**0.17**	**Jb**	**0.10**	**Jb**	**0.10**	**Jb**	**0.15**	**Jb**	**0.19**	**Jb**	**0.14**	**Jb**	**1.7**	-	**0.12**	**Jb**	**0.16**	**Jb**	**0.13**	**Jb**	**0.12**	**Jb**	**0.20**	**Jb**
Di-n-butyl Phthalate	84-74-2	ug/L	1 (g)	-	-	2944	NA	12	0.15	0.68	0.28	**0.68**	-	**0.22**	**Jb**	**0.36**	**Jb**	**0.15**	**Jb**	**0.21**	**Jb**	**0.22**	**Jb**	**0.15**	**Jb**	**0.19**	**Jb**	**0.40**	**Jb**	**0.22**	**Jb**	**0.29**	**Jb**	**0.32**	**Jb**
Hexachlorobutadiene	87-68-3	ug/L	0.9 (g)	-	-	32	0. 32	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Hexachlorocyclopentadiene	77-47-4	ug/L	3.0 (g)	-	-	7	0. 07	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
PAHs (d)																																			
Acenaphthene	83-32-9	ug/L	0.75 (g)	-	-	970	40.4	12	0.0099	5.9	0.85	**0.061**	-	**0.59**	-	**0.0099**	-	**0.68**	-	**0.18**	-	**0.060**	-	**0.47**	-	**1.3**	-	**5.9**	-	**0.58**	-	**0.17**	-	**0.17**	-
Acenaphthylene	208-96-8	ug/L	1.0 (g)	-	-	300	-	12	0.0033	0.087	0.021	**0.0033**	**Jb**	**0.087**	-	0.0094	Ub	**0.024**	-	**0.012**	-	**0.0066**	**Jb**	**0.017**	-	**0.029**	-	**0.029**	-	**0.011**	-	**0.015**	-	**0.0056**	**Jb**
Anthracene	120-12-7	ug/L	0.6 (g)	-	-	300	0. 18	12	0.0045	0.85	0.17	**0.011**	-	**0.079**	-	**0.0045**	**Jb**	**0.15**	-	**0.037**	-	**0.013**	-	**0.096**	-	**0.62**	-	**0.85**	-	**0.10**	-	**0.013**	-	**0.057**	-
Benzo(a)anthracene	56-55-3	ug/L	0.4 (g)	-	-	300	-	12	0.0022	0.029	0.014	**0.0022**	**Jb**	**0.0062**	**Jb**	0.0094	Ub	**0.021**	-	**0.0091**	**Jb**	**0.013**	-	**0.022**	-	**0.026**	-	**0.029**	-	**0.012**	-	**0.014**	-	**0.0066**	**Jb**
Benzo(a)pyrene	50-32-8	ug/L	0.3 (g)	-	-	300	-	12	0.0012	0.010	0.0043	**0.0012**	**Jb**	**0.0019**	**Jb**	0.0094	Ub	**0.0044**	**Jb**	**0.0028**	**Jb**	**0.0036**	**Jb**	**0.0056**	**Jb**	**0.0033**	**Jb**	**0.0032**	**Jb**	**0.0022**	**Jb**	**0.0035**	**Jb**	0.010	Ub
Benzo(b)fluoranthene	205-99-2	ug/L	0.6 (g)	-	-	300	-	12	0.0027	0.010	0.0059	0.0099	Ub	0.010	Ub	0.0094	Ub	**0.0041**	**Jb**	**0.0030**	**Jb**	**0.0045**	**Jb**	**0.0072**	**Jb**	**0.0033**	**Jb**	**0.0034**	**Jb**	**0.0027**	**Jb**	**0.0039**	**Jb**	0.010	Ub
Benzo(e)pyrene	192-97-2	ug/L	-	-	-	-	-	12	0.0018	0.010	0.0047	**0.0018**	**Jb**	**0.0020**	**Jb**	0.0094	Ub	**0.0051**	**Jb**	**0.0035**	**Jb**	**0.0046**	**Jb**	**0.0068**	**Jb**	**0.0035**	**Jb**	**0.0034**	**Jb**	**0.0026**	**Jb**	**0.0038**	**Jb**	0.010	Ub
Benzo[g,h,i]perylene	191-24-2	ug/L	1.2 (g)	-	-	300	-	12	0.0017	0.010	0.0055	**0.0017**	**Jb**	**0.0024**	**Jb**	0.0094	Ub	**0.0026**	**Jb**	**0.0021**	**Jb**	**0.0024**	**Jb**	**0.0031**	**Jb**	0.0099	Ub	0.010	Ub	0.010	Ub	**0.0022**	**Jb**	0.010	Ub
Benzo(k)fluoranthene	207-08-9	ug/L	0.6 (g)	-	-	300	-	12	0.0018	0.010	0.0050	0.0099	Ub	0.010	Ub	0.0094	Ub	**0.0021**	**Jb**	**0.0022**	**Jb**	**0.0024**	**Jb**	**0.0040**	**Jb**	**0.0026**	**Jb**	**0.0024**	**Jb**	**0.0018**	**Jb**	**0.0030**	**Jb**	0.010	Ub
Chrysene	218-01-9	ug/L	0.3 (g)	-	-	300	-	12	0.0014	0.026	0.014	**0.0029**	**Jb**	**0.0075**	**Jb**	**0.0014**	**Jb**	**0.022**	-	**0.012**	-	**0.017**	-	**0.026**	-	**0.025**	-	**0.026**	-	**0.013**	-	**0.015**	-	**0.0067**	**Jb**
Dibenzo[a,h]anthracene	53-70-3	ug/L	1.3 (g)	-	-	300	-	12	0.00076	0.010	0.0092	0.0099	Ub	0.010	Ub	0.0094	Ub	0.010	Ub	0.0099	Ub	0.010	Ub	**0.00076**	**Jb**	0.0099	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub
Fluoranthene	206-44-0	ug/L	0.9 (g)	-	-	40	2.96	12	0.017	0.61	0.21	**0.021**	-	**0.26**	-	**0.017**	-	**0.26**	-	**0.085**	-	**0.12**	-	**0.25**	-	**0.48**	-	**0.61**	-	**0.20**	-	**0.14**	-	**0.10**	-
Fluorene	86-73-7	ug/L	0.6 (g)	-	-	300	50	12	0.0060	3.8	0.60	**0.035**	-	**0.30**	-	**0.0060**	**Jb**	**0.53**	-	**0.15**	-	**0.023**	-	**0.36**	-	**1.4**	-	**3.8**	-	**0.44**	-	**0.041**	-	**0.12**	-
Indeno[1,2,3-c,d]pyrene	193-39-5	ug/L	1.2 (g)			300	-	12	0.0052	0.0077	0.0063	**0.0059**	**Jb**	**0.0060**	**Jb**	**0.0052**	**Jb**	**0.0064**	**Jb**	**0.0068**	**Jb**	**0.0070**	**Jb**	**0.0077**	**Jb**	**0.0061**	**Jb**	**0.0060**	**Jb**	**0.0063**	**Jb**	**0.0068**	**Jb**	**0.0055**	**Jb**
Naphthalene	91-20-3	ug/L	0.8 (g)	-	-	-	250	12	0.0029	0.52	0.072	**0.0065**	**Jb**	**0.52**	-	**0.0058**	**Jb**	**0.010**	**Jb**	**0.0094**	**Jb**	**0.0059**	**Jb**	**0.048**	-	**0.053**	-	**0.098**	-	**0.097**	-	**0.0029**	**Jb**	**0.011**	-
Phenanthrene	85-01-8	ug/L	0.5 (g)	7.7	-	7.7	4.6	12	0.0050	3.8	0.67	**0.036**	-	**0.46**	-	**0.0067**	**Jb**	**0.91**	-	**0.20**	-	**0.0050**	**Jb**	**0.43**	-	**1.6**	-	**3.8**	-	**0.38**	-	**0.0068**	**Jb**	**0.14**	-
Pyrene	129-00-0	ug/L	1.5 (g)	-	-	300	0. 24	12	0.017	0.33	0.14	**0.023**	-	**0.33**	-	**0.017**	-	**0.20**	-	**0.067**	-	**0.092**	-	**0.13**	-	**0.25**	-	**0.28**	-	**0.10**	-	**0.092**	-	**0.074**	-
PAHs (Total) calculated (e)	130498-29-2	ug/L	-	-	-	-	-	12	0.073	16	2.8	**0.21**	-	**2.7**	-	**0.073**	**J**	**2.8**	-	**0.77**	-	**0.38**	-	**1.9**	-	**5.8**	-	**16**	-	**2.0**	-	**0.52**	-	**0.70**	-
Pesticides																																			
4,4'-DDT	50-29-3	ug/L	0.1	0.13	0.13 (G, ii)	0.065	0. 001	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Dieldrin	60-57-1	ug/L	0.03	0.71	0.71 (G)	0.355	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endrin	72-20-8	ug/L	0.1	0.037	0.037 (G)	0.0185	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endrin Aldehyde	7421-93-4	ug/L	0.1	-	0.037 (G)	0.0185	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Heptachlor	76-44-8	ug/L	0.1	0.053	0.053 (G)	0.0265	0. 004	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	**0.0060**	-	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Heptachlor Epoxide	1024-57-3	ug/L	0.1	-	0.053 (G)	0.0265	0. 004	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Toxaphene	8001-35-2	ug/L	0.5	0.21	0.21	0.21	0. 0002	12	0.30	0.30	0.30	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U
PCBs																																			
PCB 153	35065-27-1	ug/L	-	-	-	-	-	12	0.0020	0.0060	0.0057	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	**0.0020**	**H, Z-03, J**	0.0060	H, Z-03, U
PCB 52	35693-99-3	ug/L	-	-	-	-	-	12	0.0040	0.0060	0.0058	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	**0.0040**	**H, Z-03, J**	0.0060	H, Z-03, U
Total PCB Congeners calculated (f)	NA	ug/L	0.01	-	-	0.033	-	12	0	0.006	0.0005	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	**0.0060**	H, Z-03, U	0	H, Z-03, U
Dioxins and Furans																																			
Total TEQ (j)	NA	-	-	-	-	-	-	12	0	10	1.5	**0.062**	**j**	**0.52**	**j**	0	-	**10**	**j**	**0.42**	**j**	0	j	**3.3**	**j**	**0.0035**	-	0	-	0	-	0	-	**3.1**	**j**
Metals (l, m)																																			
Antimony	7440-36-0	ug/L	3 (0.03) (h)	-	-	1500	500	12	1.1	5.7	3.0	**5.7**	-	**3.4**	**J**	**1.1**	**J**	**3.7**	**J**	**2.6**	**J**	**2.7**	**J**	**4**	**J**	**2.1**	**J**	**3.4**	**J**	**3.4**	**J**	**2.7**	**J**	**1.1**	**J**
Arsenic	7440-38-2	ug/L	1 (0.011) (h)	149	69 (A, D)	69	78	12	1.7	5.1	2.7	**5.1**	-	**1.7**	**J**	**2.7**	**J**	**4.1**	**J**	**2.2**	**J**	**2.8**	**J**	**3.6**	**J**	**1.7**	**J**	**1.8**	**J**	**2.3**	**J**	**2.5**	**J**	**2.1**	**J**
Barium	7440-39-3	ug/L	-	-	-	1000	-	12	161	951	322	**265**	-	**167**	-	**215**	-	**189**	-	**189**	-	**186**	-	**161**	-	**288**	-	**951**	-	**532**	-	**340**	-	**386**	-
Beryllium	7440-41-7	ug/L	0.2	-	-	1500	-	12	0.20	5.0	3.8	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**0.20**	**J**	**0.20**	**J**	**0.70**	**J**	5.0	U
Copper	7440-50-8	ug/L	1 (0.1) (h)	13.5	4.8 (D, cc)	4.8	3.6	12	0.60	5.0	4.0	5.0	U	5.0	U	**1.5**	**J**	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**0.70**	**J**	**0.60**	**J**	5.0	U
Lead	7439-92-1	ug/L	1 (0.03) (h)	133	210 (D)	210	5.3	12	5.0	16	5.9	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**16**	-	5.0	U	5.0	U
Mercury	7439-97-6	ug/L	0.2 (0.0003) (h)	2.1	-	1.8	1.1	12	0.0020	0.052	0.022	**0.022**	-	**0.016**	**J**	**0.0050**	**J**	**0.051**	-	**0.0050**	**J**	**0.031**	-	**0.039**	-	**0.052**	-	**0.0060**	**J**	**0.0090**	**J**	**0.0020**	**J**	0.020	U
Nickel	7440-02-0	ug/L	1 (0.1) (h)	118	74 (D)	74	13.1	12	1.4	2.5	1.8	**1.9**	**J**	**2.4**	**J**	**2.5**	**J**	**2.3**	**J**	**1.5**	**J**	**1.5**	**J**	**1.5**	**J**	**1.5**	**J**	**1.4**	**J**	**1.7**	**J**	**1.5**	**J**	**1.5**	**J**
Selenium	7782-49-2	ug/L	2	564	290 (D, dd)	290	136	12	1.5	10	8.6	10	U	10	U	10	U	10	U	10	U	10	U	10	U	**1.5**	**J**	**1.8**	**J**	10	U	10	U	10	U
Silver	7440-22-4	ug/L	1 (0.1) (h)	2	1.9 (D)	0.95	-	12	1.1	8.8	4.2	**8.8**	-	**1.4**	**J**	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**3.2**	**J**	**1.2**	**J**	5.0	U	**1.1**	**J**
Zinc	7440-66-6	ug/L	1 (0.5) (h)	92.7	90 (D)	90	84.2	12	44	184	84	**46**	-	**50**	-	**44**	-	**44**	-	**69**	-	**71**	-	**66**	-	**162**	-	**47**	-	**73**	-	**149**	-	**184**	-
Miscellaneous Parameters																																			
Cyanide	57-12-5	ug/L	100 (i)	-	1 (Q)	1	5.6	12	10	10	10	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U
DOC rep1	NA	%	-	-	-	-	-	12	0.0035	0.010	0.0090	**0.0035**	**J**	0.010	U	**0.0040**	**J**	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
DOC rep2	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0091	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0036**	**J**	**0.0053**	**J**	0.010	U	0.010	U
DOC rep3	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0089	**0.0036**	**J**	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0036**	**J**	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
DOC rep4	NA	%	-	-	-	-	-	12	0.0038	0.010	0.0085	0.010	U	0.010	U	**0.0044**	**J**	0.010	U	0.010	U	0.010	U	**0.0038**	**J**	0.010	U	**0.0041**	**J**	0.010	U	0.010	U	0.010	U
Dissolved Organic Carbon	NA	%	0.1	-	-	-	-	12	0.0035	0.010	0.0095	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0035**	**J**	0.010	U	0.010	U	0.010	U

Table 7: Modified Elutriate Testing Analytical Results, Detections and Exceedances[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria				No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-EL		HSCNew-NMP-02-EL		HSCNew-NMP-03-EL		HSCNew-NMP-04-EL		HSCNew-NMP-05-EL		HSCNew-NMP-06-EL		HSCNew-NMP-07-EL		HSCNew-NMP-08-EL		HSCNew-NMP-09-EL		HSCNew-NMP-10-EL		HSCNew-NMP-11-EL		HSCNew-NMP-03-EL-Field Dup	
				TSWQS (Acute) (b)	EPA WQC (Acute) (o)	NOAA (Marine Acute) (p)	Region 6 (Marine Chronic) (q)					10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018	
Total Suspended Solids	NA	ug/L	NA	-	-	-	-	12	5710	43000	16784	**22500**	-	**8000**	-	**10600**	-	**43000**	-	**23000**	-	**12800**	-	**13300**	-	**10000**	-	**19500**	-	**19000**	-	**5710**	-	**14000**	-
TOC rep1	NA	%	-	-	-	-	-	12	0.0038	0.010	0.0085	0.010	U	0.010	U	0.010	U	**0.0042**	**J**	0.010	U	0.010	U	**0.0038**	**J**	0.010	U	0.010	U	0.010	U	**0.0043**	**J**	0.010	U
TOC rep2	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0079	**0.0036**	**J**	0.010	U	0.010	U	**0.0038**	**J**	0.010	U	0.010	U	**0.0036**	**J**	0.010	U	0.010	U	0.010	U	**0.0037**	**J**	0.010	U
TOC rep3	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0067	**0.0058**	**J**	0.010	U	**0.0036**	**J**	**0.0045**	**J**	0.010	U	0.010	U	**0.0044**	**J**	0.010	U	**0.0037**	**J**	**0.0037**	**J**	**0.0041**	**J**	0.010	U
TOC rep4	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0045	**0.0045**	**J**	**0.0036**	**J**	**0.0038**	**J**	**0.0047**	**J**	**0.0042**	**J**	0.010	U	**0.0038**	**J**	**0.0038**	**J**	**0.0040**	**J**	**0.0041**	**J**	**0.0042**	**J**	**0.0036**	**J**
Total Organic Carbon	NA	%	0.1	-	-	-	-	12	0.0035	0.010	0.0070	**0.0043**	**J**	0.010	U	0.010	U	**0.0043**	**J**	0.010	U	0.010	U	**0.0039**	**J**	**0.0035**	**J**	**0.0036**	**J**	0.010	U	**0.0041**	**J**	0.010	U
Ammonia as N, filtered	7664-41-7	ug/L	30	-	-	-	-	12	1530	27800	13599	**21400**	-	**8590**	-	**1530**	-	**17200**	-	**13300**	-	**14100**	-	**27800**	-	**14000**	-	**10600**	-	**15900**	-	**15800**	-	**2970**	-
Sulfide	184-96-258	ug/L	1	-	-	-	-	12	3.0	10	9.0	10	U	10	U	10	U	**4.4**	**J**	10	U	10	U	**3.0**	**J**	10	U	10	U	10	U	10	U	10	U

FOOTNOTES- lowercase footnotes were created by the table generator

a) The primary sources for this table were: TDLs - EPA 823-B-95-001, QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations. USEPA/USACE, Regional Implementation Agreement, July 2003; US EPA SW-846 http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm;

b) TSWQS Rule 307.6- (2014) https://www.tceq.texas.gov/waterquality/standards ; **NOTE**2018 TSWQSs were adopted by the commision on February 7, 2018, these Standards are effective for all state permits; however, until approved by USEPA, the 2014 Standards apply to federal permits.

c) Azobenzene is reported by the laboratory instead of 1,2-diphenylhydrazine. 1,2-diphenylhydrazine is rapidly oxidized into azobenzene during analysis.

d) PAHs methylnapthalene and 2-methylnapthalene were not analyzed for by the laboratory

e) PAHs did not have any elevated RL. PAH (total) calculated was determined by summing all non-U qualified data.

f) Total PCBs were not calculated since all analytes were nondetect, U qualified, and there were no elevated RL. Except for Sample HSCNew-NMP-011-EL which had detected concentrations of PCBs amd were

g) These values are based on recommendations from the EPA Region 6 laboratory in Houston; these values were based on data or other technical basis;

h) The values in parentheses are based on EPA "clean techniques", (EPA 1600 series methods) which are applicable in instances where other TDLs are inadequate to assess EPA water quality criteria;

i) This value recommended by Houston lab using colorimetric method. This value is based upon FREE cyanide, not complexed as the method is designed to analyze for. If free cyanide is expected, consult the laboratory as to the best method for quantifying free cyanide;

j) Total TEQ was calculated using 2005 WHO TEF values from Van den Berg et al; 2006 (doi:10.1093/toxsci/kfl055) and https://clu-in.org/download/contaminantfocus/dioxins/Dioxin_TEFs_for_TEQs.pdf. Total TEQ was calculacted by summing all non-U qualified data. Total TEQ does not include J qualified result for Total Hepta CDD, Total Hepta CDF, Total Tetra CDD, and Total Tetra CDF since there is no reported TEF for Total Hepta CDD, Total Hepta CDF, Total Tetra CDD, and Total Tetra CDF.

l) Metals are expressed as Dissolved values in water samples, except for mercury and selenium, which shall be reported as Total Recoverable Concentrations;

m) Samples for metals analysis were diluted 10X for antimony, arsenic, barium, beryllium, cadmium, chromium (total), copper, lead, nickel, selenium, silver, thallium and zinc, 1X for chromium (3+), 2X for chromium (6+) and mercury

n) 6010/6020 are not suitable Methods for Cr+6. If Cr+6 is suspected from past dredging history or industrial landuse in the vicinity, US EPA SW-846 Method 7199 (modified);

o) EPA WQC- http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm; see EPA footnote section below for individual EPA value footnotes

p) NOAA- http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

q) Region 6 screening benchmarks come from TCEQ's ecological benchmarks for water, http://www.tceq.state.tx.us/assets/public/remediation/eco/0106eragupdate.pdf; these values are equivalent

EPA WQC footnotes- uppercase and double-lettered footnotes are directly from the NRWQC footnotes; only footnotes for constituents of concern are retained in this table

A) This recommended water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive. Please consult the criteria document for details.

D) Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column. See "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic life Metals Criteria (PDF)," (49 pp, 3MB) October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available on NSCEP's web site and 40CFR§131.36(b)(1). Conversion Factors applied in the table can be found in Appendix A to the Preamble- Conversion Factors for Dissolved Metals.

G) This Criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (PDF) (153 pp, 7.3MB) (EPA 440/5-80-019), Chlordane (PDF) (68 pp, 3.1MB) (EPA 440/5-80-027), DDT (PDF) (175 pp, 8.3MB) (EPA 440/5-80-038), Endosulfan (PDF) (155 pp, 7.3MB) (EPA 440/5-80-046), Endrin (PDF) (103 pp, 4.6MB) (EPA 440/5-80-047), Heptachlor (PDF) (114 pp, 5.4MB) (EPA 440/5-80-052), Hexachlorocyclohexane (PDF) (109 pp, 4.8MB) (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines (PDF) (104 pp, 3.3MB). If evaluation is to be done using an averaging period, the acute criteria values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

Q) This recommended water quality criterion is expressed as ug free cyanide (as CN)/l.

Y) This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.

cc) When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be appropriate.

dd) Selenium criteria document (EPA 440/5-87-006, September 1987)states that if selenium is as toxic to saltwater fishes in the field as it is to freshwater fishes in the field, the status of the fish community should be monitored whenever the conc.of selenium exceeds 5.0 µg/l in salt water because the saltwater CCC does not take into account uptake via the food chain.

ii)This criterion applies to DDT and its metabolites (i.e., the total conc. DDT plus metabolites should not exceed this value).

Laboratory Qualifiers

Cl	Residual Chlorine or other oxidizing agent was detected in the container used to analyze this sample.
H	This sample was extracted and/or analyzed outside of the EPA recommended holding time.
J	Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.
Ja	Estimated concentration between the EDL and RDL
Jb	Estimated value less than RL
Jc	The reported result is an estimated value.
U	Analyte included in the analysis, but not detected
Ua	Analyte included in the analysis, but not detected at or above the Reporting Limit
Ub	Compound was analyzed for but was not detected (non-detect)
Z-03	See case narrative.

Samples with Detections are BOLD

One or more sample concentrations exceed screening criteria

Sample concentration exceeds criteria

U.S. Army Corps of Engineers

US Army Corps of Engineers®
Engineer Research and Development Center

Sampling, Chemical Analysis, and Bioassessment in Accordance with CWA Section 404

Houston Ship Channel Expansion Channel Improvement Project, North of Morgan's Point Houston Ship Channel, Texas

(Part 2 of 6: Appendix 1, USACE SAP)

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FINAL

14 June 2023*

*Supersedes all previous versions. Only coversheet revised; no change to content.

Appendices

Appendix 1: Sampling and Analysis Plan

SAMPLING AND ANALYSIS PLAN

Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Channel Segment 1 (North of Morgan's Point), Segment 4, Segment 5, and Segment 6
Houston Ship Channel, TX

Prepared for:

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2000 Fort Point Road
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Prepared By:

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October 2, 2018

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List of Acronyms

AOC	Area of Concern
BS	Blank Spike
BU	Beneficial Use
CMC	Criterion Maximum Concentration
COC	Contaminant of Concern
CY	cubic yards
DBF	Dibenzofuran
EDD	Electronic Data Deliverable
EIS	Environmental Impact Statement
E-M	Modified Elutriate
EL	Environmental Laboratory
ERDC	Engineer Research and Development Center
ER-L	Effects Range Low
ER-M	Effects Range Median
FB	Field Blank
FD	Field Duplicate
FDA	Food and Drug Administration
FEIS	Feasibility Environmental Impact Study
FR	Feasibility Report
ft.	feet
HPAH	High-molecular-weight Polycyclic Aromatic Hydrocarbons
ITM	Inland Testing Manual
LCS	Laboratory Control Sample
LC50	Lethal Concentration – 50%
LOE	Lines of Evidence
LPAH	Low-molecular-weight Polycyclic Aromatic Hydrocarbons
LPC	Limiting Permissible Concentration
MB	Mooring Basin
MCY	million cubic yards
MLT	Mean Low Tide
MLLW	Mean Lower Low Water
MPRSA	Marine Protection, Research, and Sanctuaries Act
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NELAC	National Environmental Laboratory Accreditation Conference
NELAP	National Environmental Laboratory Accreditation Program
NOAA	National Oceanic and Atmospheric Administration
O&M	Operations and Maintenance
OTM	Ocean Testing Manual
PA	Placement Area

PCB	Polychlorinated biphenyl
POC	Point of Contact
POHA	Port of Houston Authority
QA	Quality Assurance
QC	Quality Control
R6	Region 6
RIA	Regional Implementation Agreement
RL	Reporting Limit
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
SD	Sediment
snm	square nautical miles
SMMP	Site Management and Monitoring Plan
SQG	Sediment Quality Guidance
SVOC	Semivolatile Organic Compounds
SW	Surface Water
SWG	South West (Division) Galveston (District)
TAL	Target Analyte List
TB	Turning Basin
TDL	Target Detection Limit
TPH	Total Petroleum Hydrocarbon
TSWQS	Texas State Water Quality Standards
UCL	Upper Confidence Level
VOC	Volatile Organic Compounds
WQC	Water Quality Criteria
WQS	Water Quality Standards
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

1.0 OBJECTIVES

This pre-dredging Sampling and Analysis Plan (SAP) was generated for the U.S. Army Corps of Engineers (USACE) Southwest Galveston (SWG) and the Port of Houston Authority (POHA), Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP). This SAP is focused on the Bayou Reach north of Morgan's Point, including: Segment 1 (Bay Reach north of Morgan's Point), Segment 4, Segment 5, and Segment 6 (Figure 1). The primary objectives of this SAP are to:

a) Provide the background for the proposed new construction
b) Specify environmental media to be collected, the locations of the sampling locations and other sampling parameters needed for the pre-dredging evaluation of dredged sediments within the dredging prism
c) Specify how and where to collect sediment cores representative of the dredged materials from the proposed dredging prisms for materials that are to be placed in an upland placement area (PA), or if suitable after testing to be used beneficially
d) Specify the chemical and physical analyses necessary to evaluate if the sediments are suitable for placement
e) Specify how and what to document for the field sampling and the results of physical and chemical analyses of site surface water and sediments, as well as quality control measures;
f) Specify the deliverables at the conclusion of the evaluation
g) Generate the information needed to determine whether unacceptable adverse impacts would result during either dredging within the proposed dredging prism or during placement at the selected upland PA or beneficial use

2.0 BACKGROUND AND APPROACH

2.1 Background

The Houston Ship Channel (HSC) system is located in southeast Texas and spans Harris, Chambers, and Galveston Counties, Texas and is 50 miles in length from Bolivar Island to the Main Turning Basin. The HSC for the Expansion Channel Improvement Project (ECIP) has been divided into the following six study segments (DIFR-EIS, 2017).

- Segment 1 – Bay Reach
- Segment 2 – Bayport Ship Channel (BSC)
- Segment 3 – Barbours Cut Channel (BCC)
- Segment 4 – Boggy Bayou to Sims Bayou
- Segment 5 – Sims Bayou to I-610 Bridge
- Segment 6 – I-610 Bridge to Main Turning Basin (TB)

The study area for this SAP includes: Bay Reach (Segment 1) north of Morgan's Point only (Stations 0+05 to 684+03), Boggy Bayou to Sims Bayou (Segment 4; Stations 684+03 to 833+05), Sims Bayou to I-610

Bridge (Segment 5; Stations 1110+77 to 1160+62), and I-610 Bridge to Main Turning Basin (Segment 6; Channel Stations 1160+60 to 1266+48, and Main TB Stations 0 to 30+95). The existing authorized depth of the Houston Ship Channel (HSC) for this study area ranges from -41.5 to -46.5 feet (ft.) mean lower low water (MLLW) and the existing width is 300 ft. The entire channel is not proposed for widening **and** deepening, but instead, individual target segments were identified for improvements and are specified below:

Segment 1: The existing width and depth of the main channel in Segment 1 north of Morgan's Point is 530-600 ft. and 46.5 ft. respectively, and will remain at this existing width and depth. The Mooring Basin (MB) at Station 500+00 (MM1_520+00) is approximately 57 acres and will be deepened to -41.5 ft.

Segment 4: Segment 4 has an existing width of 300 ft. with a new proposed width of 530 ft from Boggy Bayou to Greens Bayou only; the remainder of Segment 4 (Greens Bayou to Sims Bayou) will remain at its existing width. The existing depth of Segment 4 ranges from 38.5 to 41.5. Boggy Bayou to Washburn Tunnel has an existing depth of 41.5 ft. and a proposed depth of 46.5 ft. The remainder of Segment 4 will remain at its existing depth.

Segment 5: Segment 5 has an existing width of 300 ft. and will remain at its existing width. The depth of Segment 5 is 37.5 ft. with a proposed depth of 46.5 ft.

Segment 6: Segment 6 from I-610 Bridge to Main TB has an existing width of 300 ft. and the Main TB has an existing width of 400-932 ft. will remain at its existing width. The depth of Segment 6 is 37.5 ft. with a proposed depth is 41.5 ft.

2.2 Terminology

This new work construction will involve removal of predominantly new work material (virgin and non-virgin), however, some maintenance material may have shoaled in by the time dredging occurs. Each of these is defined below:

a) **Maintenance Material:** material that is removed from the navigational dredging prism in navigational channel that has shoaled in since previous maintenance dredging
b) **New Work Material:** material not within the navigational channel dredging prism defined in (a) above. New work material falls into two categories, virgin and non-virgin material:
   (i) **Virgin:** new work material that has not been dredged but is situated such that it is unlikely that exposure to contamination has occurred. An example of virgin material is an undisturbed, consolidated base geological layer from the preindustrialization era and outside of the influence of industrial releases
   (ii) **Non-Virgin:** refers to material that has not been dredged (i.e., outside of the current navigational channel dredging footprint) that has potential to have been exposed to contamination directly or indirectly from historical deposition since the industrial era, spills, transport, deposition and other mechanisms that will place such contamination within the new work dredging prism

2.3 Dredging Prism

Deepening and widening improvements will not occur in Segment 1 north of Morgan's Point. The remaining segments of the ship channel undergoing channel improvements are comprised of the following (Table 1, Figure 2):

1) **Mooring Basin (Station 500+00):** Dredged material from this area is expected to consist primarily of new work virgin material, consisting solely of undisturbed base layer geological formations free of impacts from industrial sources or transport mechanisms. There is a chance that influence from industrial sources may have occurred. As a result, these dredged materials will conservatively be considered new work non-virgin surficially, but new work virgin at depth
2) **Boggy Bayou to Washburn Tunnel (Stations 684+03 to 974+07):** Dredged material from this segment is expected to consist of some maintenance material in the existing channel, but primarily be new work virgin material, consisting solely of undisturbed base layer geological formations free of impacts from industrial sources or transport mechanisms. There is a chance that influence from industrial sources may have occurred. As a result, these dredged materials will conservatively be considered new work non-virgin surficially, but new work virgin at depth
3) **Sims Bayou to I-610 Bridge (Stations 1110+77 to 1160+62):** Dredged material from this segment is expected to consist of some maintenance material in the existing channel, but primarily be new work virgin material, consisting solely of undisturbed base layer geological formations free of impacts from industrial sources or transport mechanisms. There is a chance that influence from industrial sources may have occurred. As a result, these dredged materials will conservatively be considered new work non-virgin surficially, but new work virgin at depth
4) **I-610 Bridge to Main TB and Main TB (Stations 1160+60 to 1266+48; 0 to 30+95):** Dredged material from this segment is expected to consist of some maintenance material in the existing channel, but primarily be new work virgin material, consisting solely of undisturbed base layer geological formations free of impacts from industrial sources or transport mechanisms. There is a chance that influence from industrial sources may have occurred. As a result, these dredged materials will conservatively be considered new work non-virgin surficially, but new work virgin at depth

2.4 Placement

It is anticipated that at the time of new work dredging, there will be maintenance shoaling in the ship channels but that it will be negligible relative to the amount of new work material, since navigational maintenance dredging occurs at regular intervals. While not yet finalized, dredged material resulting from both new work or construction, operations and maintenance (O&M) will be utilized in a number of ways (e.g., upland confined, Beneficial Use (BU) such as marsh creation, bird island habitat, oyster reefs, dike reinforcement, etc.).

In this plan, approximately 5.9 MCY of new work material dredged from the study area as part of the construction phase is expected as described below:

- Segment 1 (Mooring Basin only) – 1,426,813 CY
- Segment 4 – 3,312,185 CY
- Segment 5 – 176,049 CY
- Segment 6 – 1,000,098 CY

Anticipated dredge volumes for Segments 1 (south of Morgan's Point), 2, and 3 are discussed separately in the "Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) South of Morgan's Point SAP, 2018".

2.5 Tier I Evaluation – Potential Sources of Contamination and COC Reduction

New construction sediments are not expected to adversely impact human health or the environment, however, the evaluation supported by this SAP will include site surface water, sediment, and modified elutriates for new work sediments through direct sampling. Due this industrialized portion of the HSC, no contaminants of concern (COCs) were considered for exclusion. Instead, a full chemical analysis (i.e., VOCs, SVOCs, TPH, pesticides, total PCBs, TAL metals, dioxins/furans, and miscellaneous parameters) will be required for all media types.

Dioxins/furans are not routinely analyzed for in dredge material projects outside of the HSC, however, due to the presence of the San Jacinto Waste Pits and the Area of Concern (AOC) associated with the historical releases of dioxins/dibenzofurans from this area north of Morgan's Point (shown in Figure A-3), dioxins/furans have been added to the analyte list for this project.

3.0 SCOPE OF WORK and SCHEDULE

3.1 General

The FIELD CONTRACTOR will collect sediment and water samples from the HSC vicinity as outlined in this SAP and ensure delivery of all collected samples to the ANALYTICAL PROVIDER and Engineer Research and Development Center (ERDC), as appropriate, within the specified holding times. Some analyses will be sub-contracted by ERDC; however, all container distribution, sample processing, and communications will be facilitated directly through the ERDC Analytical POC. Procedures for sample collection, required volume, handling, preservation and storage, and shipment are outlined in subsequent sections.

Close coordination by the CONTRACTORS with POHA, SWG, and ERDC personnel is an essential component of this SAP. The project coordination Points of Contact (POC) are:

Technical Team

ERDC Project Manager/Project Technical POC:
Dr. Cheryl R. Montgomery (ERDC, Environmental Laboratory, CEERD-EP-R)
W: 978-318-8644 (EST)
M: 781-530-8317 (EST)

Field Contractor POC:
Mr. Jose Aramburu (Fugro)
W: 713-369-5427
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ERDC Sample Coordinator POC:
Mr. J. Daniel Farrar (ERDC, Environmental Laboratory, CEERD-EP-R)
W: 601-634-2118 (CST)
Mr. Al Kennedy (ERDC, Environmental Laboratory, CEERD-EP-R)
W: 601-634-3344 (CST)

ERDC Analytical POC:
Dr. Anthony Bednar (ERDC, Environmental Laboratory, CEERD-EP-C)
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Project Delivery Team (PDT)

USACE Project Manager:
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POHA Project Manager:
Richard Ruchhoeft
W: 713-670-2471 (CST)

The FIELD CONTRACTOR will collect sediment and water samples from the HSC vicinity as outlined in this SAP and ensure delivery of all collected samples to the ANALYTICAL PROVIDER and Engineer Research and Development Center (ERDC), as appropriate, within the specified holding times. Procedures for sample collection, required volume, handling, preservation and storage, and shipment are outlined in subsequent sections and attachments.

If, at the time of sampling and analyzing, conditions require major deviation from the approach outlined in this SAP, the CONTRACTORS must discuss the deviation with the ERDC Project Manager/Technical POC prior to application/implementation.

Figure 5 presents an organization chart of the project managers and technical leads.

3.2 Project Area

The CONTRACTOR will collect samples from 9-channel locations within the HSC from Boggy Bayou (Station 684+03) to Main Turning Basin (Station 1266+48) along with one (1) sample from the Mooring Basin and one (1) sample the Main Turning Basin.

3.3 Sample Location and Type

Sample locations and types are specified in Table 1. Sample locations have been selected from available geotechnical borings surveys from 1963 and 1964. Where geotechnical borings surveys were not available (Segments 5 and 6), samples were distributed evenly across the length of the remaining channel to be spatially representative of the dredging prism materials. Exact sample coordinates for the channel locations will be determined in the field at the time of sampling. Each sediment sample will be a composite of two subsamples from within the area proximate to the channel location. **If a sample cannot be acquired at a designated location, the location will be moved the least distance possible, while remaining within the dredge prism.**

One field duplicate must be collected for chemical analyses. For sediment, a total of 11 channel samples plus one field duplicate will be new work material samples for chemical analyses and 11 channel locations will be collected as bulk samples for modified elutriate. For surface water, 11 channel stations and one field duplicate will be collected for chemical analyses and 11 bulk water channel samples will be collected for modified elutriate. Water samples will be collected from approximately mid-column depth.

If scouring to below the authorized depth (+ 4 ft.) occurs at the preselected locations, the FIELD CONTRACTOR MANAGER and the ERDC Technical POC will jointly decide how to shift the sample locations. All details of the steps taken to arrive at a decision as to when/how to shift a sampling point will be noted in the field logs and documented in the final report.

For the new work channel improvement area, 11 samples (+ 1 QC) in total will be sampled to dredge prism depth plus 2 feet for over dredge and 2 feet for advanced maintenance for sediment. Any material collected outside the dredge prism is not relevant to this sampling event and will be discarded. Each channel sample is a composite of material representative of a geological component of the new work dredge prism in the ship channel, since the location of these sampling points is based upon geotechnical boring information (with the reservations expressed in the preceding three paragraphs, and are listed below).

Justification for choosing these sample locations is included in Attachment A.

HSCNew-NMP-01 (Segment 1, Station 500+00): Three samples (i.e., '**-A**', '**-B**', '**-C**') are to be taken within the existing Mooring Basin and composited to one sediment sample as proposed for this reach of virgin new work material; surface water and bulk water samples will be collected mid-column where the bulk of the sediment is collected.

HSCNew-NMP-02 (Segment 4, Station 720+00): Two samples (i.e., '**-A**', '**-B**'), one on each side of the HSC near the assigned station, are to be taken and composited to one sediment sample as proposed for this reach of virgin new work material; surface water and bulk water samples will be collected mid-column where the bulk of the sediment is collected.

HSCNew-NMP-03(Segment 4, Station 800+00): Two samples (i.e., '**-A**', '**-B**'), one on each side of the HSC near the assigned station, are to be taken and composited to one sediment sample as proposed for this reach of virgin new work material; surface water and bulk water samples will be collected mid-column where the bulk of the sediment is collected.

HSCNew-NMP-04 (Segment 4, Station 912+00): Three samples (i.e., '**-A**', '**-B**', '**-C**'), one point in the turning basin expansion area and one on each side of the HSC near the assigned station, are to be taken and composited to one sediment sample as proposed for this reach of virgin new work material; surface water and bulk water samples will be collected mid-column where the bulk of the sediment is collected.

HSCNew-NMP-05 (Segment 4, Station 970+00):
Two samples (i.e., '**-A**', '**-B**'), one on each side of the HSC near the assigned station, are to be taken and composited to one sediment sample as proposed for this reach of virgin new work material; surface water and bulk water samples will be collected mid-column where the bulk of the sediment is collected.

HSCNew-NMP-06 (Segment 5, Station 1115+00):
Two samples (i.e., '**-A**', '**-B**'), one on each side of the HSC near the assigned station, are to be taken and composited to one sediment sample as proposed for this reach of virgin new work material; surface water and bulk water samples will be collected mid-column where the bulk of the sediment is collected.

HSCNew-NMP-07 (Segment 5, Station 1160+00):
Two samples (i.e., '**-A**', '**-B**'), one on each side of the HSC near the assigned station, are to be taken and composited to one sediment sample as proposed for this reach of virgin new work material; surface water and bulk water samples will be collected mid-column where the bulk of the sediment is collected.

HSCNew-NMP-08 (Segment 6, Station 1200+00): Three samples (i.e., '**-A**', '**-B**', '**-C**'), one point in the turning basin expansion area and one on each side of the HSC near the assigned station, are to be taken and composited to one sediment sample as proposed for this reach of virgin new work material; surface water and bulk water samples will be collected mid-column where the bulk of the sediment is collected.

HSCNew-NMP-09 (Segment 6, Station 1230+00):
Two samples (i.e., '**-A**', '**-B**'), one on each side of the HSC near the assigned station, are to be taken and composited to one sediment sample as proposed for this reach of virgin new work material; surface water and bulk water samples will be collected mid-column where the bulk of the sediment is collected.

HSCNew-NMP-10 (Segment 6, Station 1260+00):
Two samples (i.e., '**-A**', '**-B**'), one on each side of the HSC near the assigned station, are to be taken and composited to one sediment sample as proposed for this reach of virgin new work material; surface water and bulk water samples will be collected mid-column where the bulk of the sediment is collected.

HSCNew-NMP-11 (Segment 6, Main TB, Station 24+00): Three samples (i.e., '**-A**', '**-B**', '**-C**') are to be taken along a transect and composited to one sediment sample as proposed for this reach of virgin new work material; surface water and bulk water samples will be collected mid-column where the bulk of the sediment is collected.

3.4 Schedule, Deliverables & Required Coordination

(1) The FIELD CONTRACTOR shall provide POHA and SWG with a draft Field Sampling and Safety Plan for review ***within 30-days of the notice to proceed***. Initiation of sample collection may not begin prior to POHA and SWG approval of the Field Sampling and Safety Plan. The draft plan should provide sufficient detail on how the FIELD CONTRACTOR intends to meet sampling requirements outlined in this Scope of Work. After POHA and SWG review, any recommended changes will be incorporated and a finalized plan will be provided to POHA and SWG prior to initiation of sample collection. Two hard copies and electronic files (e.g., Microsoft Office Word, Excel, and PDF formats) of the draft and final plans will be submitted to POHA, SWG, and electronic copy only to ERDC.

(2) The FIELD CONTRACTOR is responsible for organizing and hosting a pre-construction conference call with SWG project manager, ERDC PM/technical POCs and POHA project POCs identified in Section 3.1 above. This conference call must be scheduled ***at least 3 weeks prior*** to sample collection. Additional communications should occur as needed to ensure complete clarity in project preparation, execution and deliverables.

Additionally, ***two weeks in advance*** of this call, the FIELD CONTRACTOR should provide an overview of the Field Sampling Plan and specifically acknowledge sampling techniques, required sample types and volumes, sample preservation and storage, and sample shipment strategies.

(3) The FIELD CONTRACTOR is responsible for coordination with the ERDC technical POCs, and as needed, the TOX and ANALYTICAL POCs at ERDC regarding exact sampling dates and exact sample shipment and receiving dates.

(4) Sample collection as outlined in this scope of work should be completed ***no later than date to be specified when contract is awarded***. Exact day(s) of collection should be coordinated with all SWG, ERDC, and POHA POCs identified in Section 3.1 above to ensure that sample shipment date is compatible with laboratory schedules and that the ERDC personnel are prepared for exact sample shipping and receiving dates.

(5) The FIELD CONTRACTOR shall provide POHA and SWG with a draft Post-Sampling Field Report ***within 20-days of completion of field sampling activities*** that describes sampling methods and materials, exact sample locations (latitude and longitude, NAD83) and water depth, surface water quality parameters (temperature, salinity, pH, dissolved oxygen), core descriptions, daily observations (sea-state, air temperature, wind direction and speed, etc.), pictures of sampling activities, and soil cores as well as any deviations from the Field Sampling and Safety Plan for each sample location. After POHA, ERDC, and SWG review, any recommended changes will be incorporated and a finalized report will be provided to the

POHA POC, SWG PM, and ERDC PM. Two hard copies and electronic files (Microsoft Office Word, Excel, and PDF formats) of the draft and final report (including tables, attachments, photos, etc.) should be submitted to SWG, and electronic copies to others as specified in Section 6.

4.0 SAMPLING (APPROACH and COLLECTION)

4.1 Overview

This SAP is widely based upon the four resource documents listed below but contains specifications appropriate for the HSC ECIP project:

a) USACE (1995). QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations (Chemical Evaluations). USEPA-823-B-95-001;
b) USEPA and USACE (1998). Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual. Inland Testing Manual (ITM);
c) USACE (2003). Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities – Testing Manual;
d) USEPA and USACE (2003). Regional Implementation Agreement (RIA) for the Ocean Dredged Material Disposal Program. USEPA Region 6 and US Army Corps of Engineers, Galveston District. July 2003;

The following outlines the approach for sample collection, distribution and evaluation. Any deviations, including corrective actions taken, if any, will be noted and recorded (Section 4.2). Dredged material sampling locations have been selected to be spatially representative of the dredge prism materials (Section 3.3); sampling to dredging depth addresses the vertical component of the dredging prism (Section 4.3.1, Figure 2, Table 1). Surface water (Section 4.3.2), sediment (Section 4.3.3), and modified elutriate (Section 4.3.4) samples are to be collected from the dredge prism at each channel location for the purpose of conducting testing to characterize the material that will be excavated. Field quality control (Section 4.3.5), sample preservation and storage (Table 2, Section 4.3.6), and Chain-of-Custody/Shipping procedures (Section 4.3.7) will be observed in the field. The field notebook and the final report will include this information. Sufficient volumes of materials for chemical and physical analyses (Sections 5.2) plus any required field QC samples will be collected.

Laboratory quality control (Section 5.1) will be consistent with procedures and methods in the references cited above and in the Attachments.
All chemical analyses for environmental media (Sections 5.2.1 and 5.2.2) and miscellaneous parameters (Section 5.2.3) will be tabulated and evaluated according to appropriate existing standard procedures. The evaluation shall consist of comparing analytical results to screening benchmarks for the chemical analyses of water and modified elutriate samples (Table 3) and bulk sediment (Table 4) as well as for appropriate miscellaneous parameters (Tables 3 and 4).

Since the dredge materials from this SAP are expected to be placed primarily in upland confined PAs, bioassays such as toxicity, survival and bioaccumulation are not required unless end uses of the dredged materials change from upland confined PAs to another end use (e.g. BU), in which case, the sampling event may need to be repeated to acquire sufficient materials to complete these studies.

Collection of field parameters, field sample collection and preservation, and chain of custody procedures are outlined in general below. Additional details for the FIELD CONTRACTOR are listed in Attachment B.

4.2 Deviations from SAP Procedures

All deviations from the procedures outlined in the main body of this SAP or its attachments and the effect, if any, the deviation is expected to have on the data must be documented photographically and in writing. Such deviations and the evaluation of them must be included in both the field data sheets and in the final report for the field work as well as in the final project report.

4.3 Collection/Preparation/Compositing

Samples will be collected so as to proceed from locations expected to be virgin new work to non-virgin new work. The portion of the ship channel from the open bay in the Houston Ship Channel at Bolivar Road (Station 125+000) and proceed to the Morgan's Point (Station 0+000) has already been addressed under a separate MPRSA 103 SAP. This SAP's sample collection begins at Morgan's Point and proceeds to the Main TB in Houston.

Sample quantities will be confirmed with the analytical and testing providers prior to executing sample collection. In preparation for field sampling, sufficient precleaned and laboratory approved sampling containers/equipment provided by the ANALYTICAL PROVIDER, per Attachment B, will be assembled along with preprinted labels. Sample compositing and subsample distribution for chemical testing will be performed at ERDC; only bulk samples need be collected under the conditions of Attachment B.

4.3.1 Channel Sample Locations

Based upon a review of a geotechnical borings for the HSC (Attachment A) and the proposed dredge prism, samples will be taken so as to be representative of the portions of the channel undergoing widening and/or deepening only, since these are the only potions to be dredged. These portions include Stations 520+00, 684+03 to 974+07, Stations 1110+77.54 to 1266+48 and Main TB, from which 11-samples are to be collected to obtain a representative samples of the Beaumont Clay Formation and/or channel conditions in these sections. For each channel sampling location, one water sample will collected and two or three sediment samples (see Table 1) are to be taken so that the volume from each subsample is approximately equivalent. All samples will be shipped to ERDC for compositing, subsampling, and distribution. Some individual sample locations may require multiple cores to obtain sufficient volume. Composite samples are acceptable only at an individual sampling location at each channel location; compositing between locations is not permitted. If the volume of the core exceeds the volume required for analysis, subsampling of the core shall be conducted (Attachment B).

To ensure that representative dredged materials are sampled, sample locations where depths are already at or below project depth will not be sampled. Recent bathymetry will be reviewed prior to sampling to ensure the presence of sufficient material within the proposed dredge prism and at the boring location. These conditions will be confirmed in the field prior to sampling; **however, if sufficient material is not present at the proposed boring location when in the field sampling, material for testing will be gathered in equal volumes from a location where material is present and proximate to the selected channel location.** All field conditions and coring locations will be recorded in the field notes and included in the final report.

Table 1 summarizes the planned sampling for this dredging prism, including the dredging segment, sample ID, station, distance from the existing channel center line, coordinates, media to be collected, compositing and analyses/testing required. Figures 2, 3, and 4 provide a mapping of sampling locations for the channel.

Sample collection will be carried out by the FIELD CONTRACTOR with the ERDC PM/Technical POC present. The ERDC PM/Technical POC will be on-board at the time of sampling and all sampling-related locations, deviations, etc., will be the result of concurrence between the FIELD CONTRACTOR and the ERDC PM/Technical POC.

Additional sample location determination details are provided in Attachment A.

4.3.2 Water Sample Collection

Surface water samples (mid-column) will be collected from the sampling point replicate where the bulk of the sediment is collected for each sampling location. Prior to sample collection, site conditions and water quality parameters will be collected (Attachment B). At each sample location, the water depth to the top of sediment will be determined prior to sample collection to ensure water samples are collected at the midpoint of the water column. Depths recorded must be corrected to mean lower low water (MLLW) or applicable local datum either through the use of a tide gauge or tide table.

Water samples from separate channel locations will not be composited to create a single channel sample. Each location will be sampled, analyzed, and reported as a distinct data point collocated with the sediment sample(s) for that point. All water samples bound for chemical analyses are to be filtered **WITH THE FOLLOWING EXCEPTIONS**: (1) TOC, TSS, VOCs, and metals for mercury and selenium **ONLY** and (2) water intended for modified elutriate testing. A determination as to whether water samples, along with field blanks, are field filtered or filtered in the laboratory will be made prior to sample collection.

Additional water collection details are provided in Attachment B.

4.3.3 Sediment Sample Collection

Sediment samples will be collected at the 11 channel locations (plus 1 QA), as indicated in Figure 2 and Table 1. Since the channel locations are selected to be representative of the dredge prism, shifts in position will be allowed if sufficient sediment is not present to allow a sample to be collected. Should this circumstance occur, the sampling location will be shifted as minimally as possible while remaining within

the dredge prism and within the general formation traits indicated by the geotechnical borings to facilitate acquisition of sufficient sample volume. Any deviations will be noted in the field notes and documented in the final report.

Sediment cores will be taken to the depth of dredge using a sampling method capable of accomplishing such a task (Attachment B). The X- and Y-coordinates will be recorded for each of the sampling point replicates (replicates '**-A**', '**-B**', '**-C**') for HSCNew-NMP-01 through -11. Cores between or from more than one sampling location will not be composited.

Additional sediment collection details are provided in Attachment B.

4.3.4 Modified Elutriate Preparation

Sufficient sample volume of surface water (unfiltered) and sediment will be collected so that the ERDC laboratory is able to complete modified elutriate testing for each location. Approximate sample volumes are noted in Table 2; however, sample volumes will be confirmed with the ERDC laboratory prior to field collection commencing.

A modified elutriate test (MET) will be prepared at ERDC by the analytical team according to guidance (USACE Tech Note EEDP 04-2) by mixing a calculated volume of sediment and dredging site water that should be approximately equal to 150 g/L. The well-mixed slurry will be aerated for 1 hour and allowed to settle for 24 hours (maximum) before extracting the supernatant. The supernatant will be centrifuged or filtered before following the proper preservation techniques required for all analyses. TSS, TOC, and mercury will be excluded from centrifugation or filtration.

4.3.5 Field Quality Control

Field duplicate samples (not split samples) will be collected with a frequency of one per 20 samples per environmental matrix or one per 20 samples per day, whichever is less (USEPA, 1995). Field blanks will be collected with a frequency of one per 20 samples per environmental matrix or one per 20 samples per day, whichever is less.

4.3.6 Sample Preservation and Storage

4.3.6.1 Chemical and Physical Analysis

USEPA SW-846 provides guidance, as do the references cited in Section 4.1 of this SAP, regarding preservation and storage for physical and chemical analyses of environmental media. Immediately after collection, the samples will be stored on ice in insulated coolers at 2ºC to 4ºC and shipped to the laboratory. Alternate arrangements, such as shipment in a refrigerated truck/van can also be used, provided the temperature requirements of the study are met. The laboratory must document the temperature of the cooler upon arrival and must store samples at 4°C. All studies/analyses will be performed such that the recommended holding times, as described in the referenced guidance documents and in Table 2, are met.

All sample volumes, handling, storage, and preservation requirements will be confirmed with the testing laboratories prior to sampling beginning.

4.3.7 Chain-of-Custody and Shipping

Appropriate Chain of Custody protocols will be followed. Guidance can be found in the references cited in Section 4.1. Chain of custody will be discussed and confirmed with the FIELD CONTRACTOR and ERDC prior to field collection beginning. Shipment means and receiving facility log-in/processing will ensure that holding times are met. EPA and USACE have agreed on previous projects that provided sediment storage temperatures are maintained at <4°C and that this is documented, that hold times for sediment would start at the time the composite sample is created at ERDC. Hold times for surface water begin at the time of collection, consequently, all surface water samples are collected as rapidly as possible at the end of the study. To meet this schedule, the ERDC laboratory requires that all samples (water, sediment, bulk samples etc.) be shipped at one time. These activities will be coordinated prior to field work commencing.

Media samples for chemical and physical characterization and bulk samples will be sent to ERDC-Vicksburg, MS.

The primary POC is:

Mr. J. Daniel Farrar
US Army ERDC
Environmental Laboratory, CEERD-EP-R
3909 Halls Ferry Road, Building 6009
Vicksburg, MAS 39180-6199
W: 601-634-2118 (CST)

The alternate POC is:

Mr. Al Kennedy
US Army ERDC
Environmental Laboratory, CEERD-EP-R
3909 Halls Ferry Road, Building 6009
Vicksburg, MS 39180-6199
W: 601-634-3344 (CST)

Once modified elutriate samples for chemical analyses are generated, they will be sent to the ERDC Analytical POC where analyses will be initiated/coordinated.

5.0 CHEMICAL ANALYSES AND DATA EVALUATION

All chemical analytical analyses will be performed and/or coordinated by ERDC. Additional details pertaining to chemical laboratory methods, analyses and reporting can be found in Attachment C.

5.1 Laboratory Quality Control

All chemical and physical analyses must include laboratory Quality Control (QC) samples; details of the numbers and types of laboratory QC samples can be found in Attachment C. A Level II validation package must be furnished including documentation of all QC activities performed specifically in conjunction with this project, along with sample results. The laboratory will provide a case narrative of the analyses and any deviations or out of specification events that took place during the analyses with each laboratory deliverable. The laboratories will also provide completed USEPA Region 6 (Draft) Data Review and Validation Requirements worksheets for dredged material disposal evaluation (Attachment C, Supplemental Attachment C-1). Copies of all raw data, lab notes, chromatograms, standard curves, etc., will be furnished upon request.

5.2 Chemical Analyses

All analyses shall be performed within the holding period described in the referenced guidance documents and outlined in Table 2. Chemical parameters to be analyzed in each medium are listed in Tables 3, and 4, along with required Target Detection Limits (TDLs). Sediment sample data will be reported as dry weight. If TDLs cannot be met and this is known either prior to field work commencing or while analyses are occurring, the analytical contractor will immediately contact the ERDC PM/Technical POC to resolve the potential implications this situation may have on the data usability.

Full analyte suites will be reported for all multi-analyte methods and all data will be compared to Agency screening criteria for water and guidance values for sediment. When analytes do not have screening criteria, patterns of detection limits and detected compounds will be evaluated. If analytes are all non-detected within a category with no analytical deviations or raised reporting limits, that analytical category will not require further evaluation, provided a brief summary of data quality is provided in the text (e.g., no elevated RLs, QC within parameters, etc.).

5.2.1 Surface Water and Modified Elutriate

As a preliminary screen, surface water and modified elutriate results will be screened against TSWQS (Table 3). The prioritization of the benchmark criteria from Table 3 is as follows: (1) TSWQS (marine – acute); (2) USEPA WQC (marine – CMC); (3) NOAA (marine – acute); (4) Region 6 (marine). One exception to this prioritization is copper will first be screened against the Region 6 marine chronic criteria for copper (3.6 ug/L) which is protective of oyster waters. If this criteria is exceeded, the sample will then be screened against the TSWQS value. These findings will need to be considered, as appropriate, when the placement options for these dredged materials are evaluation to ensure that protection of oyster waters/reefs is maintained.

5.2.2 Sediment

With the exception of dioxins/furans, sediment results will be screened against sediment guidance values (Table 4). The prioritization of the guidance values from Table 4 is as follows: (1) NOAA (marine ER-L); (2) NOAA ER-M (marine); and (3) USEPA R6 (marine).

Screening criteria has not been established for dioxins/furans in sediment; therefore, sediment results for dioxins/furans will be compared for consistency with previous sampling events in the area where the USEPA gave open water ocean placement concurrence.

5.2.3 Miscellaneous Parameter Analyses

Each of the miscellaneous analyses noted in Tables 3 and 4 shall be analyzed for and reported in tabular format and discussed in the report.

6.0 DELIVERABLES

Deliverables shall include both hard copy and electronic versions of the final report and data as outlined below.

6.1 Report

A report compliant with this SAP will be submitted by ERDC to SWG and POHA at completion of the dredge material characterization and evaluation. The report will synoptically summarize the key points as appropriate from the SAP, cross reference to study documents and at a minimum include:

a) Sample collection: sampling sites and locations (water and sediment); tabulated and plotted on figure showing locations and the dredging prism; summarized and cross referenced to study documents as needed
b) Field procedures: synoptic summaries and cross referenced to provided project documents; including compositing, physical observations (e.g., odor, stratification, etc.) and other field procedures, observations, deviations as appropriate
c) Quality Control (field): described and cross referenced to project documents as needed
d) Analyses: description of what was analyzed for, methodologies, etc.
e) Results and discussion: discuss data and proceed by environmental medium and within each medium, by analyte category. Each section below must have the following discussion components:
    i. Tabular Data Summaries Tables: Include appropriate statistics (e.g. N=number, minimum, mean, standard deviation from the mean, median and maximum etc.) for both analytical and miscellaneous parameters) for all media and tests
    ii. Discussion of results as per criteria outlined in Attachments and the RIA
    iii. Data review and validation (See Attachment C, Supplemental Attachment C-1)
    iv. Incorporate field and laboratory qualifiers when they impact the evaluation
    v. Incorporate site-specific aspects (e.g. matrix effects, dilution required etc.) that might impact the data discussions

vi. Summarize deviations and discuss impact, if any
vii. Cross-reference text discussion with data summary tables
viii. Incorporate USEPA R6 policy for treatment of non-detect chemical data (memo appended to Attachment C, Supplemental Attachment C-2)

6.2 Submittal

The report will be submitted to the SWG-PM:

Andrea Catanzaro (CESWG-PM-J)
W: 409-766-6346 (CST)
M: 409-502-0984 (CST)

6.2.1 Hard Copy

- One (1) hard copy of the final report and all accompanying figures and tables
- Attachments will be included; if attachments are extensive, attachments such as field/raw data sheets, photographic logs, laboratory reports as PDFs, etc. ONLY will be submitted as PDF on disc

6.2.2 Electronic Copy

- One PDF electronic copy of the final report and all accompanying figures, tables, field data sheets, raw data sheets
- PDF files of all laboratory reports for chemical and physical analyses/characterization
- Laboratory Electronic Data Deliverables (EDDs) (Equis type) (Access or sortable Excel format) consistent with attached EDD memo at the end of Attachment C as Supplemental Attachment C-2
- Additional PDF copies upon request

7.0 REFERENCES

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_____ (1964). Houston Ship Channel, Navigation Channel Borings

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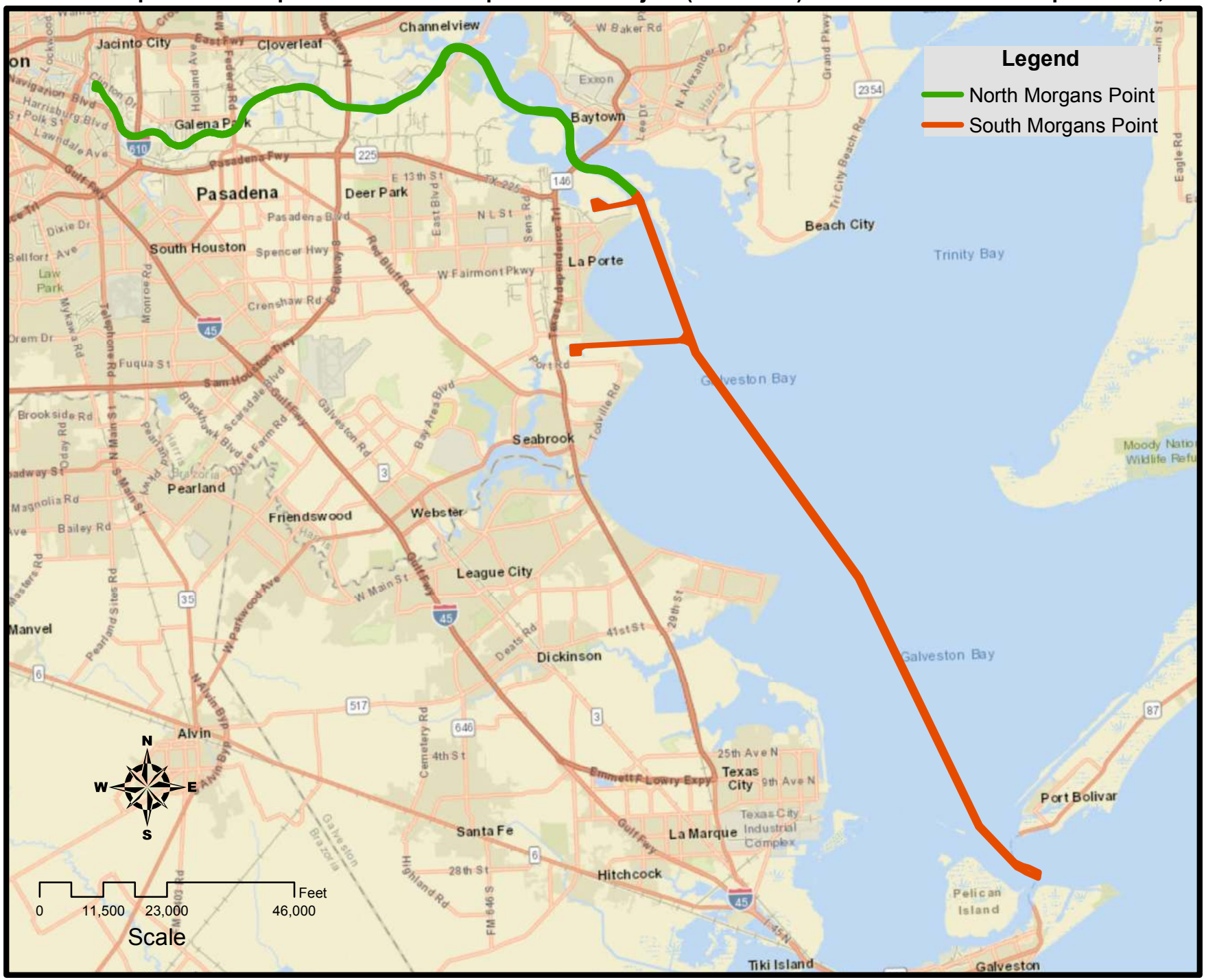
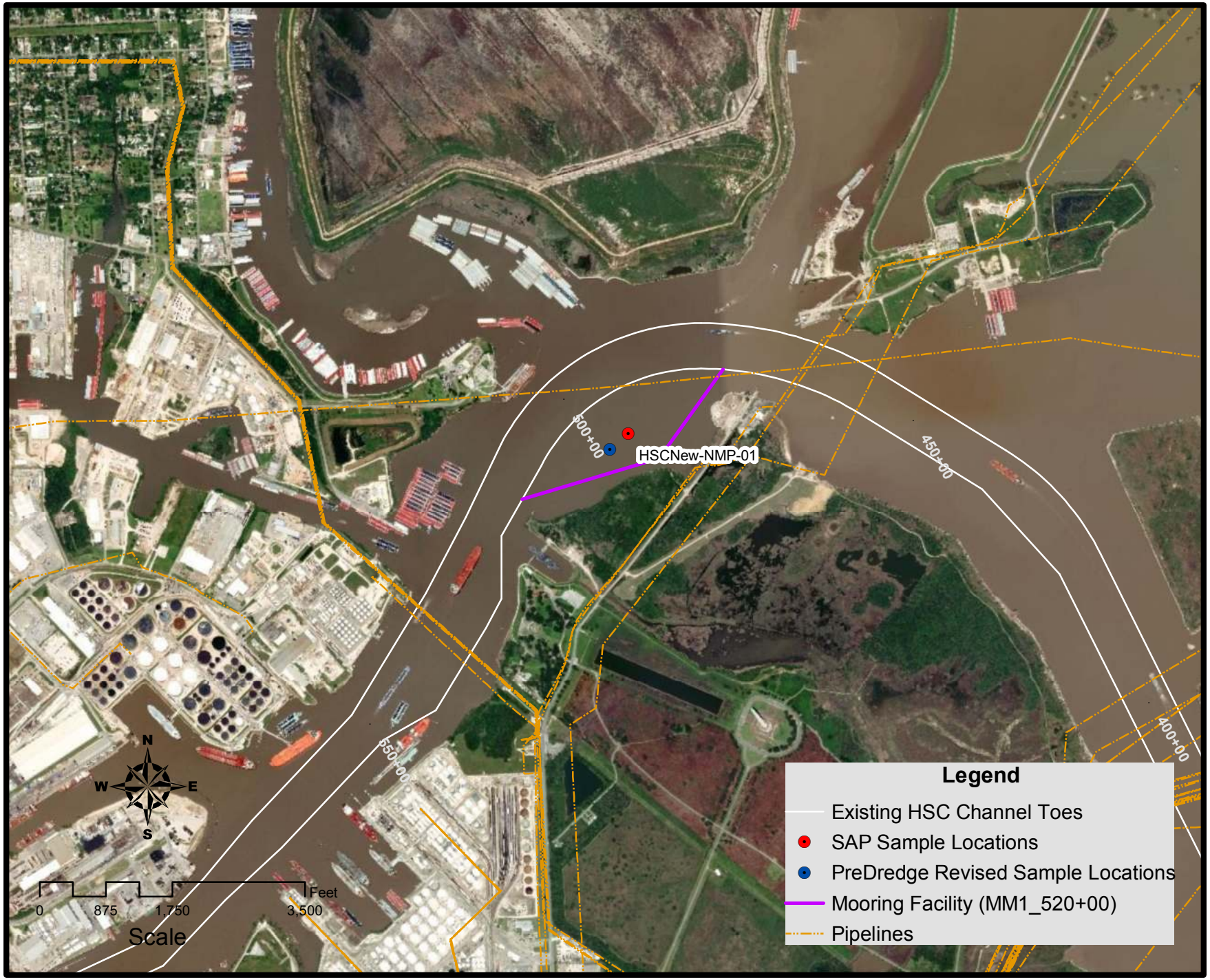
Figures

Figure 1: Study Area - Bayou Reach North of Morgans Point
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) New Work Houston Ship Channel, TX



Imagery: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC,
© OpenStreetMap contributors, and the GIS User Community

Figure 2: SAP Revised Sampling Locations - Segment 1 Bayou
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) New Work Houston Ship Channel, TX

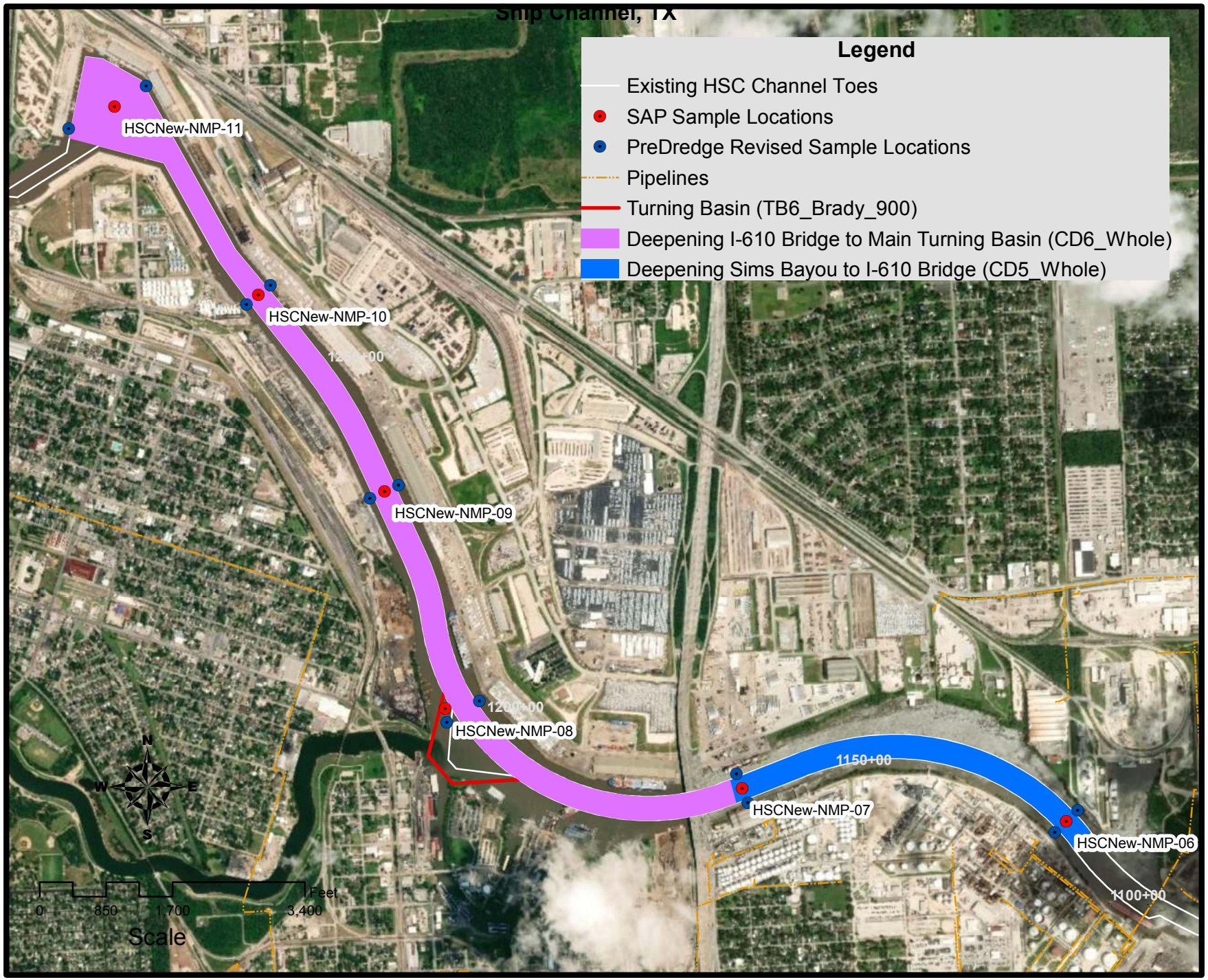


Imagery: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 3: SAP Revised Sampling Locations -
Houston Ship Channel Segment 4 Expansion Channel Improvement Project Work Houston Ship Channel, TX (HSC-ECIP) New

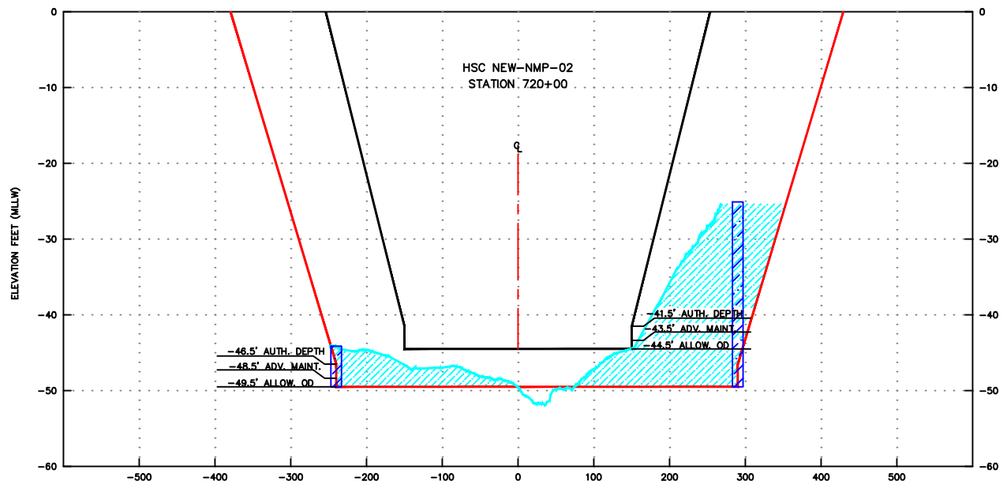
Imagery: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

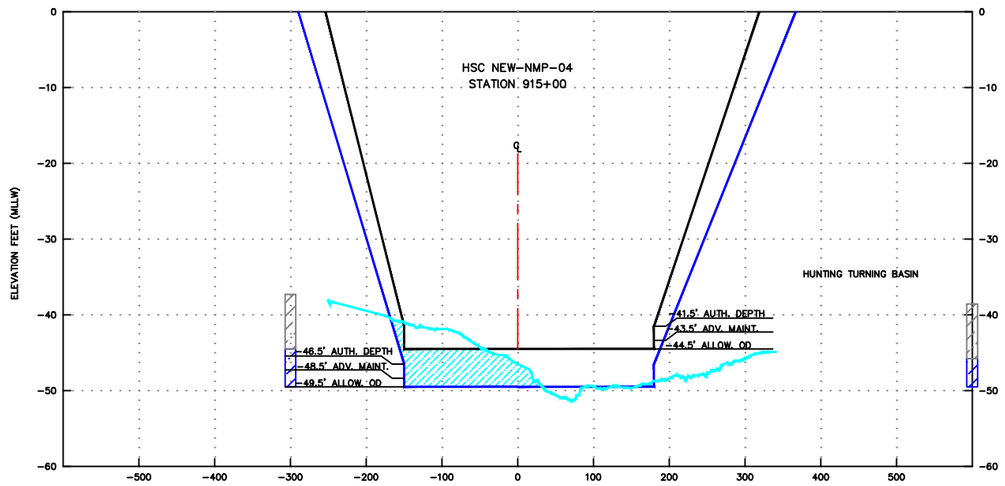
Figure 4: SAP Revised Sampling Locations - Segment 5 & 6
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) New Work Houston Ship Channel, TX

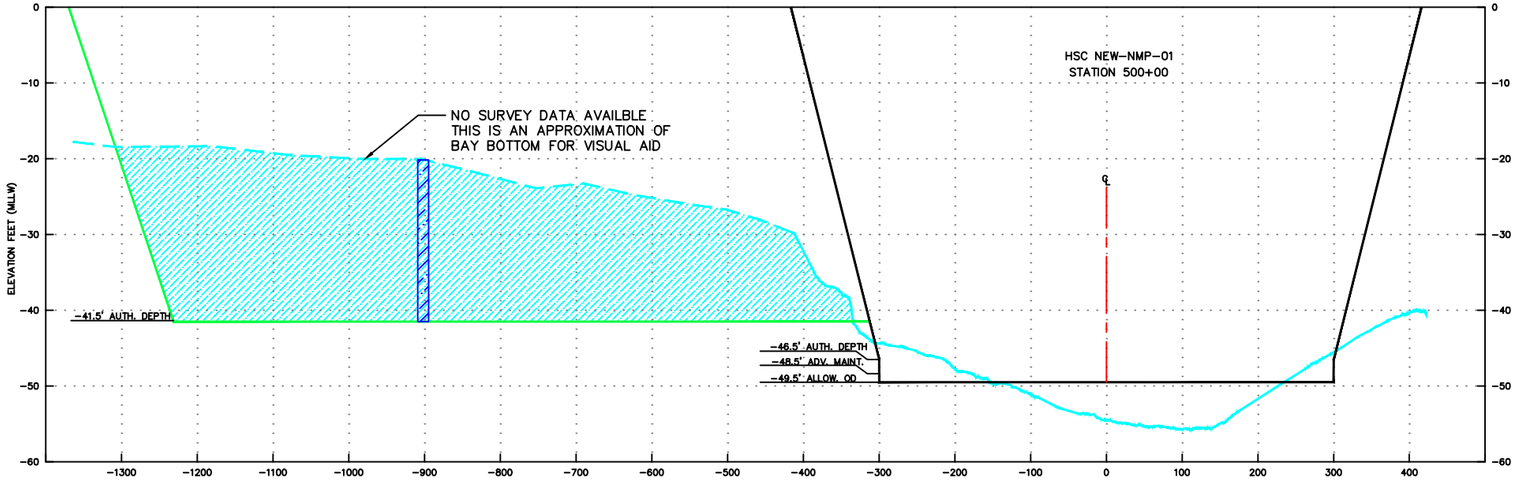


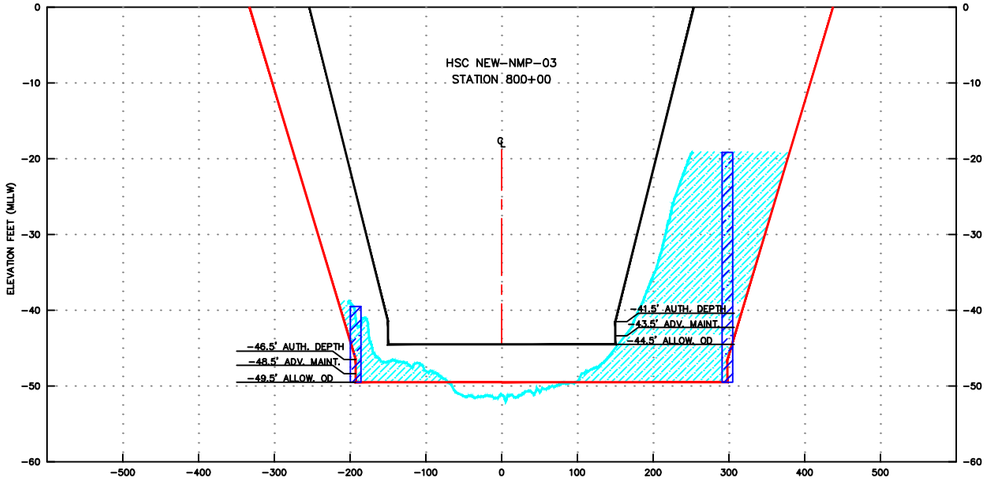
Imagery: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 5: Cross Sections for Selected Sampling Locations Including Dredge Prisms and Sampling Depth to be Retained
Houston Ship Channel Expsansion Channel Improvement Project (HSC-ECIP), Houston, TX





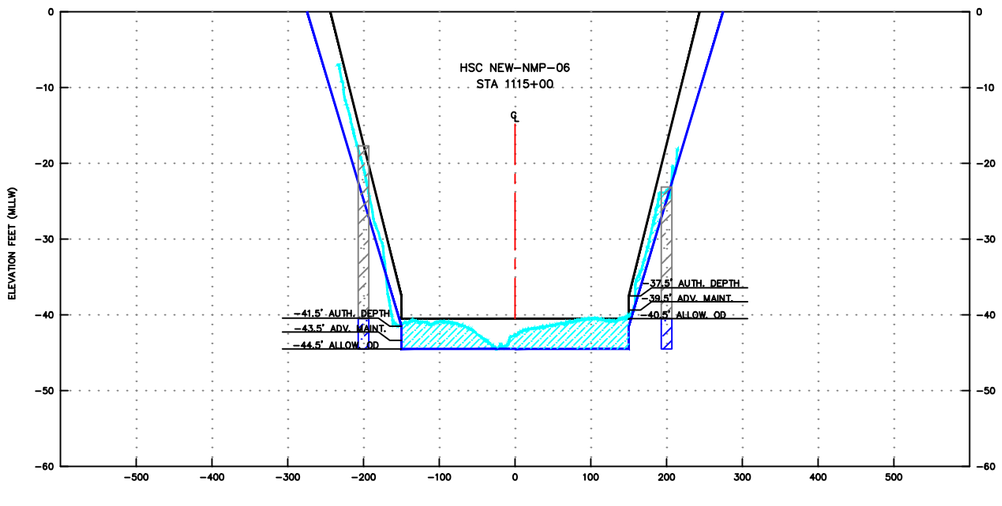


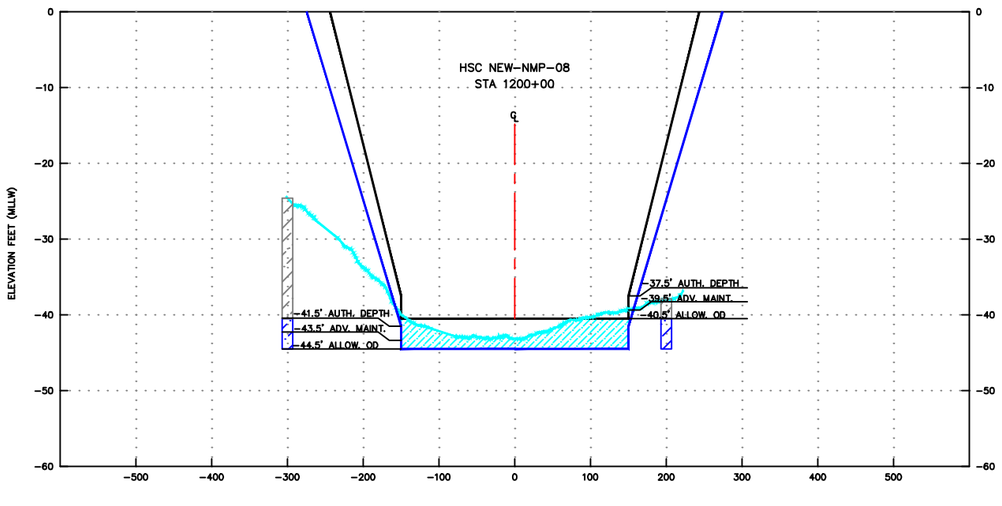


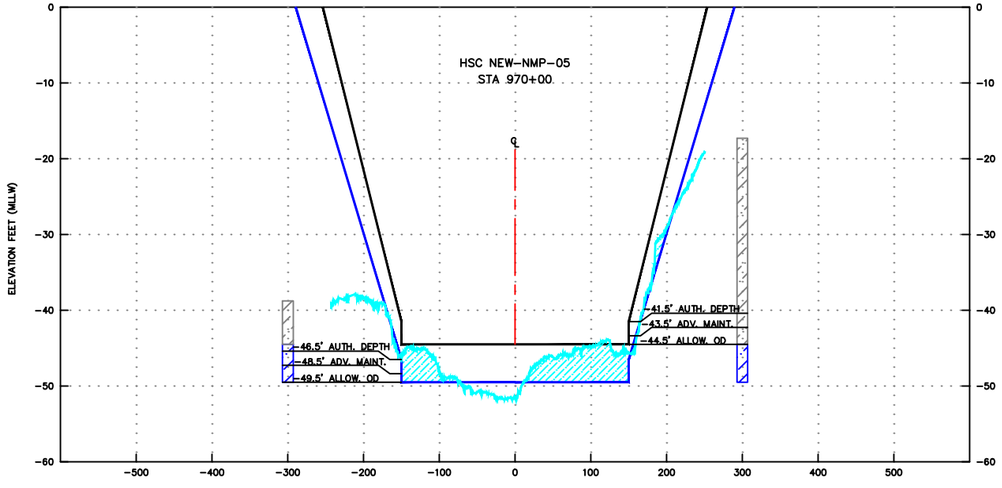
LEGEND
EXISTING CHANNEL TEMPLATE
DEEPENED CHANNEL TEMPLATE
530-FT WIDENED/DEEPENED CHANNEL TEMPLATE
MOORING BASIN (MM1_520+00)
2018 USACE SURVEY-NOAA SURVEY COMBO
NEW WORK DREDGE PRISM
SAMPLE COLLECTED
SAMPLE COLLECTED BUT DISCARDED – DOES NOT REPRESENT DREDGING PRISM
*NOTE ALL SECTIONS LOOKING TOWARDS INCREASING STATION

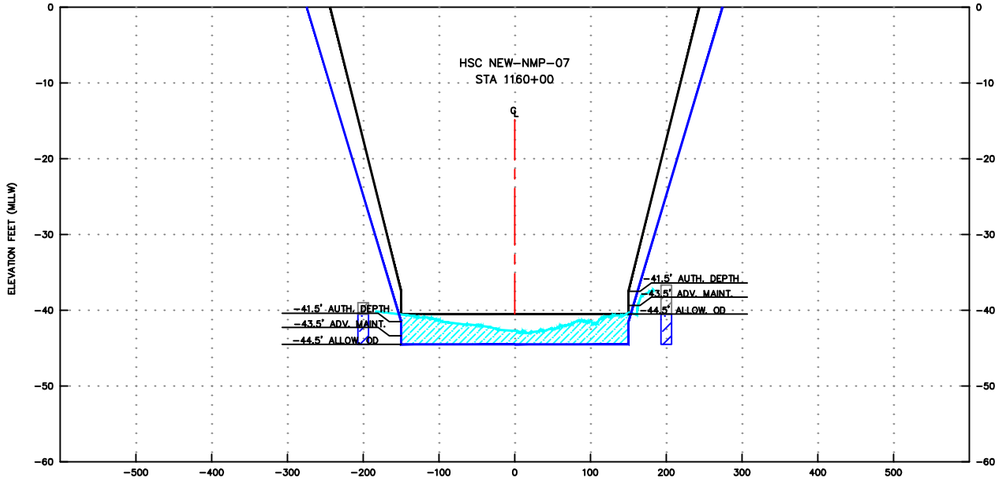
NORTH OF MORGANS POINT SAMPLING LOCATIONS REVISED 08/16/2018
SHEET 1 OF 3

Figure 5 (continued): Cross Sections for Selected Sampling Locations Including Dredge Prisms and Sampling Depth to be Retained
Houston Ship Channel Expsansion Channel Improvement Project (HSC-ECIP), Houston, TX



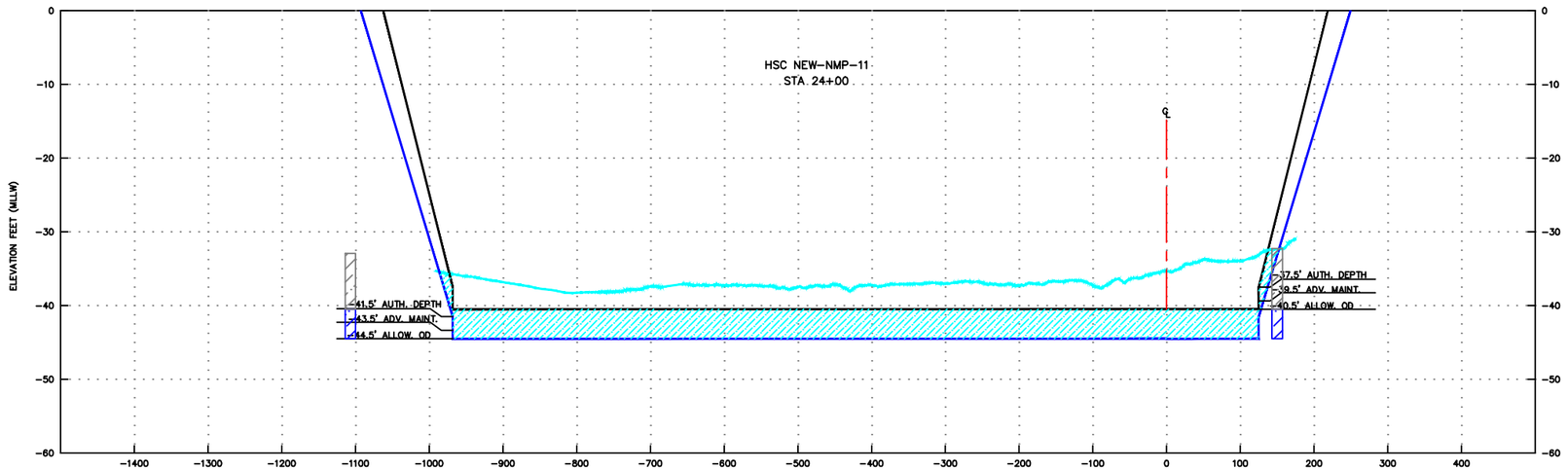


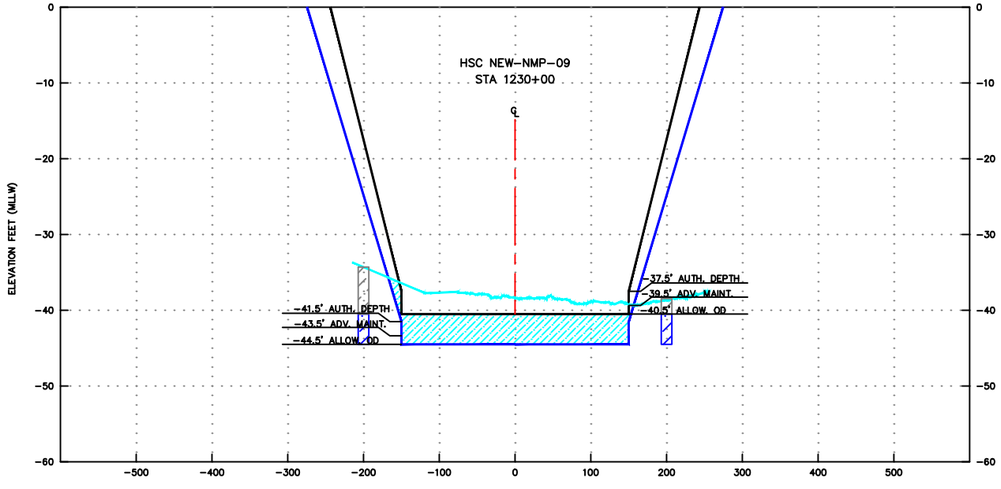


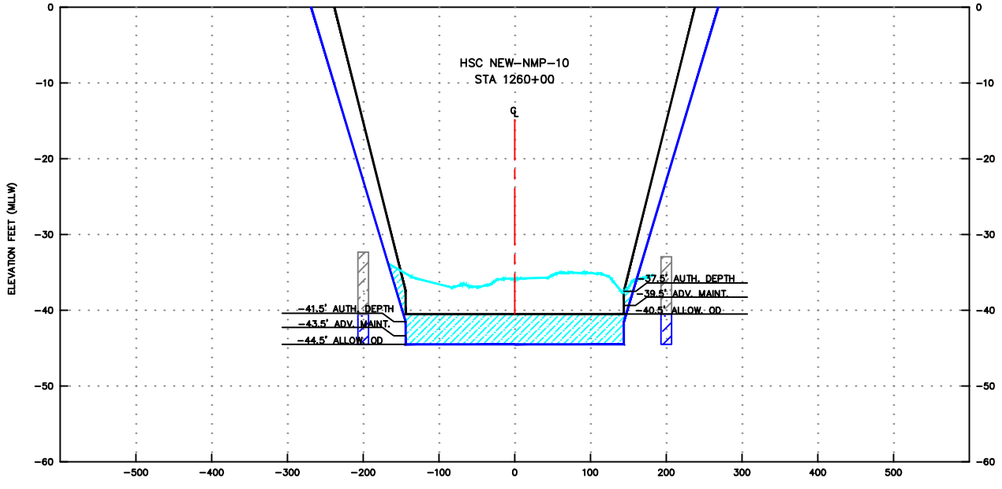


LEGEND
EXISTING CHANNEL TEMPLATE
DEEPENED CHANNEL TEMPLATE
2018 USACE SURVEY-NOAA SURVEY COMBO
NEW WORK DREDGE PRISM
SAMPLE COLLECTED
SAMPLE COLLECTED BUT DISCARDED – DOES NOT REPRESENT DREDGING PRISM
*NOTE ALL SECTIONS LOOKING TOWARDS INCREASING STATION

Figure 5 (continued): Cross Sections for Selected Sampling Locations Including Dredge Prisms and Sampling Depth to be Retained
Houston Ship Channel Expsansion Channel Improvement Project (HSC-ECIP), Houston, TX







LEGEND
EXISTING CHANNEL TEMPLATE
DEEPENED CHANNEL TEMPLATE
2018 USACE SURVEY-NOAA SURVEY COMBO
NEW WORK DREDGE PRISM
SAMPLE COLLECTED
SAMPLE COLLECTED BUT DISCARDED – DOES NOT REPRESENT DREDGING PRISM
*NOTE ALL SECTIONS LOOKING TOWARDS INCREASING STATION

NORTH OF MORGANS POINT SAMPLING LOCATIONS REVISED 08/16/2018
SHEET 3 OF 3

Tables

Table 1: Summary of Sample Collection and Testing
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) - North of Morgan's Point
Houston Ship Channel, TX

Segment	Sample Locations (1)	Station	Distance from Existing Channel Center Line (2)	Proposed Depth and Width (ft) (3)	Coordinates (NAD83)		Sample Matrix (4)	Categories of Analyses by Media (4, 5)	Chemical Analyses (6)
					N	E			
1 Mooring Basin	HSCNew-NMP-							SW - total dissolved (filtered) except VOC and Hg and Se (unfiltered); E-M - total and dissolved; SD - total (bulk)	VOCs, SVOCs, Pest, PCBs, Dioxins/DBF, TPH, TAL metals, Misc Parm.
	01-A	500+00	700	D = -45.5 (-41.5+2+2)	13,844,904	3,210,094	SD, SW (7)		
	01-B		1000	W = 1,075			SD		
	01-C		700				SD		
4 Boggy Bayou to Greens Bayou	HSCNew-NMP-							SW - total dissolved (filtered) except VOC and Hg and Se (unfiltered); E-M - total and dissolved; SD - total (bulk)	VOCs, SVOCs, Pest, PCBs, Dioxins/DBF, TPH, TAL metals, Misc Parm.
	02-A	720+00	-265	D = -50.5 (-46.5+2+2)	13,835,216	3,191,689	SD, SW		
	02-B		265	W = 530			SD		
4 Boggy Bayou to Greens Bayou	HSCNew-NMP-							SW - dissolved (filtered) except VOC and Hg and Se (unfiltered); E-M - total and dissolved; SD - total (bulk)	VOCs, SVOCs, Pest, PCBs, Dioxins/DBF, TPH, TAL metals, Misc Parm.
	03-A	800+00	-193	D = -50.5 (-46.5+2+2)	13,838,494	3,184,648	SD, SW		
	03-B		298	W = 530			SD		
4 Greens Bayou to Washburn Tunnel	HSCNew-NMP-							SW - total dissolved (filtered) except VOC and Hg and Se (unfiltered); E-M - total and dissolved; SD - total (bulk)	VOCs, SVOCs, Pest, PCBs, Dioxins/DBF, TPH, TAL metals, Misc Parm.
	04-A	912+00	In TB	D = -50.5 (-46.5+2+2)	13,836,595	3,173,878	SD, SW		
	04-B		-150	W = NA			SD		
	04-C		150				SD		
4 Greens Bayou to Washburn Tunnel	HSCNew-NMP-							SW - total dissolved (filtered) except VOC and Hg and Se (unfiltered); E-M - total and dissolved; SD - total (bulk)	VOCs, SVOCs, Pest, PCBs, Dioxins/DBF, TPH, TAL metals, Misc Parm.
	05-A	970+00	-150	D = -50.5 (-46.5+2+2)	13,831,491	3,170,996	SD, SW		
	05-B		150	W = NA			SD		
5 Sims Bayou to I-610 Bridge	HSCNew-NMP-							SW - total dissolved (filtered) except VOC and Hg and Se (unfiltered); E-M - total and dissolved; SD - total (bulk)	VOCs, SVOCs, Pest, PCBs, Dioxins/DBF, TPH, TAL metals, Misc Parm.
	06-A	1115+00	-150	D = -45.5 (-41.5+2+2)	13,829,832	3,158,049	SD, SW		
	06-B		150	W = NA			SD		
6 I-610 Bridge to Main Turning Basin	HSCNew-NMP-							SW - total dissolved (filtered) except VOC and Hg and Se (unfiltered); E-M - total and dissolved; SD - total (bulk)	VOCs, SVOCs, Pest, PCBs, Dioxins/DBF, TPH, TAL metals, Misc Parm.
	07-A	1160+00	-150	D = -45.5 (-41.5+2+2)	13,830,260	3,153,903	SD, SW		
	07-B		150	W = NA			SD		
6 I-610 Bridge to Main Turning Basin	HSCNew-NMP-							SW - total dissolved (filtered) except VOC and Hg and Se (unfiltered); E-M - total and dissolved; SD - total (bulk)	VOCs, SVOCs, Pest, PCBs, Dioxins/DBF, TPH, TAL metals, Misc Parm.
	08-A	1200+00	In TB	D = -45.5 (-41.5+2+2)	13,831,271	3,150,100	SD, SW		
	08-B		-150	W = NA			SD		
	08-C		150				SD		
6 I-610 Bridge to Main Turning Basin	HSCNew-NMP-							SW - total dissolved (filtered) except VOC and Hg and Se (unfiltered); E-M - total and dissolved; SD - total (bulk)	VOCs, SVOCs, Pest, PCBs, Dioxins/DBF, TPH, TAL metals, Misc Parm.
	09-A	1230+00	-150	D = -45.5 (-41.5+2+2)	13,834,052	3,149,321	SD, SW		
	09-B		150	W = NA			SD		
6 I-610 Bridge to Main Turning Basin	HSCNew-NMP-							SW - total dissolved (filtered) except VOC and Hg and Se (unfiltered); E-M - total and dissolved; SD - total (bulk)	VOCs, SVOCs, Pest, PCBs, Dioxins/DBF, TPH, TAL metals, Misc Parm.
	10-A	1260+00	-150	D = -45.5 (-41.5+2+2)	13,836,566	3,147,710	SD, SW		
	10-B		150	W = NA			SD		
Main Turning Basin	HSCNew-NMP-							SW - total dissolved (filtered) except VOC and Hg and Se (unfiltered); E-M - total and dissolved; SD - total (bulk)	VOCs, SVOCs, Pest, PCBs, Dioxins/DBF, TPH, TAL metals, Misc Parm.
	11-A	24+00	400	D = -45.5 (-41.5+2+2)	13,838,984	3,145,867	SD, SW		
	11-B		0	W = 1,300			SD		
	11-C		400				SD		

FOOTNOTES:

1) Three subsamples planned for collection within each sampling point as a transect as presented in the SAP, to be composited into one sample.
2) Station 800+00 is at a channel center line realignment, consequently the distances from the center line are asymmetrical
3) Reported as MLLW. The total proposed depth includes 2 feet of advanced maintenance and 2 feet of allowable over depth
4) SW = Water sample, SD = Sediment sample, E-M= Modified Elutriate, Misc - Miscellaneous. Refer to Sampling and Analysis plan for further details
5) Samples should not be filtered for VOCs, mercury and selenium analyses. Sample compositing will ONLY be permitted as designated in the SAP at each location for sediment samples. Refer to Tables 2, 3 and 4 for further detail.
6) Chemical Analyses: VOCs = Volatile Organic Compounds, SVOCs = SemiVolatile Organic Compounds, Pest = Pesticides, PCBs = PolyChlorinated Biphenyls, Dioxins/DBF = Dioxins/Dibenzofurans, TPH = Total Petroleum Hydrocarbons, Metals = Target Analyte
7) SW should be collected from the location where the bulk of the sediment is located wihtin the sample area

Table 2: Summary of Recommended Procedures for Sample Collection, Preservation and Storage [(a)]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Analyses	Collection Method[b]	Amount Required[c]	Container[d]	Preservation Technique	Storage Conditions	Holding Times[e]
SEDIMENT						
Chemical/Physical Analyses						
Volatile Organic Compounds	Grab/corer	100 g	Glass jar with Teflon lid	Refrigerate; no preservation	$4^{o}C$[f]/dark[g]	2 days if no chemical preservation at 4 ± 2°C; 14 days for sample analysis if preserved within 2 days[m]
SVOCs	Grab/corer	250 g	Solvent-rinsed amber glass jar with Teflon lid[f]	Dry ice[f] or freezer storage for extended storages; otherwise refrigerate	$4^{o}C$[f]/dark[g]	14 days (extraction)[h]
Pesticides	Grab/corer	250 g	Solvent-rinsed amber glass jar with Teflon lid[f]	Dry ice[f] or freezer storage for extended storages; otherwise refrigerate	$4^{o}C$[f]/dark[g]	14 days (extraction)[h]
Polychlorinated Biphenyls (PCBs)	Grab/corer	250 g	Solvent-rinsed amber glass jar with Teflon lid[f]	Dry ice[f] or freezer storage for extended storages; otherwise refrigerate	$4^{o}C$[f]/dark[g]	14 days (extraction)[h]
Polyaromatic Hydrocarbons (PAHs) if more lower RLs required than provided by Method 8270	Grab/corer	250 g	Solvent-rinsed amber glass jar with Teflon lid[f]	Dry ice[f] or freezer storage for extended storages; otherwise refrigerate	$4^{o}C$[f]/dark[g]	14 days (extraction)[h]
Dioxins/Furans	Grab/corer	150g	Glass jar	Refrigerate or freeze -10 ^{o}C	$<4^{o}C$	1 year to extraction; 1 year after extraction
TPH	Grab/corer	150g	Glass jar with Teflon lid	Refrigerate; no preservation	$4^{o}C$[f]/dark[g]	2 days if no chemical preservation at 4 ± 2°C; 14 days for sample analysis if preserved within 2 days[m]
Metals	Grab/corer	100 g	Amber glass jar	Dry ice[f] or freezer storage for extended storages; otherwise refrigerate	$4^{o}C$	Hg - 28 days Others – 180 days

Table 2: Summary of Recommended Procedures for Sample Collection, Preservation and Storage [(a)]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Chromium III and VI	Grab/corer	100 g	4 oz amber glass jar	Refrigerate; no preservation	$4^{o}C$/dark	30 days
Grain Size	Grab/corer	1000g	Whirl-pac bag[f]	Refrigerate	$<4^{o}C$	Undetermined
Total Organic Carbon (TOC)	Grab/corer	50 g	Heat treated amber glass jar	Dry ice[f] or freezer storage for extended storages; otherwise refrigerate	$4^{o}C$[f]	14 days
Ammonia	Grab/corer	40g	Glass jar	Refrigerate	$<4^{o}C$	7 days
Total solids/specific gravity	Grab/corer	50 g	Whirl-pac bag	Refrigerate	$<4^{o}C$	Undetermined
Miscellaneous	Grab/corer	50g	Whirl-pac bag	Refrigerate	$<4^{o}C$	Undetermined
Sediment from which elutriate is prepared	Grab/corer	Depends on tests being performed	Amber glass with Teflon-lined lid	Completely fill and refrigerate	$4^{o}C$/dark/airtight	8 weeks
Volume of Sediment Required per Sample Location		2 gallons sediment for chemical analyses (media) + 4 gallons sediment for modified elutriate Total = 6 gallons of sediment per location PLUS QC/Field Duplicate: 2 gallons sediment for chemical analyses				
Total Volume Sediment Required for 11-Channel Locations + 1-Field QA/Field Duplicate		66 gallons total of sediment for channel locations chemical analyses and modified elutriate PLUS 2 gallons sediment for the QC/Field Duplicate Sample for chemical analysis				

Table 2: Summary of Recommended Procedures for Sample Collection, Preservation and Storage [(a)]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

WATER AND ELUTRIATE						
Chemical/Physical Analyses						
Volatile Organic Compounds	Discrete sampler or pump	80 mL	Amber glass VOA vials with Teflon-lined lid[k]	pH <2 with 1:1 HCL; refrigerate in airtight, completely filled container[k]	$4^{o}C$[k]	14 days for sample analysis if preserved[m]
Semivolatile Organic Compounds	Discrete sampler or pump	2 L	Amber glass bottle with Teflon-lined lid[k]	Airtight seal; refrigerate	$4^{o}C$[k]	7 days for extraction; 40 days for extract analysis[k]
Pesticides	Discrete sampler or pump	1 L	Amber glass bottle with Teflon-lined lid[k]	Airtight seal; refrigerate	$4^{o}C$[k]	7 days for extraction; 40 days for extract analysis[k]
Polychlorinatd Biphenyls (PCBs)	Discrete sampler or pump	1 L	Amber glass bottle with Teflon-lined lid[k]	Airtight seal; refrigerate	$4^{o}C$[k]	7 days for extraction; 40 days for extract analysis[k]
Polyaromatic Hydrocarbons (PAHs) if more lower RLs required than provided by Method 8270	Discrete sampler or pump	1 L	Amber glass bottle with Teflon-lined lid[k]	Airtight seal; refrigerate	$4^{o}C$[k]	7 days for extraction; 40 days for extract analysis[k]
Phenolic compounds	Discrete sampler or pump	1 L	Amber glass[l]	0.1 - 1.0 g $CuSO_4$; H_2SO_4 to pH <2; refrigerate	$4^{o}C$[l]	24 h[l]
Dioxins/Furans	Discrete sampler or pump	1000 mL	Amber glass	Refrigerate	$4^{o}C$	1 year to extraction; 1 year after extraction
TPH	Graba/corer		Preweighed VOA vials with PTFE lined caps (fi); Encore Sampler or Solvent-rinsed amber glass VOA vials with Teflon lid[f]	Low level VOCs (Encores): NaHSO4 preservation at the lab within 24 hrs of collection; On-Site MeOH preservation for non-Encore “low” and "high" samples. Dry ice[f] or freezer storage for extended storages; otherwise refrigerate	$4^{o}C$[f]/dark[g]	2 days if no chemical preservation at 4 ± 2°C; 14 days for sample analysis if preserved within 2 days[m]
Sulfides	Discrete sampler or pump	500 mL	Plastic or glass[l]	pH >9 NaOH (ZnOAc); refrigerate	$4^{o}C$[l]	24 h[l]

Table 2: Summary of Recommended Procedures for Sample Collection, Preservation and Storage [(a)]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Metals	Discrete sampler or pump	100 mL	Acid-rinsed polyethylene or glass jar[k]	pH <2 with HNO_3[k]; refrigerate	4^oC 2^oC[k]	Hg - 14 days Others – 180 days
Chromium III and VI	Discrete sampler or pump	125 mL	Plastic	Refrigerate; no preservation	4^oC/dark	24 h
Dissolved Organic Carbon (DOC)	Discrete sampler or pump	100 mL	Amber glass VOA vials	H_2SO_4 to pH <2; refrigerate	4^oC[l]	28 days[l]
Total cyanide	Discrete sampler or pump	500 mL	Plastic	pH >12 NaOH; refrigerate	4^oC	14 days
Ammonia	Discrete sampler or pump	500 mL	Plastic	H_2SO_4 to pH <2; refrigerate	4^oC	7 days
Particulate analysis	Discrete sampler or pump	500-2000 mL	Plastic or glass	Lugols solution and refrigerate	4^oC	Undetermined
Volume of Site Water per Channel Location		3 gallons water for chemical analyses (media) + 25 gallons water for modified elutriate Total = 28 gallons of water per location PLUS QC/Field Duplicate: 3 gallons water for chemical analyses				
Total Volume Surface Water Required for 11-Channel Locations + 1-QC/Field Duplicate		308 gallons total of water for channel location chemical analyses and modified elutriate PLUS 3 gallons water for the QC/Field Duplicate Sample for chemical analysis				

Table 2: Summary of Recommended Procedures for Sample Collection, Preservation and Storage [(a)]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Footnotes

a (i) primary reference USEPA/USACE, Regional Implementation Agreement, July 2003;

(ii) **CONSULT WITH YOUR ANALYTICAL PROVIDER**. This table contains only a summary of collection, preservation, and storage procedures for samples. Consult with your analytical provider to confirm or modify for site-specific sampling and analyses. The cited references should be consulted for a more detailed description of these procedures (Inland Testing Manual, EPA-823-B-98-004);

b Collection method should include appropriate liners;

c Amount of sample required by the laboratory to perform the analysis (wet weight or volume provided, as appropriate). CONFIRM THESE QUANTITIES WITH YOUR ANALYTICAL PROVIDER!! Miscellaneous sample size for sediment should be increased if auxiliary analytes that cannot be included as part of the organic or metal analyses are added to the list. The amounts shown are not intended as firm values; more or less tissue may be required depending on the analytes, matrices, detection limits, and particular analytical laboratory;

d All containers should be certified as clean according to EPA (1990);

e These holding times are for sediment, water, and tissue based on guidance that is sometimes administrative rather than technical in nature. There are no promulgated, scientifically based holding time criteria for sediments, tissues, or elutriates. References should be consulted if holding times for sample extracts are desired. Holding times are from the time of sample collection;

f NOAA (1989);

f(i) TCEQ (formerly TNRCC, Method 1005)

g Tetra Tech (1986a);

h Sample may be held for up to one year if at -20^{O}C;

i Polypropylene should be used if phthalate bioaccumulation is of concern;

k EPA (1987); 40 CFR Part 136, Table III;

l Plumb (1981);

m If samples are not preserved to pH<2, then aromatic compounds must be analyzed within 7 days;

n Tetra Tech (1986b);

Table 3: Target Detection Levelsa (TDLs), Screening Benchmarks and Analytical Methodology, Marine Water and Elutriate
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Chemical	CAS #	Units	TDLs (b)	Screening Benchmarks				EPA Method
			Marine Water/Elutriate	TSWQS (Marine Acute) (c)	EPA WQC (Marine Acute) (d)	NOAA (Marine Acute) (e)	Region 6 (Marine) (f)	
VOLATILES								
1,1,1-Trichloroethane	71-55-6	ug/L	-	-	-	31200	1560	8260B, GC-MS Mode
1,1,2,2-Tetrachloroethane	79-34-5	ug/L	-	-	-	9020	451	
1,1,2-Tetrachloro-1,2,2-trifluoroethane	76-13-1	ug/L	-	-	-	-	-	
1,1,2-Trichloroethane	79-00-5	ug/L	-	-	-	-	275	
1,1-Dichloroethane	75-34-3	ug/L	-	-	-	-	-	
1,1-Dichloroethene	75-35-4	ug/L		-	-	224000	12500	
1,2,3-Trichlorobenzene	87-61-6	u	-	-	-	-	-	
1,2,4-Trichlorobenzene	120-82-1	ug/L	0.9	-	-	160	22	
1,2-Dibromo-3-Chloropropane	96-12-8	ug/L	-	-	-	-	-	
1,2-Dibromoethane	106-93-4	ug/L	-	-	-	-	-	
1,2-Dichlorobenzene	95-50-1	ug/L	0.8	-	-	1970	99	
1,2-Dichloroethane	107-06-2	ug/L	-	-	-	11300	5650	
1,2-Dichloropropane	78-87-5	ug/L	-	-	-	10300	-	
1,3-Dichlorobenzene	541-73-1	ug/L	0.9	-	-	1970	142	
1,4-Dichlorobenzene	106-46-7	ug/L	1	-	-	1970	99	
1,4-Dioxane	123-91-1	ug/L	-	-	-	-	-	
2-Butanone	78-93-3	ug/L	-	-	-	-	-	
2-Hexanone	591-78-6	ug/L	-	-	-	-	-	
4-Methyl-2-Pentanone	108-10-1	ug/L	-	-	-	-	61500	
Acetone	67-64-1	ug/L	-	-	-	-	282000	
Benzene	71-43-2	ug/L	2	-	-	5100	109	
Bromodichloromethane	75-27-4	ug/L	-	-	-	-	-	
Bromoform	75-25-2	ug/L	-	-	-	-	1220	
Bromomethane	74-83-9	ug/L	-	-	-	-	600	
Carbon Disulfide	75-15-0	ug/L	-	-	-	-	-	
Carbon Tetrachloride	56-23-5	ug/L	-	-	-	50000	1500	
Chlorobenzene	108-90-7	ug/L	-	-	-	-	105	
Chloroethane	75-00-3	ug/L	-	-	-	-	-	
Chloroform	67-66-3	ug/L	2	-	-	-	4100	
Chloromethane	74-87-3	ug/L	-	-	-	-	13500	
cis-1,2-Dichloroethene	156-59-2	ug/L	-	-	-	224000	-	
cis-1,3-Dichloropropene	10061-01-5	ug/L	-	-	-	-	-	
Cyclohexane	110-82-7	ug/L	-	-	-		-	
Dibromochloromethane	124-48-1	ug/L	-	-	-	12000	-	
Dichlorodifluoromethane	75-71-8	ug/L	-	-	-	-	-	
Ethylbenzene	100-41-4	ug/L	5	-	-	430	249	
Isopropylbenzene	98-82-8	ug/L	-	-	-	-	-	
Methyl acetate	79-20-9	ug/L	-	-	-	-	-	
Methyl tert-butyl ether	1634-04-4	ug/L	-	-	-	-	-	
Methylcyclohexane	108-87-2	ug/L	-	-	-	-	-	
Methylene chloride	75-09-2	ug/L	-	-	-	-	5420	
o-Xylene	95-47-6	ug/L	-	-	-	-	-	
m&p-Xylene	179601-23-1	ug/L	-	-	-	-	-	
Styrene	100-42-5	ug/L	-	-	-	-	455	
Tetrachloroethene	127-18-4	ug/L	2	-	-	-	1450	
Toluene	108-88-3	ug/L	5	-	-	6300	480	
trans-1,2-Dichloroethene	156-60-5	ug/L	-	-	-	224000	-	
trans-1,3-Dichloropropene	10061-02-6	ug/L	-	-	-	-	-	
Trichloroethene	79-01-6	ug/L	2	-	-	2000	970	
Trichlorofluoromethane	75-69-4	ug/L	-	-	-	12000	-	
Vinyl chloride	75-01-4	ug/L	-	-	-	-	-	

Table 3: Target Detection Levelsa (TDLs), Screening Benchmarks and Analytical Methodology, Marine Water and Elutriate
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Chemical	CAS #	Units	TDLs (b)	Screening Benchmarks				EPA Method
			Marine Water/Elutriate	TSWQS (Marine Acute) (c)	EPA WQC (Marine Acute) (d)	NOAA (Marine Acute) (e)	Region 6 (Marine) (f)	
SEMIVOLATILES								
1,2,4-Trichlorobenzene	120-82-1	ug/L	0.9 (g)	-	-	160	22	8270C, GC-MS SIM Mode
1,2-Dichlorobenzene	95-50-1	ug/L	0.8 (g)	-	-	1970	591	
1,2-Diphenylhydrazine	122-66-7	ug/L	1	-	-	-	-	
1,3-Dichlorobenzene	541-73-1	ug/L	0.9 (g)	-	-	1970	142	
1,4-Dichlorobenzene	541-73-1	ug/L	1 (g)	-	-	1970	99	
2,4,6-Trichlorophenol	95-95-4	ug/L	0.9 (g)	-	-	-	61	
2,4-Dichlorophenol	120-83-2	ug/L	0.8 (g)	-	-	-	-	
2,4-Dimethylphenol	105-67-9	ug/L	10	-	-	-	-	
2,4-Dinitrophenol	51-28-5	ug/L	5 (g)	-	-	4850	1330	
2,4-Dinitrotoluene	121-14-2	ug/L	2 (g)	-	-	590	-	
2,6-Dinitrotoluene	606-20-2	ug/L	2 (g)	-	-	-	-	
2-Chloronapthalene	91-58-7	ug/L	0.8 (g)	-	-	7.5	-	
2-Chlorophenol	95-57-8	ug/L	0.9 (g)	-	-	-	265	
2-Methylphenol	95-48-7	ug/L	10	3060	-	-	-	
2-Nitrophenol	88-75-5	ug/L	2 (g)	-	-	-	2940	
3,3-Dichlorobenzidine	91-4-1	ug/L	3 (g)	-	-	-	73	
4,6-Dinitro-o-cresol	534-52-1	ug/L	10	-	-	-	-	
4-Bromophenyl phenyl ether	101-55-3	ug/L	0.4 (g)	-	-	-	-	
4-Chloro-3-methylphenol	59-50-7	ug/L	0.7 (g)	-	-	-	-	
4-Chlorophenyl phenyl ether	7005-72-3	ug/L	0.6 (g)	-	-	-	-	
4-Methylphenol	106-44-5	ug/L	10	-	-	-	-	
4-Nitrophenol	100-02-7	ug/L	5 (g)	-	-	4850	717	
Acenaphthene	83-32-9	ug/L	0.75 (g)	-	-	970	40.4	
Acenaphthylene	208-96-8	ug/L	1.0 (g)	-	-	300	-	
Anthracene	120-12-7	ug/L	0.6 (g)	-	-	300	0. 18	
Benzidine	92-87-5	ug/L	1	-	-	-	-	
Benzo(a)anthracene	56-55-3	ug/L	0.4 (g)	-	-	300	-	
Benzo(a)pyrene	50-32-8	ug/L	0.3 (g)	-	-	300	-	
Benzo(b&k)fluoranthene	205-99-2	ug/L	0.6 (g)	-	-	300	-	
Benzo(e)pyrene	192-97-2	ug/L	-	-	-	-	-	
Benzo[g,h,i]perylene	191-24-2	ug/L	1.2 (g)	-	-	300	-	
Bis(2-chloroethoxy)methane	111-91-1	ug/L	1 (g)	-	-	12000	-	
Bis(2-chloroethyl)ether	111-44-4	ug/L	0.9 (g)			-	-	
Bis(2-chloroisopropyl)ether	108-60-1	ug/L	0.7 (g)	-	-	-	-	
Bis[2-ethylhexyl] Phthalate	117-81-7	ug/L	2 (g)	-	-	400	-	
Butyl Benzyl Phthalate	85-68-7	ug/L	4 (g)	-	-	2944	147	
Chrysene	218-01-9	ug/L	0.3 (g)	-	-	300	-	
Dibenzo[a,h]anthracene	53-70-3	ug/L	1.3 (g)	-	-	300	-	
Diethyl Phthalate	84-66-2	ug/L	1 (g)	-	-	2944	884	
Dimethyl Phthalate	131-11-3	ug/L	1 (g)	-	-	2944	580	
Di-n-butyl Phthalate	84-74-2	ug/L	1 (g)	-	-	2944	NA	
Di-n-octyl Phthalate	117-84-0	ug/L	3 (g)	-	-	2944	-	
Fluoranthene	206-44-0	ug/L	0.9 (g)	-	-	40	2.96	
Fluorene	86-73-7	ug/L	0.6 (g)	-	-	300	50	
Hexachlorobenzene	118-74-1	ug/L	0.4 (g)	-	-	160	-	
Hexachlorobutadiene	87-69-3	ug/L	0.9 (g)	-	-	32	0. 32	
Hexachlorocyclopentadiene	77-47-4	ug/L	3.0 (g)	-	-	7	0. 07	
Hexachloroethane	67-72-1	ug/L	0.9 (g)	-	-	940	9.4	
Indeno[1,2,3-c,d]pyrene	193-39-5	ug/L	1.2 (g)			300	-	

Table 3: Target Detection Levelsa (TDLs), Screening Benchmarks and Analytical Methodology, Marine Water and Elutriate
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Chemical	CAS #	Units	TDLs (b)	Screening Benchmarks				EPA Method
			Marine Water/Elutriate	TSWQS (Marine Acute) (c)	EPA WQC (Marine Acute) (d)	NOAA (Marine Acute) (e)	Region 6 (Marine) (f)	
Isophorone	78-59-1	ug/L	1	-	-	12900	1290	8270C, GC-MS SIM Mode
Naphthalene	91-20-3	ug/L	0.8 (g)	-	-	-	250	
Nitrobenzene	98-95-3	ug/L	0.9 (g)	-	-	6680	66.8	
N-Nitrosodimethylamine	62-75-9	ug/L	3.1 (g)	-	-	-	330000	
N-Nitrosodi-n-propylamine	621-64-7	ug/L	0.9 (g)	-	-	-	120	
N-Nitrosodiphenylamine	86-30-6	ug/L	2.1 (g)	-	-	3300000	330000	
Pentachlorophenol	87-86-5	ug/L	50	15.1	13	13	9.6	
Phenanthrene	85-01-8	ug/L	0.5 (g)	7.7	-	7.7	4.6	
Phenol	108-95-2	ug/L	10	-	-	5800	5500	
Pyrene	129-00-0	ug/L	1.5 (g)	-	-	300	0. 24	
PAH (Total)	130498-29-2	ug/L	-	-	-	-	-	
Total Petroleum Hydrocarbons	8012-95-1	ug/L	100	-	-	-	-	8021/TCEQ 1005
PESTICIDES								
4,4'-DDD	72-54-8	ug/L	0.1	-	-	3.6	0. 025	8081A
4,4'-DDE	72-55-9	ug/L	0.1	-	-	14	0. 14	
4,4'-DDT	50-29-3	ug/L	0.1	0.13	0.13 (G, ii)	0.065	0. 001	
Aldrin	309-00-2	ug/L	0.03 (g)	1.3	1.3 (G)	0.65	0. 13	
Alpha-BHC	319-84-6	ug/L	0.03	-	-	-	-	
Beta-BHC	319-85-7	ug/L	0.03	-	-	-	-	
Chlordane and Derivatives	57-74-9	ug/L	0.03 (g)	0.09	0.09 (G)	-	-	
Delta-BHC	319-86-8	ug/L	0.03	-	-	-	-	
Dieldrin	60-57-1	ug/L	0.03	0.71	0.71 (G)	0.355	0. 002	
Endosulfan I	115-29-7	ug/L	0.1	0.034	0.034 (G, Y)	0.017	-	
Endosulfan II	33213-65-9	ug/L	0.1	0.034	0.034 (G, Y)	0.017	-	
Endosulfan Sulfate	1031-07-8	ug/L	0.1	0.034	0.034 (G, Y)	0.017	-	
Endrin	72-20-8	ug/L	0.1	0.037	0.037 (G)	0.0185	0. 002	
Endrin Aldehyde	7421-93-4	ug/L	0.1	-	0.037 (G)	0.0185	0. 002	
Gamma-BHC (lindane)	58-89-9	ug/L	0.1	-	0.16 (G)	0.08	-	
Heptachlor	76-44-8	ug/L	0.1	0.053	0.053 (G)	0.0265	0. 004	
Heptachlor Epoxide	1024-57-3	ug/L	0.1	-	0.053 (G)	0.0265	0. 004	
Toxaphene	8001-35-2	ug/L	0.5	0.21	0.21	0.21	0. 0002	
POLYCHLORINATED BIPHENYLS								
Total PCB (l)	1336-36-3	ug/L	0.01		-	0.033	-	8082
METALS (l)								
Antimony	7440-36-0	ug/L	3 (0.03) (h)	-	-	1500	500	6010 or 6020 (k)
Arsenic	7440-38-2	ug/L	1 (0.011) (h)	149	69 (A, D)	69	78	
Barium	7440-39-3	ug/L	-	-	-	1000	-	
Beryllium	7440-41-7	ug/L	0.2	-	-	1500	-	
Cadmium	7440-43-9	ug/L	1 (0.01) (h)	40	40 (D)	40	-	
Chromium (total)	7440-47-3	ug/L	1	-	-	-	103	
Chromium (3+)	7440-47-3 (III)	ug/L	1	-	-	103000	-	EPA modified 7199
Chromium (6+) (k)	7440-47-3	ug/L	1	1090	1,100 (D)	1100	49.6	
Copper	7440-50-8	ug/L	1 (0.1) (h)	13.5	4.8 (D, cc)	4.8	3.6	6010 or 6020 (k)
Lead	7439-92-1	ug/L	1 (0.03) (h)	133	210 (D)	210	5.3	
Mercury	7439-97-6	ug/L	0.2 (0.0003) (h)	2.1	-	1.8	1.1	
Nickel	7440-02-0	ug/L	1 (0.1) (h)	118	74 (D)	74	13.1	
Selenium	7782-49-2	ug/L	2	564	290 (D, dd)	290	136	
Silver	7440-22-4	ug/L	1 (0.1) (h)	2	1.9 (D)	0.95	-	
Thallium	7440-28-0	ug/L	1 (0.03) (h)	-	-	2130	21.3	
Zinc	7440-66-6	ug/L	1 (0.5) (h)	92.7	90 (D)	90	84.2	

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Houston Ship Channel, TX

Chemical	CAS #	Units	TDLs (b)	Screening Benchmarks				EPA Method
			Marine Water/Elutriate	TSWQS (Marine Acute) (c)	EPA WQC (Marine Acute) (d)	NOAA (Marine Acute) (e)	Region 6 (Marine) (f)	
DIOXINS/FURANS								
Dioxin/Furan Total TEQ	-	ug/L	-	-	-	-	-	8280/8290
MISCELLANEOUS PARAMETERS								
Ammonia	NH3	ug/L	30	-	-	-	-	350
Cyanides	57-12-5	ug/L	100 (i)	-	1 (Q)	1	5.6	9010B/9012A
Dissolved Organic Carbon	Q129	%	0.1	-	-	-	-	415.3
Total Organic Carbon	7440-44-0	%	0.1	-	-	-	-	9060
Total Sulfide	18496-25-8	ug/L	0.1	-	-	-	-	9030
Total Suspended Solids	TSS	mg/L	NA	-	-	-	-	SM 2540D

FOOTNOTES- lowercase footnotes were created by the table generator

a) The primary sources for this table were: TDLs - EPA 823-B-95-001, QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations. USEPA/USACE, Regional Implementation Agreement, July 2003; US EPA SW-846 http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm;

b) Consult with your analtyical provider to ensure the laboratory MDL Study can detect VOC constituents to the concentrations noted in the screening

c) TSWQS Rule 307.6- (2014) https://www.tceq.texas.gov/waterquality/standards ; **NOTE**2018 TSWQSs were adopted by the commision on February 7, 2018, these Standards are effective for all state permits; however, until approved by USEPA, the 2014 Standards apply to federal permits.

d) EPA WQC- http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm; see EPA footnote section below for individual EPA

e) NOAA- http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

f) Region 6 screening benchmarks come from TCEQ's ecological benchmarks for water, http://www.tceq.state.tx.us/assets/public/remediation/eco/0106eragupdate.pdf; these values are equivalent to TSWQS chronic values

g) These values are based on recommendations from the EPA Region 6 laboratory in Houston; these values were based on data or other technical basis;

h) The values in parentheses are based on EPA "clean techniques", (EPA 1600 series methods) which are applicable in instances where other TDLs are inadequate to assess EPA water quality criteria;

i) This value recommended by Houston lab using colorimetric method. This value is based upon FREE cyanide, not complexed as the method is designed to analyze for. If free cyanide is expected, consult the laboratory as to the best method for quantifying free cyanide;

j) Metals shall be expressed as Dissolved values in water samples, except for mercury and selenium, which shall be reported as Total Recoverable

k) 6010/6020 are not suitable Methods for Cr+6. If Cr+6 is suspected from past dredging history or industrial landuse in the vicinity, US EPA SW-846 Method 7199 (modified);

l) Total PCBs for Region 6 from "Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (revised) January 2006; Total PCBs for NOAA from Squirt Table for Organics in Sediment;

EPA WQC footnotes- uppercase and double-lettered footnotes are directly from the NRWQC footnotes; only footnotes for constituents of concern are retained in this table

A) This recommended water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive. Please consult the criteria document for details.

D) Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column. See "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic life Metals Criteria (PDF)," (49 pp, 3MB) October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available on NSCEP's web site and 40CFR§131.36(b)(1). Conversion Factors applied in the table can be found in Appendix A to the Preamble- Conversion Factors for Dissolved Metals.

G) This Criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (PDF) (153 pp, 7.3MB) (EPA 440/5-80-019), Chlordane (PDF) (68 pp, 3.1MB) (EPA 440/5-80-027), DDT (PDF) (175 pp, 8.3MB) (EPA 440/5-80-038), Endosulfan (PDF) (155 pp, 7.3MB) (EPA 440/5-80-046), Endrin (PDF) (103 pp, 4.6MB) (EPA 440/5-80-047), Heptachlor (PDF) (114 pp, 5.4MB) (EPA 440/5-80-052), Hexachlorocyclohexane (PDF) (109 pp, 4.8MB) (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines (PDF) (104 pp, 3.3MB). If evaluation is to be done using an averaging period, the acute criteria values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

Q) This recommended water quality criterion is expressed as ug free cyanide (as CN)/l.

Y) This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.

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Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Chemical	CAS #	Units	TDLs (b)	Screening Benchmarks				EPA Method
			Marine Water/Elutriate	TSWQS (Marine Acute) (c)	EPA WQC (Marine Acute) (d)	NOAA (Marine Acute) (e)	Region 6 (Marine) (f)	

cc) When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be

dd) Selenium criteria document (EPA 440/5-87-006, September 1987)states that if selenium is as toxic to saltwater fishes in the field as it is to freshwater fishes in the field, the status of the fish community should be monitored whenever the conc.of selenium exceeds 5.0 µg/l in salt water because the saltwater CCC does not take into account uptake via the food chain.

ii)This criterion applies to DDT and its metabolites (i.e., the total conc. DDT plus metabolites should not exceed this value).

Table 4: Target Detection Levelsa (TDLs), Screening Benchmarks and Analytical Methodology, Marine Sediment
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Chemical	CAS #	Units	TDL	Screening Benchmarks			EPA Method
			Marine Sediment (b)	NOAA (Marine-ERL) (d)	NOAA (Marine-ERM) (d)	Region 6 (Marine) (c)	
VOLATILES							
1,1,1-Trichloroethane	71-55-6	mg/kg	-	-	-	2.63	8260B, GC-MS Mode
1,1,2,2-Tetrachloroethane	79-34-5	mg/kg	-	-	-	0.61	
1,1,2-Tetrachloro-1,2,2-trifluoroethane	76-13-1	mg/kg	-	-	-	-	
1,1,2-Trichloroethane	79-00-5	mg/kg	-	-	-	0.3	
1,1-Dichloroethane	75-34-3	mg/kg	-	-	-	-	
1,1-Dichloroethene	75-35-4	mg/kg	-	-	-	15.41	
1,2,3-Trichlorobenzene	87-61-6	mg/kg	-	-	-	-	
1,2,4-Trichlorobenzene	120-82-1	mg/kg	0.01	-	-	0.39	
1,2-Dibromo-3-Chloropropane	96-12-8	mg/kg	-	-	-	-	
1,2-Dibromoethane	106-93-4	mg/kg	-	-	-	-	
1,2-Dichlorobenzene	95-50-1	mg/kg	0.02	-	-	0.74	
1,2-Dichloroethane	107-06-2	mg/kg	-	-	-	4.3	
1,2-Dichloropropane	78-87-5	mg/kg	-	-	-	2.82	
1,3-Dichlorobenzene	541-73-1	mg/kg	0.02	-	-	0.32	
1,4-Dichlorobenzene	106-46-7	mg/kg	0.02	-	-	0.7	
1,4-Dioxane	123-91-1	mg/kg	-	-	-	-	
2-Butanone	78-93-3	mg/kg	-	-	-	-	
2-Hexanone	591-78-6	mg/kg	-	-	-	-	
4-Methyl-2-Pentanone	108-10-1	mg/kg	-	-	-	45.34	
Acetone	67-64-1	mg/kg	-	-	-	167.23	
Benzene	71-43-2	mg/kg	0.01	-	-	-	
Bromodichloromethane	75-27-4	mg/kg	-	-	-	-	
Bromoform	75-25-2	mg/kg	-	-	-	1.78	
Bromomethane	74-83-9	mg/kg	-	-	-	-	
Carbon Disulfide	75-15-0	mg/kg	-	-	-	-	
Carbon Tetrachloride	56-23-5	mg/kg	-	-	-	3.67	
Chlorobenzene	108-90-7	mg/kg	-	-	-	-	
Chloroethane	75-00-3	mg/kg	-	-	-	-	
Chloroform	67-66-3	mg/kg	0.01	-	-	4.3	
Chloromethane	74-87-3	mg/kg	-	-	-	8.74	
cis-1,2-Dichloroethene	156-59-2	mg/kg	-	-	-	-	
cis-1,3-Dichloropropene	10061-01-5	mg/kg	-	-	-	-	
Cyclohexane	110-82-7	mg/kg	-	-	-	-	
Dibromochloromethane	124-48-1	mg/kg	-	-	-	-	
Dichlorodifluoromethane	75-71-8	mg/kg	-	-	-	-	
Ethyl benzene	100-41-4	mg/kg	0.01	-	-	0.65	
Isopropylbenzene	98-82-8	mg/kg	-	-	-	-	
Methyl acetate	79-20-9	mg/kg	-	-	-	-	
Methyl tert-butyl ether	1634-04-4	mg/kg	-	-	-	-	
Methylcyclohexane	108-87-2	mg/kg	-	-	-	-	
Methylene chloride	75-09-2	mg/kg	-	-	-	3.82	
m-Xylene	108-38-3	mg/kg	-	-	-	-	
o-Xylene	95-47-6	mg/kg	-	-	-	-	
p-Xylene	106-42-3	mg/kg	-	-	-	-	

Table 4: Target Detection Levelsa (TDLs), Screening Benchmarks and Analytical Methodology, Marine Sediment
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Houston Ship Channel, TX

Chemical	CAS #	Units	TDL	Screening Benchmarks			EPA Method
			Marine Sediment (b)	NOAA (Marine-ERL) (d)	NOAA (Marine-ERM) (d)	Region 6 (Marine) (c)	
Styrene	100-42-5	mg/kg	-	-	-	-	8260B, GC-MS Mode
Tetrachloroethene	127-18-4	mg/kg	0.01	-	-	3.1	
Toluene	108-88-3	mg/kg	0.01	-	-	0.94	
trans-1,2-Dichloroethene	156-60-5	mg/kg	-	-	-	-	
trans-1,3-Dichloropropene	10061-02-6	mg/kg	-	-	-	-	
Trichloroethene	79-01-6	mg/kg	-	-	-	1.47	
Trichlorofluoromethane	75-69-4	mg/kg	-	-	-	-	
Vinyl chloride	75-01-4	mg/kg	-	-	-	-	
SEMIVOLATILES							
1,2,4-Trichlorobenzene	120-82-1	ug/kg	10	-	-	-	8270C; GC-MS in SIM mode
1,2-Dichlorobenzene	95-50-1	ug/kg	20	-	-	-	
1,2-Diphenylhydrazine	122-66-7	ug/kg	10	-	-	-	
1,3-Dichlorobenzene	541-73-1	ug/kg	20	-	-	-	
1,4-Dichlorobenzene	541-73-1	ug/kg	20	-	-	-	
2,4,6-Trichlorophenol	95-95-4	ug/kg	140 (e)	-	-	-	
2,4-Dichlorophenol	120-83-2	ug/kg	120 (e)	-	-	-	
2,4-Dimethylphenol	105-67-9	ug/kg	20	-	-	-	
2,4-Dinitrophenol	51-28-5	ug/kg	500 (e)	-	-	-	
2,4-Dinitrotoluene	121-14-2	ug/kg	200 (e)	-	-	-	
2,6-Dinitrotoluene	606-20-2	ug/kg	200 (e)	-	-	-	
2-Chloronapthalene	91-58-7	ug/kg	160 (e)	-	-	-	
2-Chlorophenol	95-57-8	ug/kg	110 (e)	-	-	-	
2-Methylphenol	95-48-7	ug/kg	50	-	-	63	
2-Nitrophenol	88-75-5	ug/kg	200 (e)	-	-	-	
3,3-Dichlorobenzidine	91-4-1	ug/kg	300 (e)	-	-	-	
4,6-Dinitro-o-cresol	534-52-1	ug/kg	600	-	-	-	
4-Bromophenyl phenyl ether	101-55-3	ug/kg	160 (e)	-	-	-	
4-Chloro-3-methylphenol	59-50-7	ug/kg	140 (e)	-	-	-	
4-Chlorophenyl phenyl ether	7005-72-3	ug/kg	170 (e)	-	-	-	
4-Methylphenol	106-44-5	ug/kg	100	-	-	670	
4-Nitrophenol	100-02-7	ug/kg	500 (e)	-	-	-	
Acenaphthene	83-32-9	ug/kg	20	16	500	16	
Acenaphthylene	208-96-8	ug/kg	20	44	640	44	
Anthracene	120-12-7	ug/kg	20	85.3	1100	85.3	
Benzidine	92-87-5	ug/kg	5	-	-	-	
Benzo(a)anthracene	56-55-3	ug/kg	20	261	1600	261	
Benzo(a)pyrene	50-32-8	ug/kg	20	430	1600	430	
Benzo(b&k)fluoranthene		ug/kg	20	-	-	-	
Benzo[g,h,i]perylene	191-24-2	ug/kg	20	-	-	-	
Bis(2-chloroethoxy)methane	111-91-1	ug/kg	170 (e)	-	-	-	
Bis(2-chloroethyl)ether	111-44-4	ug/kg	170 (e)	-	-	-	
Bis(2-chloroisopropyl)ether	108-60-1	ug/kg	140 (e)	-	-	-	
Bis[2-ethylhexyl] Phthalate	117-81-7	ug/kg	50	-	-	182 (i)	
Butyl Benzyl Phthalate	85-68-7	ug/kg	50	-	-	-	

Table 4: Target Detection Levelsa (TDLs), Screening Benchmarks and Analytical Methodology, Marine Sediment
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Chemical	CAS #	Units	TDL	Screening Benchmarks			EPA Method
			Marine Sediment (b)	NOAA (Marine-ERL) (d)	NOAA (Marine-ERM) (d)	Region 6 (Marine) (c)	
Chrysene	218-01-9	ug/kg	20	384	2800	384	8270C; GC-MS in SIM mode
Dibenzo[a,h]anthracene	53-70-3	ug/kg	20	63.4	260	63.4	
Diethyl Phthalate	84-66-2	ug/kg	50	-	-	-	
Dimethyl Phthalate	131-11-3	ug/kg	50	-	-	-	
Di-n-butyl Phthalate	84-74-2	ug/kg	50	-	-	-	
Di-n-octyl Phthalate	117-84-0	ug/kg	50	-	-	-	
Fluoranthene	206-44-0	ug/kg	20	600	5100	600	
Fluorene	86-73-7	ug/kg	20	19	540	19	
Hexachlorobenzene	118-74-1	ug/kg	10	-	-	-	
Hexachlorobutadiene	87-69-3	ug/kg	20	-	-	-	
Hexachlorocyclopentadiene	77-47-4	ug/kg	300 (e)	-	-	-	
Hexachloroethane	67-72-1	ug/kg	100	-	-	-	
Indeno[1,2,3-c,d]pyrene	193-39-5	ug/kg	20	-	-	-	
Isophorone	78-59-1	ug/kg	10	-	-	-	
Naphthalene	91-20-3	ug/kg	20	160	2100	160	
Nitrobenzene	98-95-3	ug/kg	160 (e)	-	-	-	
N-Nitrosodimethylamine	62-75-9	ug/kg	-	-	-	-	
N-Nitrosodi-n-propylamine	621-64-7	ug/kg	150 (e)	-	-	-	
N-Nitrosodiphenylamine	86-30-6	ug/kg	20	-	-	-	
Pentachlorophenol	87-86-5	ug/kg	100	-	-	-	
Phenanthrene	85-01-8	ug/kg	20	240	1500	240	
Phenol	108-95-2	ug/kg	100	-	-	-	
Pyrene	129-00-0	ug/kg	20	665	2600	665	
PAH Total	130498-29-2	ug/kg	20	4022	44792	4022	
Total Petroleum Hydrocarbons	8012-95-1	mg/kg	5	-	-	-	8021/TCEQ 1005
PESTICIDES							
4,4'-DDD	72-54-8	ug/kg	5 (e)	2	20	1.22	8081A
4,4'-DDE	72-55-9	ug/kg	5 (e)	2.2	27	2.07	
4,4'-DDT	50-29-3	ug/kg	5 (e)	1	7	1.19	
Aldrin	309-00-2	ug/kg	3 (e)	-	-	-	
Alpha-BHC	319-84-6	ug/kg	3 (e)	-	-	-	
Beta-BHC	319-85-7	ug/kg	3 (e)	-	-	-	
Chlordane and Derivatives	57-74-9	ug/kg	3 (e)	0.5	6	2.26 (i)	
Delta-BHC	319-86-8	ug/kg	3 (e)	-	-	-	
Dieldrin	60-57-1	ug/kg	5 (e)	0.02	8	0.715 (i)	
Endosulfan I	115-29-7	ug/kg	5 (e)	-	-	-	
Endosulfan II	33213-65-9	ug/kg	5 (e)	-	-	-	
Endosulfan Sulfate	1031-07-8	ug/kg	5 (e)	-	-	-	
Endrin	72-20-8	ug/kg	5 (e)	-	-	-	
Endrin Aldehyde	7421-93-4	ug/kg	5 (e)	-	-	-	
Gamma-BHC (Lindane)	58-89-9	ug/kg	3 (e)	-	-	0.32 (i)	

Table 4: Target Detection Levelsa (TDLs), Screening Benchmarks and Analytical Methodology, Marine Sediment
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Chemical	CAS #	Units	TDL	Screening Benchmarks			EPA Method
			Marine Sediment (b)	NOAA (Marine-ERL) (d)	NOAA (Marine-ERM) (d)	Region 6 (Marine) (c)	
Heptachlor	76-44-8	ug/kg	3 (e)	-	-	-	8081A
Heptachlor Epoxide	1024-57-3	ug/kg	3 (e)	-	-	-	
Toxaphene	8001-35-2	ug/kg	50	-	-	-	
POLYCHLORINATED BIPHENYLS							
Total PCB (f)	1336-36-3	ug/kg	1	22.7	180	22.7	8082
METALS (g)							
Antimony	7440-36-0	mg/kg	2.5	2	-	-	6010/6020 (h)
Arsenic	7440-38-2	mg/kg	0.3 (e)	8.2	70	8.2	
Barium	7440-39-3	mg/kg	-	-	-	-	
Beryllium	7440-41-7	mg/kg	1 (e)	-	-	-	
Cadmium	7440-43-9	mg/kg	0.1	1.2	9.6	1.2	
Chromium (total)	7440-47-3	mg/kg	1 (e)	81	370	81	
Chromium (3+)	7440-47-3 (III)	mg/kg	1	-	-	-	EPA modified 7199
Chromium (6+) (h)	7440-47-3 (Cr6+)	mg/kg	1	-	-	-	
Copper	7440-50-8	mg/kg	1 (e)	34	270	34	6010/6020 (h)
Lead	7439-92-1	mg/kg	0.3 (e)	46.7	218	46.7	
Mercury	7439-97-6	mg/kg	0.2	0.15	0.71	0.15	
Nickel	7440-02-0	mg/kg	0.5 (e)	20.9	51.6	20.9	
Selenium	7782-49-2	mg/kg	0.5 (e)	-	-	-	
Silver	7440-22-4	mg/kg	0.2	1	3.7	1	
Thallium	7440-28-0	mg/kg	0.2	-	-	-	
Zinc	7440-66-6	mg/kg	2 (e)	150	410	150	
DIOXINS/FURANS							
Dioxin/Furan Total TEQ	-	pg/g	-	-	-	-	8280/8290
MISCELLANEOUS PARAMETERS							
Ammonia	NH3	mg/kg	0.1	-	-	-	350
Atterburg Limits	-	-	-	-	-	-	ASTM D4318
Cyanides	57-12-5	mg/kg	2	-	-	-	9010B/9012A
Grain Size (sand, silt, clay)	-	%	1%	-	-	-	Sieve & Hydrometer
Percent Moisture	-	%	-	-	-	-	ASTM D2216
Specific Gravity	-	mg/kg	0.01	-	-	-	ASTM D854-00
Total Organic Carbon	Q129	%	0.10%	-	-	-	9060
Total Solids/Dry Weight	-	%	0.10%	-	-	-	ASTM D2216
Total Sulfide	18496-25-8	mg/kg	0.1	-	-	-	9030
Total Volatile Solids	-	%	10.0%	-	-	-	1684

Table 4: Target Detection Levelsa (TDLs), Screening Benchmarks and Analytical Methodology, Marine Sediment
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Chemical	CAS #	Units	TDL	Screening Benchmarks			EPA Method
			Marine Sediment (b)	NOAA (Marine-ERL) (d)	NOAA (Marine-ERM) (d)	Region 6 (Marine) (c)	

FOOTNOTES:

a) The primary sources for this table were: TDLs - EPA 823-B-95-001, QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations. USEPA/USACE, Regional Implementation Agreement, July 2003; US EPA SW-846 http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm;

b) Consult with your analtyical provider to ensure the laboratory MDL Study can detect VOC constituents to the concentrations noted in the screening criteria.

c) Region 6 screening benchmarks come from TCEQ's ecological benchmarks for sediment, http://www.tceq.state.tx.us/assets/public/remediation/eco/0106eragupdate.pdf; unless otherwise noted, benchmarks are Effects Range Low (ERL) from: Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder. 1995. Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. Environ. Manage. 19(1):81-97; see footnote (i)

d) NOAA- http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

e) These values are based on recommendations from the EPA Region 6 Laboratory in Houston; these values were based on data or other technical basis;

f) Total PCBs for Region 6 from "Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (revised) January 2006; Total PCBs for NOAA from Squirt Table for Organics in Sediment

g) Metals shall be expressed as Dissolved values in water samples, except for mercury and selenium, which shall be reported as Total Recoverable Concentrations;

h) 6010/6020 are not suitable Methods for Cr+6. If Cr+6 is suspected from past dredging history or industrial landuse in the vicinity, US EPA SW-846 Method 7199 (modified);

i) Threshold Effects Level (TEL) from: Smith, S.L., D.D. MacDonald, K.A. Keenleyside, and C.L. Gaudet. 1996b. The Development and Implementation of Canadian Sediment Quality Guidelines. In: Development and Progress in Sediment Quality Assessment: Rationale, Challenges, Techniques & Strategies. Ecovision World Monograph Series. Munawar & Dave (Eds.).
Academic Publishing, Amsterdam, The Netherlands.

Attachments

STATEMENT OF WORK AND SAMPLING AND ANALYSIS PLAN

Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Attachment A: Selection of Sampling Locations for North of Morgan's Point

Attachment A: Selection of Sampling Locations for North of Morgan's Point

1.0 Objective

The objective of this memo is to use a technically justifiable, Lines-of-Evidence (LOE) to develop the sampling locations for the HSC New Work Predredging Evaluation study that covers the Bay Reach segment north of Morgan's Point through to the Main Turning Basin (TB) where dredged material is being considered for beneficial use and upland placement.

2.0 Approach

The geotechnical boring logs and locations from the Bay Reach north of Morgan's Point were evaluated in a stepwise manner to determine similarity in stratification for the purposes of grouping the Beaumont Clay formation in the project area into testing "ranges". This approach is project specific and site specific to the portions of the HSC associated with new work (widening and deepening) only.

The following evaluation steps are described in greater detail below:

1) Retain borings located in the ship channel and remove borings outside of the dredge prism footprint from further consideration
2) Isolate the project depth horizon on the boring logs
3) Evaluate the horizons in the dredge prism (from (2)) for the borings retained (from (1)) using laboratory classification designations and estimate percentages of the boring length that can be assigned to each the strata
4) Group borings by similarities and evaluate spatial distribution
5) Select sampling locations to represent major boring compositions

Table 1 presents the stepwise progression of sampling point selection. The rationale for this is presented below.

Sample locations selection for the portion of the HSC where geotechnical boring surveys are not available (Segments 5 and 6) are described in Section 2.4 below.

2.1 Tier 1 - Boring Selection

Supplemental Attachment A-1 shows the channel segments along with the boring locations and logs. Table A-1 summarizes the information from Supplemental Attachment A-1 and summarizes the selection process for the study. The study area has over 50 geotechnical boring locations in the 1963 and 1964 series that were considered in the evaluation where widening and/or deepening are considered for the channel improvements (Figures A-1 and A-2). Figure A-3 is included to show that no channel improvement are planned for the portion of the channel from Morgan's Point through to Station 700+00 in Segment 4. Figure A-3 also shows the approximate boundaries of the Study Area of Concern (AOC) associated with the San Jacinto Waste Pits.

Attachment A: Selection of Sampling Locations for North of Morgan's Point

The first screening step was to remove locations that were not located in the channel and did not have material within the project depth from further evaluation. Each retained boring location is presented in Table A-1. Boring identifiers and their depth can be found in columns 2 and 4. Each boring was analyzed to determine rough percentages of material that each geotechnical boring was comprised of. Columns 5, 6, 7, and 8 describe the texture of the boring.

2.2 Tier 2 - Boring Composition and Grouping

The 9 borings identified in the 1963 and 1964 series were retained for further evaluation and then reviewed for the type of material they were comprised of using the laboratory classifications assigned (Supplemental Attachment A-1). The borings were composed of five categories of material that were classified and defined as follows:

- CH = Clay with High Plasticity
- CL = Clay (inorganic and CL-ML (low plasticity)
- ML = Inorganic Silt and Fine Sand (slight plasticity)
- SM= Silty Sands/Sand Silt Mix
- SC= Clayey Sands, Sand-Clay Mix

Percentages of each type of material were estimated for each core (column 5) and then the borings were grouped into four categories by similarity of composition (column 6). This resulted in the 9 boring locations being grouped into four categories:

Green: 4 - locations comprised of Clay > 90%
Yellow: 2- location comprised of 90% > Clay > 70%
Orange:2 - location comprised of 70% > Clay > 50%
Red: 1 – location comprised of Clay < 50%

2.3 Spatial Evaluation of Borings by Composition Category

Since most of the project area is a clay texture (i.e., clay > 70%), sampling points from the other textural categories (i.e., clay < 70%) were selected as study collection locations and the remaining sampling points for study were picked from geotechnical locations that were distributed over the length of Segments 4/5/6 where they were present. These locations include or are near boring 3ST-37, 3ST-166, 3ST-169, 3St-173, 3ST-187 and 76-3 (Table A-1, Figures A-1 and A-2). No study samples are located in the stretch of the ship channel from Morgan's Point to Station 700+00 in Segment 4 (Figure A-3).

2.4 Sample Location Selection for Remaining Channel

For the portion of the HSC where geotechnical boring surveys were not available, such as the Mooring Basin and portions of Segments 5 and 6, sampling locations were chosen to be spatially distributed locations over the remaining lengths of the project area to ensure representative characterization of the dredging prim.

Attachment A: Selection of Sampling Locations for North of Morgan's Point

3.0 Summary

Based upon location and composition, eleven sample locations, assigned the names HSCNew-NMP-01, -02, -03, -04, -05, -06, -07, -08, -09, -10, and -11 will be collected from the project area north of Morgan's Point and tested (SAP Figure 2).

4.0 References

1963. *Houston-Galveston Navigation Channel, Navigation Channel Borings.*

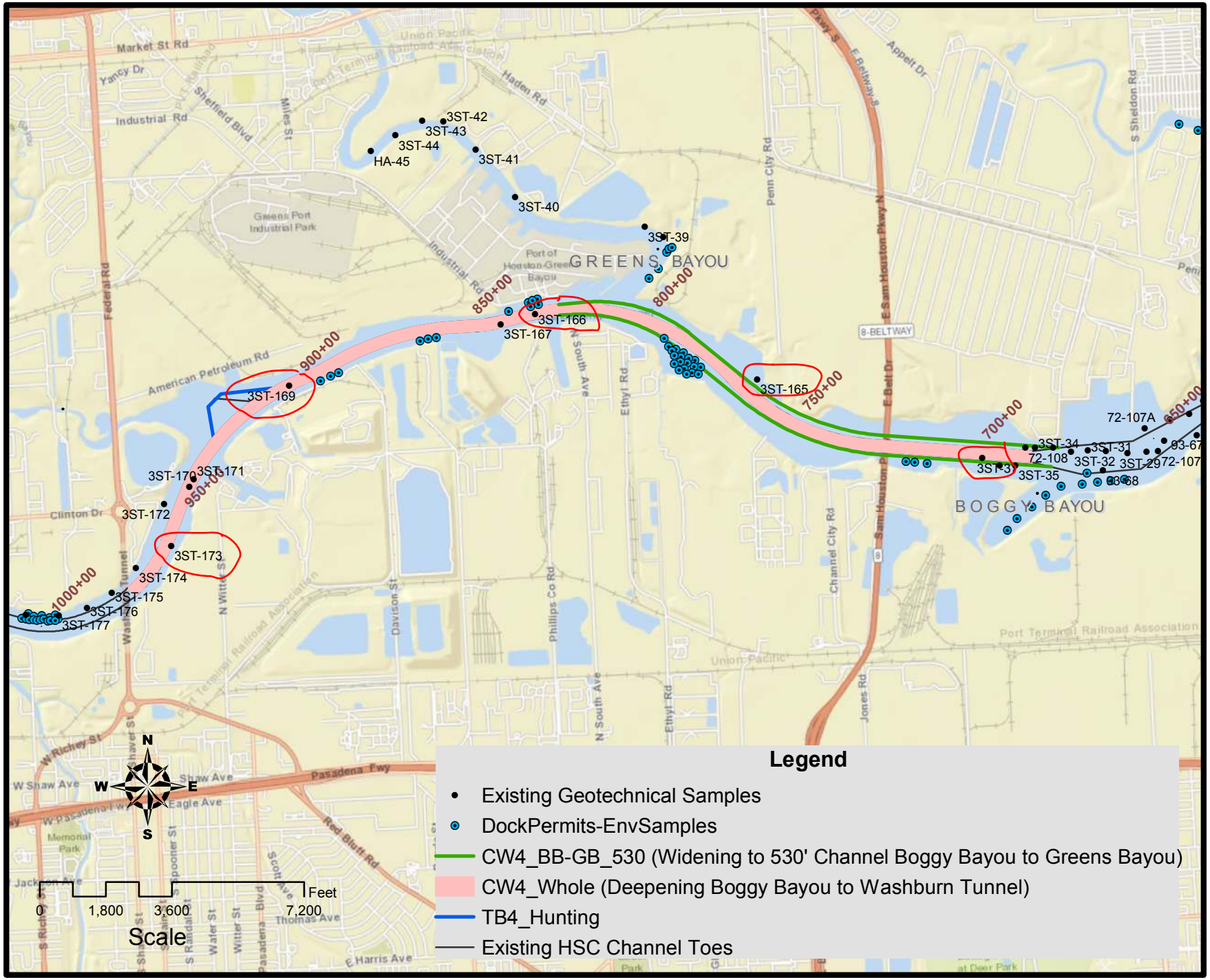
1964. *Houston-Galveston Navigation Channel, Navigation Channel Borings.*

USACE (2017) Houston Ship Channel Extension Channel Improvement Project, Harris, Chambers, and Galveston Counties, Texas. Draft Integrated Feasibility Report – Environmental Impact Statement USACE Galveston District, Southwest Division. August 2017.

Attachment A: Selection of Sampling Locations for North of Morgan's Point

Supplemental Attachment A-1: Geotechnical Boring Surveys (1963 and 1964)

Figure A-1: Segment 4 Geotech Borings and Proposed Dredge Prism
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), Houston Ship Channel, TX



Imagery: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC,
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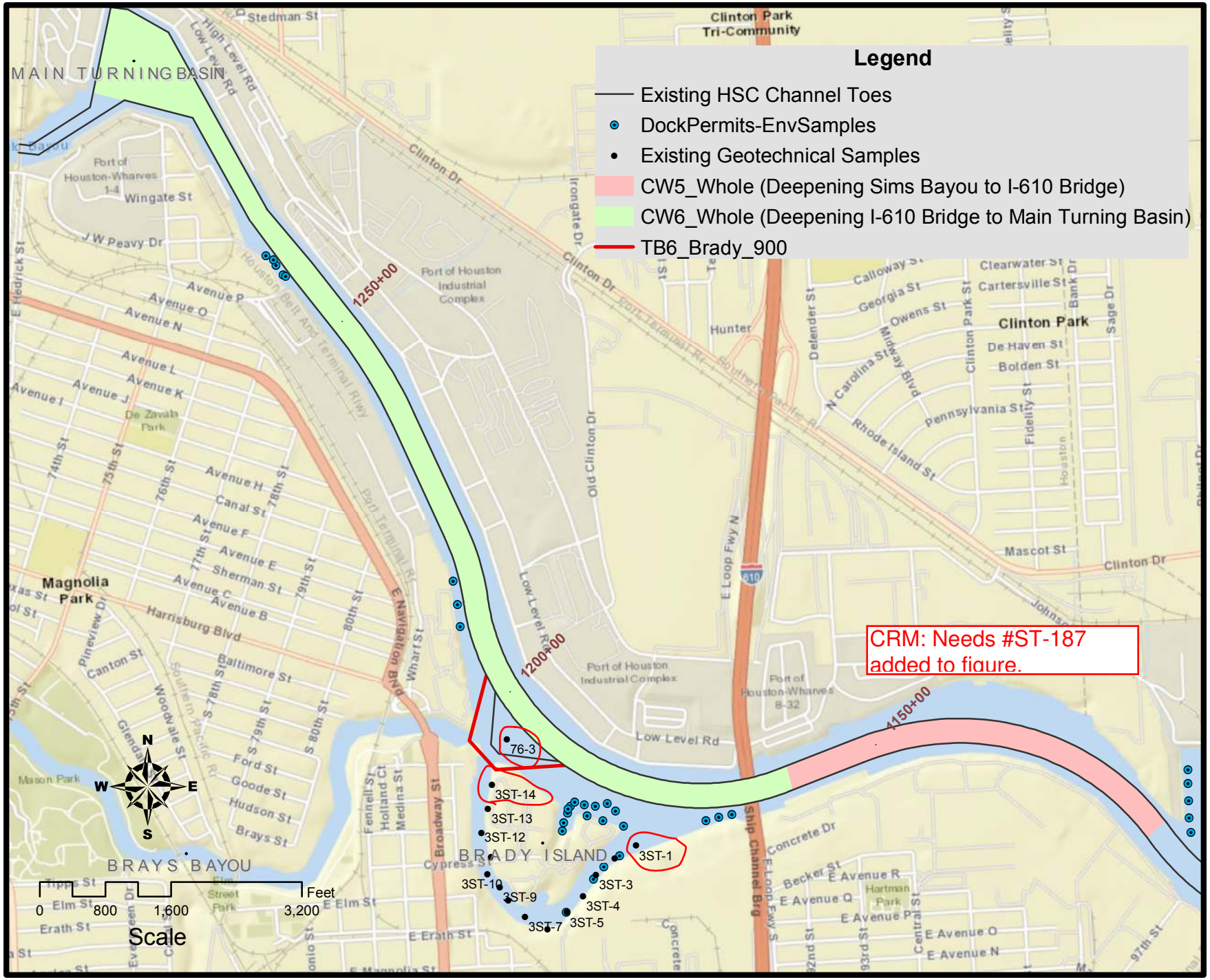
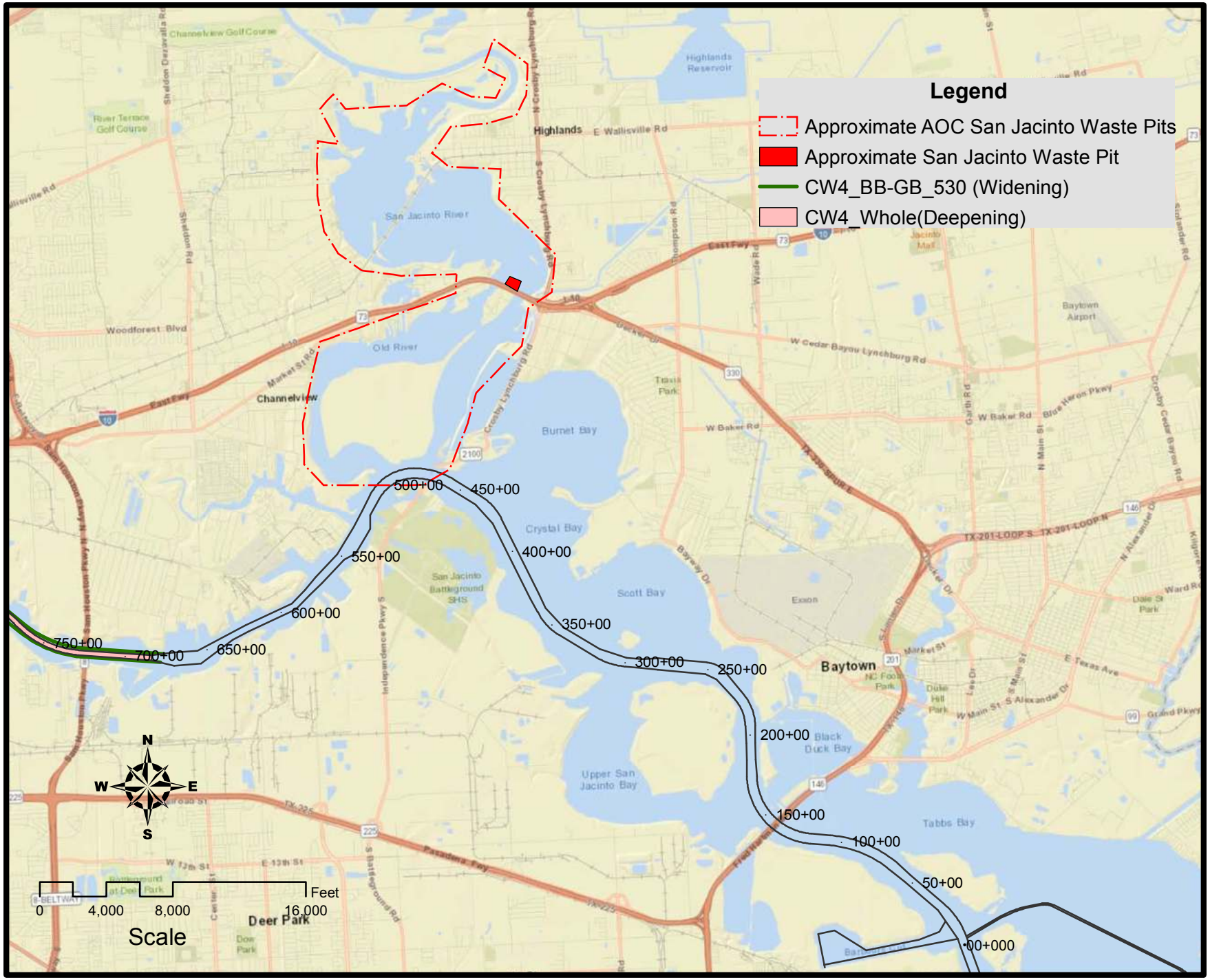
Figure A-2: Segments 5 & 6 Geotech Borings and Proposed Dredge Prism
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), Houston Ship Channel, TX



Imagery: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Figure A-3: San Jacinto Waste Pits AOC Boundary
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), Houston Ship Channel, TX



Imagery: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC,
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STATEMENT OF WORK AND SAMPLING AND ANALYSIS PLAN

Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Attachment B: Field Sample Collection, Preservation, Chain of Custody and Field Reporting

Attachment B: Field Sample Collection, Preservation, and Chain of Custody

TABLE OF CONTENTS

Attachment B: Field Sample Collection, Preservation, and Chain of Custody

1.0 General Quality Assurance

All physical and chemical tests/analyses will follow protocols described in this attachment, the main body of the SAP, the Inland Testing Manual and appropriate existing Standard Operating Procedures (SOPs) unless otherwise indicated. Any variations from the Inland Testing Manual, USEPA or ASTM methodologies will be approved by the Port of Houston Authority (POHA) and USACE/ERDC Project Managers (PM) prior to conducting the analyses/tests.

2.0 Deviations

All deviations from the procedures outlined in the main body of the SAP, in the following sections of this document and the effect/impact (e.g., change in sampling techniques, lack of preservative, non-representative sample collection, etc.) must be documented both in writing and photographically. This information must be included in the field data sheets and final report. A Project Manager from the FIELD CONTRACTOR and the ERDC PM/Technical POC are expected to be on the boat during sampling. If, at the time of sampling, field conditions require a major deviation from the approach outlined in this SAP, the deviation must be discussed with the ERDC PM/Technical POC who will be in contact with the USACE POC prior to application/implementation. Contact information for these individuals is:

ERDC Project Manager/Project Technical POC:
Dr. Cheryl R. Montgomery (ERDC, Environmental Laboratory, CEERD-EP-R)
W: 978-318-8644 (EST)
M: 781-530-8317 (EST)

ERDC Sample Coordinator POC:
Mr. Daniel Farrar (ERDC, Environmental Laboratory, CEERD-EP-R)
W: 601-634-2118
M: 601-529-8042

ERDC Analytical POC:
Dr. Anthony Bednar (ERDC, Environmental Laboratory, CEERD-EP-R)
W: 601-634-3652
M: 601-618-9164

3.0 Sample Location & Type

The proposed channel improvements for these segments are only to deepen the Mooring Basin in Segment 1, widen part of Segment 4 from 300 ft. to 530 ft., and deepen a portion of Segment 4 from 41.5 ft. to 46.5 ft. All Segments 5 and 6 are proposed to be only deepened from 37.5 ft. to 41.5 ft.

The evaluation of geotechnical borings (SAP, Attachment A) resulted in six (6) sampling locations representative of the dredge material in the new work dredge prism from Segments 4 and 5 being selected within the study area where widening and deepening are to be done. An additional 5 samples were selected over the Mooring Basin and remaining areas of Segments 5 and 6 to ensure characterization of

the Beaumont Clay formation over remaining project area to the Turning Basin (TB), where geotechnical borings were not available (SAP Figure 2 and Table 1).

Recent bathymetry will be used before field sampling to confirm adequate sediment is available for collection within the dredged prism. Exact sample coordinates for each sample location will be determined at the time of sampling in the field, using the coordinates provided in SAP Table 1 as a guide.

Ten channel sampling locations and one Mooring Basin sample location in the study area will be sampled for sediment, surface water, and bulk water. Each sediment sample is a composite of material representative of the proposed dredged area near that station and each water sample is representative of the individual sample location. Water depths are generally expected to be about anywhere <5 to 40+ feet for sample locations in the study area.

3.1 Sample collection

Surface water will be collected from the central location, mid-column within each sampling location.

For sediment collection, dredge material sampling will be collected as transects at any given sample location. In instances where scouring has occurred at the selected sample location, **sampling may shift to be longitudinal** to one side of the channel within the sampling area where new work material within the dredge prism is evident. **If a sample cannot be acquired at a designated location, the location will be moved the least distance possible, while remaining within the dredge prism and within the representative sample area.** At the time of sampling, the FIELD CONTRACTOR's project manager and ERDCs PM/Technical POC will jointly agree how/when to shift a sampling location if a location specified in the SAP cannot be collected because it is already below the new work dredge prism or insufficient material is present for efficient sample volume collection. Due to the minimal sampling plan, samples must be collected from all sample areas, so depth readings will be used to select alternate locations if necessary.

All field conditions and decisions made will be documented in the field notes, the field contractor's report, and the final project report.

The rational for each sampling point is described in Section 3.3 in the SAP. Numbers and types of samples are detailed in SAP Table 1, and summarized as follows:

Sample ID	Segment Identifier	Station	Media	Tests
HSCNew-NMP-01	Segment 1 (Mooring Basin)	500+00	SW, SD	physical, chemical, modified elutriate
HSCNew-NMP-02	Segment 4	720+00	SW, SD	physical, chemical, modified elutriate
HSCNew-NMP-03	Segment 4	800+00	SW, SD	physical, chemical, modified elutriate
HSCNew-NMP-04	Segment 4	912+00	SW, SD	physical, chemical, modified elutriate

HSCNew-NMP-05	Segment 4	970+00	SW, SD	physical, chemical, modified elutriate
HSCNew-NMP-06	Segment 5	1115+00	SW, SD	physical, chemical, modified elutriate
HSCNew-NMP-07	Segment 5	1160+00	SW, SD	physical, chemical, modified elutriate
HSCNew-NMP-08	Segment 6	1200+00	SW, SD	physical, chemical, modified elutriate
HSCNew-NMP-09	Segment 6	1230+00	SW, SD	physical, chemical, modified elutriate
HSCNew-NMP-10	Segment 6	1260+00	SW, SD	physical, chemical, modified elutriate
HSCNew-NMP-11	Segment 6	24+00	SW, SD	physical, chemical, modified elutriate

4.0 Sample Collection

4.1 Overview

The FIELD CONTRACTOR is responsible for collection and transportation of all sediment and water samples specified in this Scope of Work. The FIELD CONTRACTOR will collect sufficient surface water and sediment for all physical and chemical tests, as specified in Tables 2, 3, and 4 of the main body of the SAP. All sediment and water sample collection, handling, preservation, storage and tracking will be conducted in accordance with this SAP. Specific instructions on water (Section 4.2) and sediment (Section 4.3) are provided below.

4.1.1 Station Positioning

Latitude and longitude coordinates (recorded as NAD83) for all proposed sample locations are provided in Table 1 of the SAP. The FIELD CONTRACTOR will proceed to each sampling location; if a location does not indicate any need for sampling (i.e. location is scoured below project depth), the FIELD CONTRACTOR will discuss the condition(s) with the ERDC PM/Technical POC, who will be on-board and an agreed upon alternative location will be selected that remains within the dredge prism and the ample area. The exact coordinates of each sample location shall be determined and recorded by the FIELD CONTRACTOR at the time of sampling using a Differential Global Positioning System (DGPS) with +/- 6 foot accuracy and recorded as NAD83.

4.1.2 Conventional Water Quality Parameters and General Observations

Conventional water quality parameters at mid-water column depth will be measured and recorded from the central location within each sample location, including water temperature, salinity, pH, conductivity, ORP, turbidity and dissolved oxygen. Water depth, adjusted to MLLT, at each station will be noted and general site observations will be recorded (e.g., air temperature, wind speed, sea-state, etc.).

4.1.3 Sample Nomenclature

A sample numbering system that will provide a unique and unambiguous label for each sample will be decided upon and documented prior to going into the field. Labels will be preprinted with as much project information as possible prior to going into the field. Surplus labels should be available should the need arise to utilize them. Sample name convention is demonstrated in Table 1 of the SAP and is explained below.

All sample names will begin with HSCNew-NMP-, representing the Houston Ship Channel New Work North of Morgan's Point. Depending on the sample location and sample media type, additional suffixes will be added to the sample name as listed below:

- -01, -02, -03, -04, -05, -06, -07, -08, -09, -10, -11 represents the sample locations
- -SD, -SW, -EL represents media type; sediment, surface water, elutriate, respectively
- -QA represents quality assurance sample

Examples of full nomenclature demonstrated below:

- Bay Reach sediment quality assurance sample- HSCNew-NMP-04-SD-QA

4.1.4 Sample Preservation and Storage

A suitable method for preservation and shipment of all sediment and water samples will be used, as indicated in Table 2 of the SAP and according the ANALTYICAL PROVIDER/ERDC sample handling instructions. Such instructions must be obtained no later than the week preceding field work. The ANALYTICAL PROVIDER shall furnish clean, appropriately sized glass and/or plastic containers for sediment and water samples, labeled accordingly and containing preservatives, as appropriate. ERDC shall instruct the FIELD CONTRACTOR as to the nature, size, and precleaning of containers for the collection of bulk media.

All samples will be iced or refrigerated immediately after collection, and must be stored at 4 ± 1°C, never frozen, within 24 hours after collection. Samples will be protected from light during storage and transportation and must remain at 4 ± 1°C throughout transport and until received and logged in at ERDC.

4.1.5 Chain of Custody

A dated Chain of Custody document shall be furnished to record all collected samples and must accompany the samples from the field through all shipping to reporting and sample destruction. All Chain of Custody forms must clearly note the sample name, date and time of collection, container type, any special handling (i.e., filtering or acidification), type of analyses required by the laboratories, date relinquished, and signature of all individuals involved in the stages of sample collection, handling, and shipping.

Additional guidance on appropriate Chain of Custody protocols can be found in Section 5.2 below and reference guidance documents (USEPA, 1986; USEPA/USACE, 1995; USEPA/USACE, 1998; Plumb, 1981).

Attachment B: Field Sample Collection, Preservation, and Chain of Custody

THESE PROCEDURES MUST BE AGREED UPON AND DOCUMENTED PRIOR TO FIELD WORK COMMENCING.

Shipping and sample distribution to the testing facilities will be managed by the FIELD CONTRACTOR and overseen by ERDC staff (Section 5.1).

4.2 Water Sampling

Water samples will be collected from the central channel location for each of the 11- sample locations (Table 1 and Figures 2, 3, and 4) at mid-depth in the water column. Conventional water quality parameters will be measured and recorded at mid-depth in the water column at each sample location where the bulk of the sediment is collected (Figure 2, 3, and 4) as listed above in Section 4.1.2.

The depth of the water sample shall be mid-depth in the water column, but under no circumstances will the water intake hose end be any closer than 3 feet from the sediment surface.

Special care should be taken to avoid the introduction of contaminants from the sampling device and the containers. The FIELD CONTRACTOR shall collect water samples with a suitable non-contaminating water-sampling device, such as a metal-free bilge pump using tubing and materials designed to minimize the introduction of phthalates and other plasticizers. Prior to sample collection, an initial volume of water equaling at least 10 times the hose volume will be pumped through the sampling device and discarded. If cubitainers are used, they must be made of non-contaminating material and rinsed 10-times prior to filling.

Table 2 of the SAP summarizes surface water sampling parameters including sample volume, container type, handling, preservation, storage etc.

All water samples that will be submitted for any type of chemical analyses (with the exception of VOCs and Hg and Se) will be field filtered and placed into suitable pre-cleaned laboratory supplied polyethylene bottles or amber glass bottles with appropriate acid or base preservatives (Table 2). Water samples to be analyzed for metals, with the exception of Hg and Se, will be field filtered through a clean 0.45 µm filter prior to dispensing into containers with acid preservatives. All containers are to be filled completely, avoiding the presence of any head space in the sample bottles. The lids will then be tightly secured, and the containers will be placed into an ice chest with sufficient cushioning material to prevent breakage during shipment. Exact sampling position will be recorded for each sample collected. Water volumes collected for non-chemical (e.g., elutriate) testing need not be field filtered.

Water samples from individual locations must not be composited to create a single site sample. Each channel sample location must be sampled, analyzed, and reported as a distinct data point.

4.3 Sediment Sampling

Sediment samples will be collected from each of the 11 sample location (Table 1 and Figure 2, 3, and 4).

Attachment B: Field Sample Collection, Preservation, and Chain of Custody

For the 11 sample locations, sediment samples will be collected to the dredging prism depth. The sampling is expected to require a vibracore sampler with the rigid PVC liner; however, if sampling depths are short, other equipment may be utilized. Justification for the type of equipment used must be written in the field logs and documented in the final report. Regardless of the equipment used, all designated samples MUST BE COLLECTED and the material must be representative of the dredge prism; material collected below depth will be discarded and any debris within the retained sample will be discarded in such a manner as to not destroy the representativeness of the sample.

Prior to collection at each station, the core sampler will be washed with an Alconox solution, flushed with ambient water to remove all remnant sample material and then rinsed with de-ionized water to avoid cross-contamination among sample sites. **If contamination is suspected, a solvent rinse (acetone) will also be done.**

Table 2 in the main body of the SAP summarizes sediment sampling parameters including sample volume, container type, handling, storage etc.

4.3.1 Sampling Depths

Bay Reach north of Morgan's Point to the Main TB (HSCNew-NMP-01-SD through -11-SD): To be representative of new work material to match the dredge prism while accounting for 2 feet of advanced maintenance and 2 feet of allowable over dredge (-46.5 + 2 + 2 ft). The depth within the dredge prism will not exceed -50.5 ft for locations HSCNew-NMP-02, HSCNew-NMP-03, HSCNew-NMP-04, and HSCNew-NMP-05. The depth within the dredge prism will not exceed -45.5 ft for locations HSCNew-NMP-01, HSCNew-NMP-06, HSCNew-NMP-07, HSCNew-NMP-08, HSCNew-NMP-09, HSCNew-NMP-10, and HSCNew-NMP-11. If sample location is already to depth, **the location will be adjusted the least amount possible** to collect sediment representative of new work material while remaining in the dredge prism and the sample area; this can be accomplished through shifting the transect or by shifting to longitudinal sampling if scourging on one side of the sample area is below depth or will yield nominal amounts of dredge material. Exact sampling position will be recorded for each sample collection (See Section 2).

4.3.2 Field data

Field data from all sampling stations shall be described at the time of sampling and will include but not be limited to date, time, water depth adjusted to MLLT, sample appearance, odor, horizons, total length of core and horizons, stratifications, texture, plasticity measurements (hand rolled method), GPS coordinates, and photos. If sampling locations are referenced to a local coordinate grid, the local grid should be tied to the North American Datum (NAD 1983) to allow conversion to latitudes and longitudes.

4.3.3 Sediment Samples Collected for Chemical/Physical Analyses and Bioassays

At each channel sample location, each core collected within the correlated area will, in its entirety, be placed in appropriately labeled pre-cleaned containers, 5-gallon buckets or other suitable containers (SAP Table 2). It is expected that multiple cores will be required to obtain the required volume for both chemical, elutriate and physical analyses. All containers, regardless of size, will be filled completely to

avoid head space. The lids will then be tightly secured, and the containers will be placed into an ice chest or refrigerating unit with sufficient cushioning material to prevent leakage and breakage during shipment.

4.3.4 Bulk Sediment Samples Collected

Bulk samples will be collected in the field in precleaned pails and not homogenized. Bulk samples will be shipped to ERDC where compositing, homogenization, subsampling and other sample processing logistics will occur.

5.0 Sample Preservation, Storage, and Shipment

All sample containers will be supplied in advance by the ANALYICAL PROVIDER. The required chemical preservatives for aqueous samples will be added to the appropriate containers by the ANALYICAL PROVIDER prior to delivery to the field.

A label with a unique sample identifier will be attached to all sample containers at the time of sample collection. This sample coding system will be brought to the field and be available during sampling. The label will be preprinted **at a minimum** with the following information:

- Unique chain-of-custody control number
- Analyses requested
- Preservative used
- Date and time of sample collection
- Sampler's initials

The FIELD CONTRACTOR is responsible for ensuring delivery of all sediment and water samples to the ERDC Environmental Laboratory in the first stage of SAP execution. Shipping containers and packaging must be capable of protecting the sample containers from breakage and holding sample temperatures 4 ± 1°C through the collection, to the delivery of samples at ERDC. Table 2 of the SAP summarizes procedures for sample collection, preservation, and storage. Final study samples will be shipped within 1-day of completion of all sampling activities.

For the second stage of the SAP execution, where elutriate samples for chemical analyses are generated at ERDC, ERDC is responsible for ensuring that analytical holding times for all sample media for the second stage of distribution are not exceeded, and to coordinate a collection and delivery schedule for all samples with the ANALYICAL PROVIDER contact identified below.

Alternatively, shipments may be made by a CONTRACTOR-furnished refrigerator truck capable of maintaining temperatures 4 ± 1°C. The completed Chain of Custody must be included with sample delivery regardless of the selected shipment alternative.

Attachment B: Field Sample Collection, Preservation, and Chain of Custody

5. 1 Sample Distribution and Coordination

5.1.1 Water Samples

Water samples for both chemical/physical analyses (all field filtered) and bulk samples (all unfiltered) will be dispensed into pre-labeled, clean laboratory provided containers with appropriate preservatives. These samples will be shipped by commercial carrier with appropriate Chain-of-Custody documentation, directly to the ANALYTICAL PROVIDER from the field and be addressed to:

Attn: Dan Farrar
USACE ERDC EP-R
Building 6008
3909 Halls Ferry Road
Vicksburg, MS 39180
W: 601-634-2118 (CST)

Upon receipt, ERDC will log in the samples, noting the condition, temperature etc. of the samples upon arrival. While in their custody, sample storage requirements will be met. Samples will be distributed for testing.

5.1.2 Sediment Samples

All sediment will be shipped by commercial carriers with the Chain of Custody form, to the ERDC Environmental Laboratory and be addressed to:

Attn: Dan Farrar
USACE ERDC EP-R
Building 6008
3909 Halls Ferry Road
Vicksburg, MS 39180
W: 601-634-2118 (CST)

Upon receipt, ERDC will log in the samples, noting the condition, temperature etc. of the samples upon arrival. While in their custody, sample storage requirements will be met. Samples will be distributed for testing.

5.1.3 Elutriate Samples

Elutriate samples will be prepared at ERDC from the bulk homogenized sediment samples and site water samples. At the completion of test, the samples destined for chemical/physical analyses will be shipped to the ANALYTICAL PROVIDER. These samples will be shipped by commercial carrier with appropriate Chain-of-Custody documentation, directly to ERDC and be addressed to:

Attachment B: Field Sample Collection, Preservation, and Chain of Custody

Analytical Project POC:
Dr. Anthony Bednar
ERDC, Environmental Laboratory, CEERD-EP-C
W: 601-634-3652
C: 601-618-9164

5.2 Chain of Custody

Strict Chain-of-Custody procedures are required to ensure integrity is maintained from collection to final disposition. Chain-of-custody procedures include tracking and documentation during sample collection, shipment, and laboratory processing. A sample is considered to be in an individual's custody if it is: (1) in the physical possession of the responsible party; (2) in view of the responsible party after being in their possession; (3) secured to prevent tampering; or (4) placed in a designated, secure area that is controlled and restricted by the responsible party.

Custody will be documented throughout all sampling activities on the Chain-of-Custody record for each day of sampling and/or analysis. The record will accompany samples from the time of collection in the field, through arrival at, analyses, issuance of final report and ultimately disposal at the laboratory at the completion of the study.

All personnel with sample custody are required to sign, date, and note on the record the time when receiving and relinquishing samples from their immediate custody. Any discrepancies must be noted at this time. Courier bills of lading (e.g., FedEx Airbills and receipts) will be used as custody documentation during this time and will be retained as part of the permanent sample custody documentation. In some cases, samples may be hand delivered to the laboratory; hand delivery will be noted on the chain of custody form. Any subcontractor laboratory is responsible for sample custody once samples are received.

Chain-of-Custody forms will be used to document the integrity of all samples. To maintain a record of sample collection, transfer of samples between personnel, shipment of samples, and receipt of samples at the laboratory. Chain-of-Custody forms will be filled out for each sample/analysis at each sampling location. Information entered on the chain of custody includes:

- Project name, project number;
- Name and address of laboratory to receive the samples;
- Chain-of-custody control number;
- Sample type, sample method;
- Location ID, sample ID;
- Matrix code;
- Analyses requested;
- Field QC for MS/MSD, if applicable;
- Container type, size and number;
- Preservatives used;
- Turn-around-time for laboratory analysis;

- Comments or notes to Laboratory, if applicable;

Any corrections to the Chain-of-Custody form entries will be made by a single-line strike through the incorrect item, and then entering the correct entry adjacent to the strikeout item. Corrections will be initialed and dated by the person making the change. After the form has been inspected and determined to be satisfactorily complete, the sample collector will sign, date, and note the time of transfer and will reference a tracking number on the form. The Chain-of-Custody form will be placed in a resealable plastic bag and placed inside the cooler after the sample packer has detached or made an appropriate copy of the form.

Further custody transfers of samples will be recorded on the Chain-of-Custody form by signatures of the transferor (relinquisher) and the transferee (receiver). This procedure will be repeated, as necessary, until final delivery is made to the analytical laboratory.

STATEMENT OF WORK AND SAMPLING AND ANALYSIS PLAN

Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP)
Houston Ship Channel, TX

Attachment C: Chemical Laboratory Methods, Analyses and Reporting

Attachment C: Laboratory Methods, Analyses, and Reporting

Table of Contents

Attachment C: Laboratory Methods, Analyses, and Reporting

1.0 General Quality Assurance

All physical and chemical tests/analyses will follow protocols described in this attachment, the main body of the SAP, the Green Book, the Inland Testing Manual and appropriate existing Standard Operating Procedures (SOPs) or test methods unless otherwise indicated. Any variations from the Green Book, ITM, USEPA or ASTM methodologies will be approved by the PDT and Technical Team PMs prior to conducting the analyses/tests.

2.0 Deviations

All deviations from the procedures outlined in the main body of the SAP and in the following sections of this document and the effect/impact, must be documented in writing in the case files and the case narrative on an SDG specific basis. If, at the time of analyses and reporting, conditions require a major deviation from the approach outlined in the SAP, the deviation must be discussed with the ERDC PM/Technical POC who will be in contact with the USACE SWG POC (or alternate POC) prior to application/implementation. Additionally, anomalous, non-routine or sample specific manipulations and laboratory results (i.e., QC samples out of defined limits, dilutions required, matrix effects etc.) must be discussed with the ERDC Project Manager/Technical POC **AS THE SITUATIONS ARISE** before actions are taken and **NOT AFTER**. This applies to analyses conducted in-house at ERDC or with any of their selected sub-contractors. The ERDC Technical Project Manager will communicate these circumstances to the Project Delivery Team (PDT). Contact for the ERDC POC is:

ERDC Project Manager/Technical POC:
Dr. Cheryl R. Montgomery
ERDC, Environmental Laboratory, CEERD-EP-R
W: 978-318-8644 (EST)
C: 781-530-8317 (EST)

3.0 Sample and Laboratory Coordination, Shipping and Chain-of-Custody

3.1 Sample and Laboratory Coordination

Sample collection only is required in the field by the FIELD CONTRACTOR. Sample composting homogenizing, subsampling, etc., as required, will be conducted at the ERDC facility in Vicksburg. The POCs for these activities are as follows:

Field Contractor/PM POC:
Name XX
Company XX, Title XX
W:
C:

Attachment C: Laboratory Methods, Analyses, and Reporting

Sample Processing POCs at ERDC:
Mr. J. Daniel Farrar
ERDC, Environmental Laboratory, CEERD-EP-R
601-634-2118 (CST)

Mr. A. Kennedy, (Alternate)
ERDC, Environmental Laboratory, CEERD-EP-R
(601) 634-3344

It will be decided prior to collection if surface water samples for chemical/miscellaneous analyses will be field filtered or filtered in the lab. Surface water samples for analyses will be filtered with the exception of samples for TOC, TSS, VOCs, and metals for Hg and Se only. Samples will be collected in clean, laboratory provided bottles/containers. All other water samples (bulk) for modified elutriate testing do not require filtration. All water samples must be shipped directly from the field to the ERDC from the field station so that holding times are adhered to.

No field compositing or homogenizing of sediment will be conducted by the FIELD CONTRACTOR. Sediment samples for chemical/miscellaneous analyses will be placed in clean, laboratory provided bottles/containers that were shipped by ERDC at least one week prior to field sampling commencing. Sediment samples for chemical/physical analyses and sediment samples for preparation of the modified elutriate supernatant will be shipped directly from the field by the FIELD CONTRACTOR to ERDC at the contact names (Farrar/Kennedy) noted above. Upon sample receipt at ERDC, samples will be composited, homogenized, subsampled as appropriate.

A modified elutriate test (MET) will be prepared at ERDC by the analytical team according to guidance (USACE Tech Note EEDP 04-2) by mixing a calculated volume of sediment and dredging site water that should be approximately equal to 150 g/L. The well-mixed slurry will be aerated for 1 hour and allowed to settle for 24 hours (maximum) before extracting the supernatant. The supernatant will be centrifuged or filtered before following the proper preservation techniques required for all analyses. TSS, TOC, and mercury will be excluded from centrifugation or filtration. Chemical analyses will be coordinated by ERDC.

ERDC Analytical POC:
Dr. Anthony Bednar
ERDC, Environmental Laboratory, CEERD-EP-C
W: 601-634-3652
M: 601-618-9164

3.2 Shipping and Chain of Custody

Samples will be shipped from the field to ERDC in Vicksburg, MS on ice or by a truck equipped with refrigeration capable of maintaining 4 ± 1°C. Upon arrival at the laboratory, all samples will be stored unopened in darkened, commercial walk-in coolers at 4 ± 1°C. Appropriate Chain-of-Custody protocols will be followed beginning with collections of samples in the field. Chain-of-Custody will follow guidance

in USEPA, 1986; USEPA/USACE, 1995; USEPA/USACE, 1998; and Plumb, 1981. See Attachment B and Table 2 in the SAP for additional details on Chain-of-Custody requirements.

4.0 Chemical Analyses

All chemical analytical analyses shall be coordinated and/or performed by/through ERDC.

All analyses shall be performed within the holding period described in the referenced guidance documents and summarized in Table 2 of the SAP. Each surface water, modified elutriate, and sediment sample will undergo testing/analyses. The results will be summarized in tabular format and discussed in the final report. Chemical parameters to be analyzed for in each medium are listed in Tables 3 and 4 in the SAP, along with required Target Detection Limits (TDLs) and recommended analytical methods.

Alternate analytical methods are permissible, provided the analytical performance is equivalent to the method listed, all TDLs are met AND the ERDC Project Manager/Technical POC is advised **IN ADVANCE** of analyses proceeding. Sediment sample data will be reported as dry weight. If analytical TDLs cannot be met, the laboratory must inform USACE **PRIOR** to sample collection. If sample specific characteristics result in TDLs/RLs being elevated, or other analytical anomalies occur, the ANALYTICAL PROVIDER will consult with the ERDC POC **AS THEY OCCUR** and **PRIOR** to completing the analyses so that coordination with USACE SWG can be accomplished in a timely manner. The technical project managers' contact information is:

Project Manager/Project Technical POC:
Dr. Cheryl R. Montgomery
ERDC, Environmental Laboratory, CEERD-EP-R
W: 978-318-8644 (EST)
C: 781-530-8317 (EST)

All analyses will be performed on all sample media (i.e., surface water, sediment, and modified elutriate). Detected and non-detected analytes will be reported as numerical values in the laboratory deliverable.

5.0 Miscellaneous Parameter Analyses

Each of the miscellaneous parameters noted in Tables 3 and 4 will be analyzed for and reported as numerical values in the laboratory deliverable in tabular format and discussed in the report.

6.0 Laboratory Quality Control

The following laboratory QC program must include, but not be limited to:

a) Method Blanks: Shall be performed at a frequency of one per batch of samples, per matrix type, per sample extraction or preparation method
b) Laboratory Control Samples: Shall be analyzed at a minimum of 1 per batch of 20 or less samples per matrix type, per sample extraction or preparation method, except for analytes for which spiking solutions are not available

c) Matrix Spikes (MS)/Matrix Spike Duplicates (MSDs): Will be performed ***ON PROJECT MATERIAL AND NOT LABORATORY SAMPLES UNRELATED TO THE SITE*** at a frequency of 1 in 20 samples per matrix type, per sample extraction or preparation method, except for analytes for which spiking solutions are not available. The spike concentration shall be no greater than 25% to 50% of the maximum concentration along the linear segment of the instrument calibration curve for any analyte

d) Surrogates: Surrogate compounds must be added to all samples, standards, and blanks for all organic chromatography methods except when the matrix precludes its use or when a surrogate is not available

e) Field Equipment Blanks: Analysis shall be performed at a frequency of one per batch of samples collected

f) Instrument Performance: Calibration of instrumentation and performance of periodic instrument checks according to the manufacturer and USEPA recommendations, and appropriate SOPs

g) Laboratory Performance Evaluation: Participation in performance evaluation and method studies available from USEPA, American Society for Testing and Materials (ASTM), or other agency. Performance evaluation under such a program is to be conducted, at least, on a semiannual basis

h) Laboratory Contamination: Each new shipment or lot of solvent, reagent or adsorbent will be evaluated for purity in accordance with appropriate SOPs;

i) Laboratory Standards: Laboratory standards will be prepared and verified in accordance with appropriate SOPs

j) QC Limits: Calculation of QC limits and preparation of control charts will be performed inaccordance with appropriate SOPs

k) Deviations: Out of control events, or outlier data will be noted and corrective action will be taken in accordance with appropriate SOPs

Documentation of all quality control activities performed specifically in conjunction with this project will be furnished along with sample results. Copies of all raw data, lab notes, chromatograms, standard curves, etc., shall be furnished upon request. The laboratory will provide a case narrative of the analyses and any deviations or out of specification events that took place during the analyses.

7.0 Laboratory Report and Electronic Data Deliverables

Full laboratory deliverables are required for this project. These include:

- PDF files of all laboratory reports for chemical and physical analyses/characterization; these reports will provide a case narrative summarizing the work, including deviations, exceptions and any other noteworthy findings; qualifiers will be defined in the pdf laboratory reports
- Data verification for analytical performance, completeness, etc., will be completed (see Supplemental Attachment 3-1)
- Electronic Data Deliverable (EDD) in an Equis type sortable Excel or Access data deliverable of all study data, including QC samples, shall be provided; the specific fields for this database will, at a minimum include the fields outlined in the Supplemental Attachment 3-2

Attachment C: Laboratory Methods, Analyses, and Reporting

- One PDF hard copy of all reports for POHA and SWG
- Electronic versions on disc for POHA, SWG and USACE ERDC

Attachment C: Laboratory Methods, Analyses, and Reporting

Supplemental Attachment C-1: USEPA Region 6, Data Review and Validation Requirements Dredged Material Disposal Evaluation

EPA Region 6
Data Review and Validation Requirements
Dredged Material Disposal Evaluation

Project: _____

Project Initiation Date: _____

Project Sampling Dates:

Begin: _____

End: _____

Final Report Date: _____

Final Review Date: _____

I certify the review in this document conforms to all applicable regulatory and project-specific requirements.

_____
QA Officer

Project Review

The following sections must be completed prior to field sampling or laboratory analysis:

The SAP/QAPP was prepared and submitted for approval by the Corps of Engineers District Office and EPA Region 6.

Submitted by:
Date submitted:

The SAP/QAPP was approved by the Corps of Engineers District Office and EPA Region 6.

Approved by:

Any deviations from District-approved protocols for sampling or analysis were clearly stated to the District and approved by the District office and EPA Region 6.

Laboratory Information

Use one sheet for each laboratory that will perform analytical work for this project.

Laboratory Name/Identification:

Is lab NELAC certified? Yes/No If Yes, please supply certification number

Can lab meet the QC requirements below as specified in the SAP/QAPP?

Yes/No	
	Analytical requirement
	Instrumentation
	MDL's
	Precision and accuracy
	Required turnaround time

Note below any requirements the laboratory is unable to meet.

Sample Custody

Was all required information on the chain-of-custody form:

(Yes/No)	
	Did chain of custody forms accompany samples to subcontract lab?
	Is the project identification on the chain of custody?
	Are the analyses requested printed on the sample containers?
	Were all samples correctly identified?
	Were the analyses correctly identified on the chain of custody or an attached document listed on the chain of custody?
	Were sample dates and times listed on the chain of custody?
	Were the chains of custody signed by both the relinquisher and receiver of the samples?
	Was the carrier identified on the chain of custody?
	If more than one chain of custody was needed for samples, are the chains of custody clearly numbered?
	Were samples packed on wet ice, with an expected receipt temperature of 4 ± 2°C?
	Were any sample conditions or irregularities (broken bottles, improper temperature) noted on the chain of custody or accompanying paperwork?
	Was the chain of custody submitted as part of the report to the primary contractor?
	Were all requested analyses performed?
	Was adequate sample volume provided to the contractor lab?
	If any anomalous behavior of the samples was found, was it noted in the lab case narrative?

Additional sample custody issues or deficiencies:

Analytical Review Summary

Were all raw data included in the final report?

(Yes/No)

	Prep logs
	Analytical logs
	Data reduction logs
	Calculations
	Data report
	QC Package

Verify that samples were prepared according to the method specified.

	10% check
	100% check

Verify that samples were analyzed according to the method specified.

	10% check
	100% check

Verify that data were properly transferred from run to data report.

	10% check
	100% check

Verify that QC was calculated and within limits and complete the QC forms provided in this package.

	10% check
	100% check

Additional data quality issues:

List of Acronyms

CCV	continuing calibration verification
IC	initial calibration
ICB	initial calibration blank
ICV	initial calibration verification
IS	internal standard
LCS/DLCS	laboratory control sample/duplicate laboratory control sample
LDR	linear dynamic range
LFB	laboratory fortified blank
MB	method blank
MDL	method detection limit
MN	*Macoma nasuta*
MS/MSD	matrix spike/matrix spike duplicate
NV	*Neanthes virens*
RL	reporting limit
SAP/QAPP	Sampling and Analysis Plan/Quality Assurance Project Plan
RIA	EPA Region 6 - Regional Implementation Manual
SRM	standard reference material

Project Identification:

Reviewed by:

Review Date:

Parameter: Metals (e.g. Silver, Arsenic)

List Metals Analyzed:

Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL		
MS/MSD	1 set per 20 samples or per batch	70 - 130% for spike limits 30% RSD for precision		
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision		
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by the provider		
LCS/LFB	1 per 20 samples or 1 per batch up to 20 samples	70 - 130% Recovery		
ICV	Immediately following calibration curve	90 - 110% Recovery		

Project Identification:

Reviewed by:

Review Date:

Parameter: Metals (e.g. Silver, Arsenic)

List Metals Analyzed:

Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

CCV	Minimum - check calibration at middle and end of each batch or 1 per 10 analyses, whichever is greater	90 - 110% Recovery		
LDR	Verify LDR once per quarter for ICP analyses and one time for mercury analysis			
IC	Verify initial calibration for AA and mercury analysis performed daily	cc > 0.9950 for all calibrations		
MDL	Verify MDL study once per year for each analyte of interest	Updated annually		
ICB	Immediately after initial calibration	No analyte should be detected > RL		

Project Identification:

Reviewed by:

Review Date:

Parameter: Metals (e.g. Silver, Arsenic)

List Metals Analyzed:

Matrix: ☐ Sediment ☑ Water/Elutriate ☐ Tissue

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL		
MS/MSD/MST	1 set per 20 samples or per batch	70 - 130% for spike limits 30% RSD for precision		
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision		
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by the provider		
LCS/LFB	1 per 20 samples or 1 per batch up to 20 samples	70 - 130% Recovery		
ICV	Immediately following calibration curve	90 - 110% Recovery		

Project Identification:

Reviewed by:

Review Date:

Parameter: Metals (e.g. Silver, Arsenic)

List Metals Analyzed:

Matrix: ☐ Sediment ☑ Water/Elutriate ☐ Tissue

Analytical Method Used:

CCV	Minimum - check calibration at middle and end of each batch or 1 per 10 analyses, whichever is greater	90 - 110% Recovery		
LDR	Verify LDR once per quarter for ICP analyses and one time for mercury analysis			
IC	Verify initial calibration for AA and mercury analysis performed daily	cc > 0.9950 for all calibrations		
MDL	Verify MDL study once per year for each analyte of interest	Updated annually		
ICB	Immediately after initial calibration	No analyte should be detected > RL		

Project Identification:

Reviewed by:

Review Date:

Parameter: Metals (e.g. Silver, Arsenic)

List Metals Analyzed:

Matrix: ☐ Sediment ☐ Water/Elutriate ☑ Tissue

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL		
MS/MSD/MST	1 set per 20 samples or per batch	70 - 130% for spike limits 30% RSD for precision		
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision		
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by the provider		
LCS/LFB	1 per 20 samples or 1 per batch up to 20 samples	70 - 130% Recovery		

Project Identification:

Reviewed by:

Review Date:

Parameter: Metals (e.g. Silver, Arsenic)

List Metals Analyzed:

Matrix: ☐ Sediment ☐ Water/Elutriate ☑ Tissue

Analytical Method Used:

ICV	Immediately following calibration curve	90 - 110% Recovery		
CCV	Minimum - check calibration at middle and end of each batch or 1 per 10 analyses, whichever is greater	90 - 110% Recovery		
LDR	Verify LDR once per quarter for ICP analyses and one time for mercury analysis			
IC	Verify initial calibration for AA and mercury analysis performed daily	cc > 0.9950 for all calibrations		
MDL	Verify MDL study once per year for each analyte of interest	Updated annually		
ICB	Immediately after initial calibration	No analyte should be detected > RL		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☐ PAHs ☑ Pesticides ☐ PCBs
Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL		
MS/MSD/MST	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision		
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision		
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider		
ICV	Immediately following calibration curve	80 - 120% Recovery		
CCV	At the beginning of every 12 hours of analysis	<15% Difference		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☐ PAHs ☑ Pesticides ☐ PCBs
Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

Surrogates	Every sample	30 - 150%		
Internal Standard	Every sample	30 - 150%		
IC	Verify after each initial calibration	<20% RSD for each analyte		
MDL	Verify MDL study once per year for each analyte of interest	Updated annually		
ICB	Immediately after initial calibration	No analyte should be detected > RL		

Additional Issues Related to Data Quality	

Project Identification:

Reviewed by:

Review Date:

Parameter: ☐ PAHs ☑ Pesticides/PCP ☐ PCBs
Matrix: ☐ Sediment ☑ Water/Elutriate ☐ Tissue

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL		
MS/MSD/MST	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision		
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision		
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider		
ICV	Immediately following calibration curve	80 - 120% Recovery		
CCV	At the beginning of every 12 hours of analysis	<15% Difference		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☐ PAHs ☑ Pesticides/PCP ☐ PCBs
Matrix: ☐ Sediment ☑ Water/Elutriate ☐ Tissue

Analytical Method Used:

Surrogates	Every sample	30 - 150%		
Internal Standard	Every sample	30 - 150%		
IC	Verify after each initial calibration	<20% RSD for each analyte		
MDL	Verify MDL study once per year for each analyte of interest	Updated annually		
ICB	Immediately after initial calibration	No analyte should be detected > RL		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☐ PAHs ☐ Pesticides ☑ PCBs
Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL		
MS/MSD/MST	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision		
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision		
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider		
ICV	Immediately following calibration curve	80 - 120% Recovery		
CCV	At the beginning of every 12 hours of analysis	<15% Difference		
Surrogates	Every sample	30 - 150%		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☐ PAHs ☐ Pesticides ☑ PCBs
Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

Internal Standard	Every sample	30 - 150%		
IC	Verify after each initial calibration	<20% RSD for each analyte		
MDL	Verify MDL study once per year for each analyte of interest	Updated annually		
ICB	Immediately after initial calibration	No analyte should be detected > RL		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☐ PAHs ☐ Pesticides ☑ PCBs
Matrix: ☐ Sediment ☐ Water/Elutriate ☑ Tissue

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL		
MS/MSD/MST	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision		
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision		
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider		
ICV	Immediately following calibration curve	80 - 120% Recovery		
CCV	At the beginning of every 12 hours of analysis	<15% Difference		
Surrogates	Every sample	30 - 150%		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☐ PAHs ☐ Pesticides ☑ PCBs
Matrix: ☐ Sediment ☐ Water/Elutriate ☑ Tissue

Analytical Method Used:

Internal Standard	Every sample	30 - 150%		
IC	Verify after each initial calibration	<20% RSD for each analyte		
MDL	Verify MDL study once per year for each analyte of interest	Updated annually		
ICB	Immediately after initial calibration	No analyte should be detected > RL		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☑ PAHs & PCP ☐ Pesticides ☐ PCBs
Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL		
MS/MSD/MST	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision		
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision		
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider		
ICV	Immediately following calibration curve	80 - 120% Recovery		
CCV	At the beginning of every 12 hours of analysis	<15% Difference		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☑ PAHs & PCP ☐ Pesticides ☐ PCBs
Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

Surrogates	Every sample	30 - 150%		
Internal Standard	Every sample	30 - 150%		
IC	Verify after each initial calibration	<20% RSD for each analyte		
MDL	Verify MDL study once per year for each analyte of interest	Updated annually		
ICB	Immediately after initial calibration	No analyte should be detected > RL		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☑ PAHs & PCP ☐ Pesticides ☐ PCBs
Matrix: ☐ Sediment ☑ Water/Elutriate ☐ Tissue

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL		
MS/MSD/MST	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision		
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RPD for precision		
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider		
ICV	Immediately following calibration curve	80 - 120% Recovery		
CCV	At the beginning of every 12 hours of analysis	<15% Difference		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☑ PAHs & PCP ☐ Pesticides ☐ PCBs
Matrix: ☐ Sediment ☑ Water/Elutriate ☐ Tissue

Analytical Method Used:

Surrogates	Every sample	30 - 150%		
Internal Standard	Every sample	30 - 150%		
IC	Verify after each initial calibration	<20% RSD for each analyte		
MDL	Verify MDL study once per year for each analyte of interest	Updated annually		
ICB	Immediately after initial calibration	No analyte should be detected > RL		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☑ PAHs ☐ Pesticides ☐ PCBs
Matrix: ☐ Sediment ☐ Water/Elutriate ☑ Tissue

Analytical Method Used: 8151 & 8270D SIM

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL		
MS/MSD/MST	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision		
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision		
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider		
ICV	Immediately following calibration curve	80 - 120% Recovery		
CCV	At the beginning of every 12 hours of analysis	<15% Difference		

Project Identification:

Reviewed by:

Review Date:

Parameter: ☑ PAHs ☐ Pesticides ☐ PCBs
Matrix: ☐ Sediment ☐ Water/Elutriate ☑ Tissue

Analytical Method Used: 8151 & 8270D SIM

Surrogates	Every sample	30 - 150%		
Internal Standard	Every sample	30 - 150%		
IC	Verify after each initial calibration	<20% RSD for each analyte		
MDL	Verify MDL study once per year for each analyte of interest	Updated annually		
ICB	Immediately after initial calibration	No analyte should be detected > RL		

Project Identification:

Reviewed by:

Review Date:

Parameter: TOC

Matrix: Sediment

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL		
MS/MSD/MST	1 set per 20 samples or per batch	75 - 125% for spike limits 20% RSD for precision		
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	20% RSD for precision		
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider		
ICV	Immediately following calibration curve	80 - 120% Recovery		
CCV	At the beginning of every 12 hours of analysis	90 - 110%		
IC	Verify after each initial calibration	cc > 0.9950 for all calibrations		
MDL	Verify MDL study once per year for each analyte of interest	Updated annually		

Project Identification:

Reviewed by:

Review Date:

Part I	**General Data Reporting Requirements**
SUMMARY TABULAR DATA AND PROJECT NARRATIVE **Each of the following elements should be present as described.**	
	A summary table listing the percent survival in all control, reference, and test samples
	A summary table containing the LC_{50}/EC_{50} values for the suspended particulate phase (SPP) tests and t-tests from the solid phase tests
	A narrative which summarizes all of the deviations from the Green Book and Regional Guidance Manual protocols. Deviations of sample handling, test conditions, ammonia purging procedures, control performance, reference toxicant test performance, organism handling/acclimation, and water quality parameters should be provided in this section.
	A summary table which documents collection dates and holding times for the test, control, and reference sediment samples. Holding times for site water, SPP, and lab saltwater for all tests should be included in this table.
	The data narrative should describe the major biological project activities and results. Computerized tables of results, water quality, and other pertinent information should be placed in this portion of the biological data package.

RAW BIOLOGICAL AND WATER QUALITY DATA FROM TESTS	
	Survival Data
	Water Quality Parameters
	Feeding Schedule and Amount (if applicable)
	Organism Observations
	Summary of Test Conditions

TEST ORGANISM HOLDING, HANDLING AND ACCLIMATION	
	Organism Shipping Data Sheet Provided by Supplier
	Copy of Overnight Shipping Airbill (if applicable)
	Internal Receiving and Distribution Data
	Holding/Acclimation Records (including water quality, renewals, and feeding)
	Mortality During Holding and Acclimation
	Taxonomic Identification for Each Species

REFERENCE TOXICANT DATA	
	Raw Bench Sheets For Reference Toxicant Tests
	Reference Toxicant Stock & Test Solution Preparation Sheet
	LC_{50}/EC_{50} Statistical Calculations
	Updated Reference Toxicant Control Charts with Acceptability Limits

STATISTICAL DATA FROM DREDGE MATERIAL TESTS	
	Provide all computer-generated LC_{50}, EC_{50}, and/or t-test Spreadsheets or graphical interpolations for the SPP and solid phase tests.

INVALID TEST DATA	
	If a test was repeated for any reason, the data from the original test must be included in the final report. If a serious deviation occurs which has the potential to affect test acceptability, USACE and EPA must be contacted immediately to determine if a retest is needed.

Part II	Test-Specific Information (additional to items specified in Part I)
AMPHIPOD SOLID PHASE TEST	
	Pretest Overlying Water Renewal Log and Total Porewater Ammonia Data
	Total/Unionized Porewater Ammonia Measured in Dummy Jars During Testing

POLYCHAETE SOLID PHASE TEST	
	Pretest Overlying Water Renewal Log and Total Porewater Ammonia Data
	Total/Unionized Overlying Unionized Ammonia Measured During Testing

SUSPENDED PARTICULATE PHASE TESTS (SPP)	
	SPP Preparation Log (All volumes, Mixing Times, Centrifuge Information etc.)
	Raw Data for Bivalve Gamete Collection and Preparation

BIOACCUMULATION TESTING	
	Daily Flow Calibration Log – Initial and Final Adjusted Flows
	Pre- and Post-test Depuration Logs – Time Started/Ended and Flow Rates
	Receiving Logs for All Natural Saltwater (If Collected)
	Preparation Logs for All Artificial Saltwater
	If Control Survival <90%, Provide Detailed Narrative for the 5 Factors
	Raw Statistical Data Comparing Test and Reference Tissue Chemistry

SAMPLING / SAMPLE HANDLING	
	Chain of Custody Forms for All Test, Control, and Reference Samples
	Field Data Sheets and/or Sampling Logs (Including Photos If Available)
	Log of Test Sediment Composite Preparation
	Sieving – Size of Mesh Used for Samples Used in Toxicity Tests/Bioaccumulation
	Holding Times for All Samples (Test, Reference, Control, Elutriate, Lab Saltwater) in Summary Chart Format

Project Identification:

Reviewed by:

Review Date:

Laboratory:	**Suspended Particulate Tests**			**Solid Phase Test**		**Bioaccumulation Tests**	
	Minnow	**Mysid**	**Zooplankton**	**Amphipod**	**Crustacean**	**Sand Worm**	**Clam**
Test Species: Identify each species used for toxicology in the cells to the right	***Menidia beryllina* 9-14 days old**	***Americamysis bahia* 1-5 days old**	***Americamysis bahia* ≤ 1 day old**	***Leptocheirus plumulosus***	***Americamysis bahia* 1-5 days old**	***Neanthes virens***	***Macoma nasuta***
Correct species used as stated in the SAP/QAPP? (Y/N)							
Test Condition Within Acceptable Limits? (Y/N)							
Control Survival (Y/N)							
Reference Toxicant Response within 2 standard deviations of long term mean (Y/N)							
Temperature (Y/N)							
Dissolved Oxygen (Y/N)							
pH (Y/N)							
Salinity (Y/N)							
Acclimation Procedures (Y/N)							
Sediment Holding Time <8 wks (Y/N)							
Statistical Analyses Appropriate (Y/N)							
Ammonia Management (Y/N)							

Attachment C: Laboratory Methods, Analyses, and Reporting

Supplemental Attachment C-2: Fields to Include in Laboratory Electronic Data Deliverables (EDDs)

Supplemental Attachment C-2A: Descriptors for Sample Results EDD File Column (Field) Names

Field Name	Field Description	Field Specs
Client	Name of Client	Text
Project	Name of Project	Text
Project_Number	Project number or "none" if one does not exist	Text
Lab_Name	Laboratory Name Code From Code Appendix	Text
Sample_Name	Same as used in SAP	Text
Lab_Sample_ID	Lab assigned sample number	Text
RPT_Matrix	report sediment, water, elutriate, tissue (as appropriate)	Text
Analytical_Matrix	matrix type: solid or liquid	Text
Sample_Date	Date sample collected	Date [MM/DD/YYY]
Sample_Time	Time sample collected	Time [HH24:MM]
Sample_Y	Sample Latitude - Where sample was collected from, reported in NAD83 to at least four decimal places	Number [DDMM.MMMM]
Sample_X	Sample Longitude - Where sample was collected from, reported in NAD83 to at least four decimal places	Number [DDMM.MMMM]
Date_Received	Date sample received by lab	Date [MM/DD/YYY]
Time_Recieved	Time sample received by lab	Time [HH24:MM]
Prep_Date	Date sample prepared for analysis	Date [MM/DD/YYY]
Prep_Time	Time sample prepared for analysis	Time [HH24:MM]
Analysis_Date	Date of analysis	Date [MM/DD/YYY]
Analysis_Time	Time of analysis	Time [HH24:MM]
QC_Batch_Number	QC Batch Number asociated with this analysis	Text
Lab_Method_Code	Laboratory Method Code	Text
Lab_Method_Name	Name of laboratory method ot test	Text
Prep_Name	Enter "NA" if not applicable	Text
Extraction_Date	Date sample was extracted for analysis	Date [MM/DD/YYY]
Extraction_Time	Time sample was extracted for analysis	Time [HH24:MM]
Analyte_Name	Name of parameter being analyzed, i.e., cadmium, grain size, etc.	Text
CAS_Number	CAS number	Number
Surrogate	Surrogate Name - spike of a known amount of a compound similar to the organic chemicals being analyzed. It is added before extraction and because it is normally not found in the environment, it is a valid test of the extraction and preparation of a sample for analysis. Results are reported the same as any other analyte.	Number

Supplemental Attachment C-2A: Descriptors for Sample Results EDD File Column (Field) Names

Field Name	Field Description	Field Specs
Result	Result or RL for non-detects - Non-detects should be reported as the RL and qualified with a U. The Result field shall not be left blank. If a result was not obtained (e.g., if an RPD cannot be calculated due to non-detects), enter "-999" and use the appropriate qualifier.	Number
Method_Detection_Limit	Most recent MDL (from annual MDL study) - 'The Method Detection Limit is required for all chemistry analyses. It is not required for physical analyses. Use same units as on TDL sheet.	Number
Target_Detection_Limit	Target Detection Limit (TDL) in approved SAP	Number
Reporting_Limit	Reporting limit - adjusted for moisture and dilution (lowest standard)	Number
Units	Use units specified inTDL sheet	Text
Result_Qualifier	From Code Appendix sheet or other qualifier defined in Lab Notes Sheet - This field is required if the data need to be qualified. Result qualifiers and descriptions can be taken from the appendix, or labs can enter their own codes and description identified in the Lab Notes sheet.	Text
RPToMDL	Report to MDL: report either True or False. Note: J-flagged data would fall between the RL and MDL.	Text
%_Moisture	percent	Number
Result_Dry_Weight	As corrected for percent moisture or solids	Number
Measurement Basis	report either wet or dry	Text
Dilution_Factor	If sample is not diluted, report a value of 1	Number
Spike_Level	Amount of spike added	Number
Recovery	percent	Number
Upper_CL	Upper Control Limit	Number
Lower_CL	Lower Control Limit	Number
Analyst	Name or initials of analyst	Text
PSOLIDS	Percent Solids	Number

Supplmental Attachment C-2B: Descriptors for QC Results for EDD File Column (Field) Names

Field Name	Field Description	Field Specs
Lab_Name	Laboratory Name Code From Code Appendix	Text
Sample_Name	Same as used in SAP	Text
Lab_Sample_ID	Lab assigned sample number	Text
QC_Type	QC type from Code Appendix	Text
Analytical Matrix	solid or liquid	Text
RPT_Matrix	report sediment, water, elutriate, tissue (as appropriate)	Text
Prep_Date	Date sample prepared for analysis	Date [MM/DD/YYY]
Prep_Time	Time sample prepared for analysis	Time [HH24:MM]
Analysis_Date	Date of analysis	Date [MM/DD/YYY]
Analysis_Time	Time of analysis	Time [HH24:MM]
QC_Batch_Number	QC Batch Number asociated with this analysis	Text
Lab_Method_Code	Laboratory Method Code	Text
Lab_Method_Name	Name of laboratory method or test	Text
Prep_Name	Laboratory method prep code/name	Text
Analyte_Name	Name of parameter being analyzed, i.e., cadmium, grain size, etc.	Text
CAS_Number	CAS number or reference number (from CAS Numbers sheet). Enter as a number without dashes	Number
Surrogate	Surrogate Name - spike of a known amount of a compound similar to the organic chemicals being analyzed. It is added before extraction and because it is normally not found in the environment, it is a valid test of the extraction and preparation of a sample for analysis. Results are reported the same as any other analyte.	Number
Result	Result or RL for non-detects - Non-detects should be reported as the RL and qualified with a U. The Result field shall not be left blank. If a result was not obtained (e.g., if an RPD cannot be calculated due to non-detects), enter "-999" and use the appropriate qualifier.	Number
Method_Detection_Limit	Most recent MDL (from annual MDL study) - 'The Method Detection Limit is required for all chemistry analyses. It is not required for physical analyses. Use same units as on TDL sheet.	
Reporting_Limit	Reporting limit - adjusted for moisture and dilution	Number
Target_Detection_Limit	Target Detection Limit (TDL) in approved SAP	Number
Units	Use units specified in Target Detection Limit sheet.	Text
Result_Qualifier	From Code Appendix sheet or other qualifier defined in Lab Notes Sheet - This field is required if the data need to be qualified. Result qualifiers and descriptions can be taken from the appendix, or labs can enter their own codes and description identified in the Lab Notes sheet.	Text

Supplmental Attachment C-2B: Descriptors for QC Results for EDD File Column (Field) Names

Field Name	Field Description	Field Specs
RPToMDL	From Code Appendix sheet or other qualifier defined in Lab Notes Sheet - This field is required if the data need to be qualified. Result qualifiers and descriptions can be taken from the appendix, or labs can enter their own codes and description identified in the Lab Notes sheet.	Text
%_Moisture	percent	Number
Result_Dry_Weight	Use if result is corrected for Dry Weight	Number
Basis	Dry, Wet, NA	Text
Dilution_Factor	If sample is not diluted, report a value of 1	Number
Source_ID		Number
Source_Res		Number
Spike_Level	Amount of spike added	Number
Recovery	percent	Number
RPD	Relative percent difference	Number
Upper_CL	Upper Control Limit	Number
Lower_CL	Lower Control Limit	Number
RPD_Control_Limit	RPD Control Limit	Number
Analyst	Name or initials of analyst	Text
PSOLIDS	Percent Solids	Number
QC origninal conc	Orignial concentration of QC sample	Number
QC spike measured	Spike concentration result	Number
QC dup original conc	Orignial concentration of duplicate QC sample	Number
QC dup spike added	Amount of spike added to duplicate QC sample	Number
QC dup spike measured	Duplicate spike concentration result	Number
QC dup spike recovered	Duplicate spike percent recovery	Number
QC spike lcl	QC spike lcl	Number
QC spike status	QC spike status	Number
QC dup spike status	QC dup spike status	Number
QC rpd status	QC rpd status	Number

U.S. Army Corps of Engineers

US Army Corps of Engineers®
Engineer Research and Development Center

Sampling, Chemical Analysis, and Bioassessment in Accordance with CWA Section 404

Houston Ship Channel Expansion Channel Improvement Project, North of Morgan's Point Houston Ship Channel, Texas

(Part 3 of 6: Appendix 2, Field Report)

Cheryl R. Montgomery, Ph.D.
Brooke N. Stevens, Ph.D.
E. Michelle Bourne, M.S.
US Army Corps of Engineers
Engineer Research and Development Center
Environmental Laboratory
Vicksburg, MS

FINAL

14 June 2023*

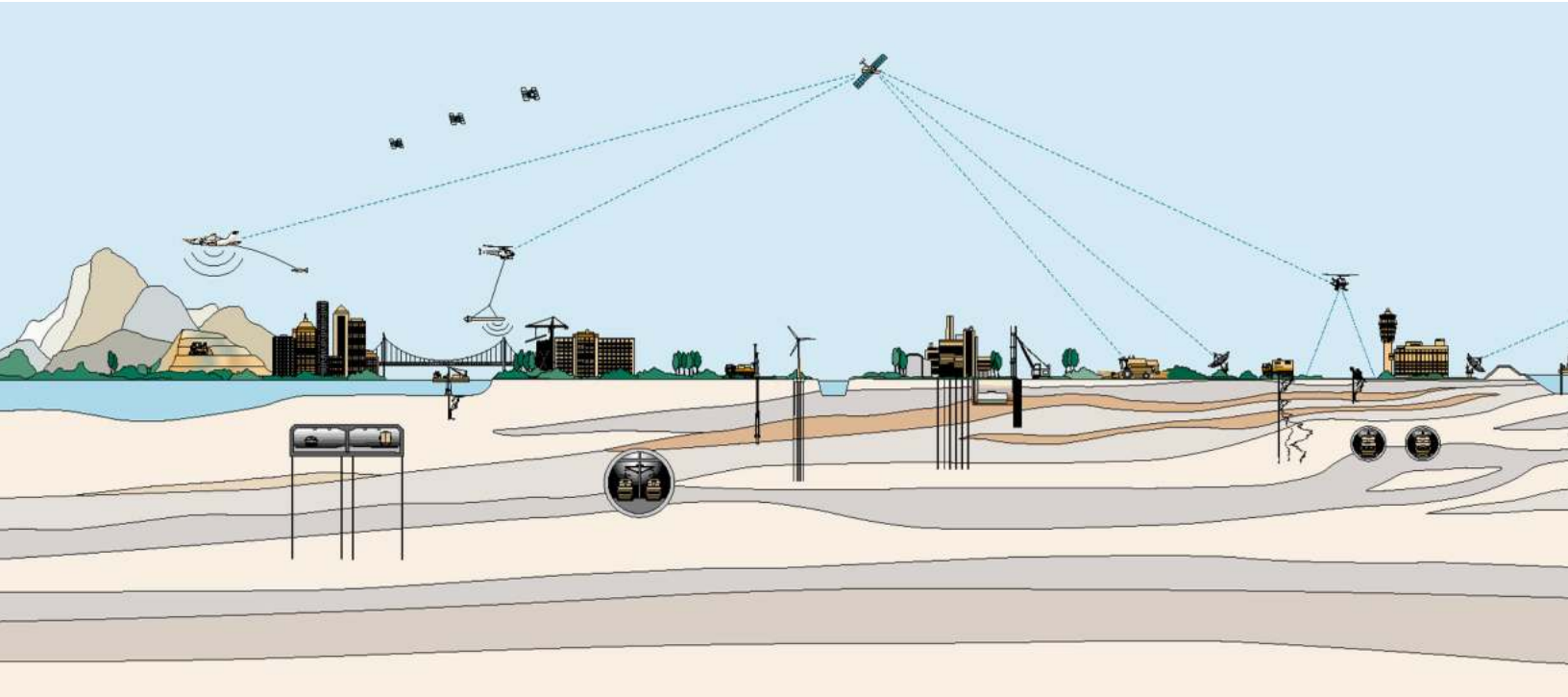
*Supersedes all previous versions. Only coversheet revised; no change to content.

Appendix 2: Fugro Field Report

FUGRO USA LAND, INC.

FACTUAL DATA REPORT
SEDIMENT AND WATER SAMPLING
NORTH OF MORGAN'S POINT
HOUSTON SHIP CHANNEL EXPANSION CHANNEL IMPROVEMENT PROJECT
HOUSTON SHIP CHANNEL, TEXAS

REPORT NO. 04.18180008-NMP



FUGRO USA LAND, INC.

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June 13, 2019

AECOM
5111 Westheimer Rd Suite 400
Houston, Texas 77056

Attention: Mr. Dan Sepulveda, P.E.

Factual Data Report
Sediment and Water Sampling, North of Morgan's Point
Houston Ship Channel Expansion Channel Improvement Project
Houston Ship Channel, Texas

Fugro USA Land, Inc. (Fugro) is pleased to present this Factual Data Report for Sampling at Locations North of Morgan's Point, conducted as part of the sediment and water sampling program for the Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) in the Houston Ship Channel, Texas. Mr. M. R. McCrary, P.E. of AECOM representing a Joint Venture of Turner Collie & Braden and Gahagan & Bryant Associates, Inc. (AECOM JV) authorized our services by signing a Subcontract Agreement (AECOM Project Number 60315156, named New Study HSC/CCB/GBA) on September 5, 2018.

This report only presents factual information related to the sediment and water sampling program for locations North of Morgan's Point. A similar report was presented for Locations South of Morgan's Point on November 6, 2018 (Ltr# 18180038-SMP). Collection of sediments and water samples was in accordance with the HSC ECIP Sampling Analysis and Plans. This report presents sampling procedures, custody of samples and delivery. No laboratory testing, recommendations or evaluations were requested as a part of this agreement.

Fugro appreciates the opportunity to work with you on this project and look forward to continuing as your service providers. If you need further assistance or have any questions, please contact Fugro at (713) 369-5400.

STATE OF TEXAS
JOSE GERARDO ARAMBURU
93016
LICENSED PROFESSIONAL ENGINEER

Sincerely,
FUGRO USA LAND, INC.
TBPE Firm Registration No. 2599

Jose Aramburu, P.E.
Exploration Manager

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Project HSSE Management Plan

APPENDIX F

QA Documentation

APPENDIX G

Project Execution Plan

APPENDIX H

Photos of Samples (to be provided digitally)

LIST OF ACRONYMS

CME	Central Mining Equipment
COC	Chain of Custody
DO	dissolved oxygen
DPR	Daily progress Reports
DTM	deck to mudline
DTW	deck to water
HAZID	Hazard Identification
HSA	Hollow Stem Augers
HSSE	Health, Safety, Security and Environment
HSC ECIP	Houston Ship Channel Expansion Channel Improvement Project
L/B	Lift Boat
MLLW	Mean Low Lower Water
NAD	North America Datum
NMP	North of Morgan's Point
ODMDS	offshore dredged material disposal site
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCP	Polychlorinated Pesticides
PEP	Project Execution Plan
POHA	Port of Houston Authority
POHPA	Port of Houston Pilots Association
QC	quality control
QHSE	Quality, Health, Safety and Environment
SAPs	Sampling and Analysis Plans
SMP	South of Morgan's Point
SMP-REF	reference sample location
SPT	sample penetration test
TOC	Total Organic Carbon
TSP	Tentatively Selected Plan
TSS	Total Suspended Solids
USACE	U.S. Army Corp of Engineers
USACE ERDC	U.S. Army Engineer Research Development Center
USCG	United States Coast Guard
VTSA	Vessel Traffic Service Authority

1.0 INTRODUCTION

1.1. Project Description

The Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) is a federal feasibility study for the Port of Houston. The deep draft navigation study has resulted in a Tentatively Selected Plan (TSP) that will involve dredging of various channel improvements such as widening, deepening, and turning basins. The project was divided into two divisions: (1) the TSP South of Morgan's Point, and (2) TSP North of Morgan's Point.

The HSC Sampling South of Morgan's Point (SMP) program is comprised of three study segments: Channel Segment 1 (Bay Reach South of Morgan's Point), Segment 2 (Bayport Ship Channel), and Segment 3 (Barbours Cut Channel). HSC Sampling North of Morgan's Point (NMP) program is comprised of Segment 1 (Bay Reach North of Morgan's Point), Segment 4 (Boggy Bayou to Sims Bayou), Segment 5 (Sims Bayou to I-610 Bridge), and Segment 6 (I-610 Bridge to the Main Turning Basin).

Separate Sampling and Analysis Plans (SAPs) were developed by the U.S. Army Corp of Engineers (USACE) for each division, SMP and NMP, based on different requirements for dredging and placement of dredged materials. Sampling and analysis of materials SMP will include additional testing for ocean placement. The USACE provided details of the SAP for both divisions of the project. The "Sampling and Analysis Plan, Houston Ship Channel Expansion Channel Improvement Project, (HSC ECIP) Channel Segment 1 (North of Morgan's Point), Segment 4, Segment 5, and Segment 6, Houston Ship Channel, TX" dated October 2, 2018 was provided to Fugro for the field sampling effort. USACE personnel were not onboard the sampling vessel during the duration of the sampling event for NMP. Collected samples were delivered to the U.S. Army Engineer Research Development Center (USACE ERDC) in Vicksburg, MS as instructed.

This report (04.18180008-NMP) presents a factual report of our operations and sampling process North of Morgan's Point. A separate factual report was presented for the sampling operations South of Morgan's Point (04.18180008-SMP).

1.2. Purpose and Scope of Work

AECOM JV is the consultant providing planning, engineering, and environmental services to the Port of Houston Authority (POHA), the Nonfederal Sponsor for the feasibility study. AECOM JV contracted Fugro USA Land, Inc. (Fugro) for sediment and water sampling at the HSC ECIP. Fugro served in the field contractor role as outlined in Sections 3 and 4, and Attachments 2 and 3 of the SAP. Fugro's goal was to provide AECOM JV with the volume of samples required from the dredge prism with quality and in a safe and efficient manner consistent with procedures outlined in the USACE SAP.

The scope of work consists of obtaining sediment and water samples for chemical and physical laboratory analyses at 11 sampling locations throughout the HSC NMP.

A site vicinity map with the study area is presented on Plate 1 of this report. Plate 2 presents an overall view of the area for locations North of Morgan's Point.

AECOM also contracted Fugro to store and deliver collected samples to USACE ERDC. The "Sampling and Analysis Plan, Houston Ship Channel Expansion Channel Improvement Project, Channel Segment 1 (North of Morgan's Point), Segment 4, Segment 5, and Segment 6, Houston Ship Channel, TX" and dated October 2, 2018 were provided to Fugro for the field sampling effort. Several meetings took place ahead of and during the sampling effort to direct or amend the SAP provided. The SAP was prepared by USACE and used to conduct the field program. The field program was tailored to adequately drill, sample, and recover sediment samples and collect water samples in water depths that range from 11 to 43 ft with sample acquisition down to depths ranging between 41.5 to 46.5 ft below Mean Low Lower Water (MLLW).

1.3. Applicability of Report

Fugro has prepared this factual report for AECOM for use as reference of the conducted sampling operations. The scope of the explorations performed in this report are for locations North of Morgan's Point. No laboratory testing was conducted during the sampling operations. The intent of the sediment collections was environmental purposes and should not be used or correlated for geotechnical purposes.

1.4. Limitations

Fugro makes no claim or representation concerning any activity or condition falling outside the specified purposes to which this report is directed. Fugro has conducted our work using the standard level of care and diligence normally practiced by recognized engineering firms now performing similar services under similar circumstances. Fugro intends for this report, including all figures, to be used in its entirety. The information presented in this report may not apply to locations not explored by borings or areas outside the project boundaries. This information should be made available to prospective users for information only, and not as a warranty of subsurface conditions.

1.5. Fugro's and Subcontractors' Roles

Fugro served as the Field Contractor described in the NMP SAP and provided the drilling services to acquire sediment samples. Fugro subcontracted Benchmark Ecological Services, Inc. (Benchmark), serving as environmental sampling consultant providing for the environmental subsampling, handling and shipment of samples, sample record keeping and chain of custody, and water sampling. Fugro also subcontracted Shallow Draft Elevating Boats, Inc. of Louisiana for lift boat services that provided the platform for sediment sampling.

2.0 FIELD PROGRAM

2.1 General

The North of Morgan's Point field program consisted of sediment sampling through soil borings and water sampling. Sampling was conducted to obtain the amount of sample specified for laboratory testing in Table 2 of the NMP SAP. The Sediment sampling services were conducted between October 1 and 8, 2018. Water sampling services were conducted at the end of the sediment sampling program on October 22, 2018 and following USACE specifications in Table 2 of the NMP SAP. Sampling was conducted at the locations initially specified in Figure 2 of the NMP SAP, that were adjusted during field work in coordination with the AECOM JV and USACE to address issues and constraints presented by the in-situ material, actual channel side slope and depths, potential drilling hazards identified during the hazard survey described in Section 2.6, and vessel traffic. These adjustments are discussed later in this report. The ultimate coordinates of these locations are provided in Table 1.

The sampling program consisted of:

- Drilling and sampling sediment borings at eleven (11) sampling locations (HSCnew-NMP-01 through NMP-11), and one quality control (QC)Location NMP-03 (DUP); and
- Collecting water samples at all sampling locations (HSCnew-NMP-01 through NMP-11).

A summary of the Sampling Locations in comparison with the HSC Stations is presented below:

Sampling Locations	HSC Station
HSCNew-NMP-01	503+00
HSCNew-NMP-02	730+00
HSCNew-NMP-03	794+00
HSCNew-NMP-04	873+00
HSCNew-NMP-05	961+00
HSCNew-NMP-06	1127+00
HSCNew-NMP-07	1180+00
HSCNew-NMP-08	1200+00
HSCNew-NMP-09	1230+00
HSCNew-NMP-10	1260+00
HSCNew-NMP-11	03+00

The sample naming incorporated the sample location identification (ID) in the SMP SAP. Modifiers were added to these IDs to track iterations of the relocations of these original locations to alternate locations in response to field conditions, traffic and the hazard survey, explained in more detail in Sections 2.6 and 3.5.4. The following explains the modifiers in order of use in the sample ID:

- A and C were the subsample location for the left or right in-channel position per the SMP SAP. Center position B was discarded as explained in the next paragraph and Section 3.5.4.
- H signified subsample location alternates moved specifically due to the hazard survey to avoid anomalies that could represent pipelines or debris specifically in the HSCnew-NMP-01 location following discussions with ERDC and the AECOM JV.
- Number suffix “-1”, “-2” etc. meant repetition at a general location by locally repositioning borehole locations to obtain sufficient volume, or to deal with local field conditions encountered the day of sampling such as rig slope stability.

The sampling program was conducted following specifications contained in the NMP SAP and the prescribed sampling intervals for each location. Initial subsample positions at each location were given in Table 1 of the NMP SAP. The center position given in the table was deleted due to heavy daily vessel traffic making it impracticable to drill for samples in the middle of the Federal channel. At the JV and ERDC’s direction, the required volume from the center subsample was reapportioned to the two other subsample positions. Operations were conducted seven (7) days a week on a 10 to 12-hr schedule.

A detailed Project Execution Plan (PEP) providing our field procedures, safety, security, health, environment, and quality plans for the proposed project was submitted to AECOM on August 14, 2018. A revised version (01) was submitted to AECOM on September 10, 2018. A detailed description of our equipment/vessel details and methodologies about the exploration activities are described in our PEP. A Hazard Identification (HAZID) workshop was conducted based on our execution plan along with representatives from Benchmark, Lift Boat Personnel, and Fugro staff, including the Quality, Health, Safety and Environment (QHSE) representative, site manager, and project manager. The HAZID was conducted on August 31, 2018. A full Safety Plan was submitted to AECOM on September 9, 2018.

A brief description of various field activities is provided in the following sections of this report.

A total of fifty-nine (59) sub-sampling locations were drilled to obtain the amount of sample specified in Table 2 the NMP SAP. For sediment, 6 gallons per location, and 2 gallons for a field duplicate were specified. For water, 28 gallons per location, and 3 gallons for a field duplicate were specified. A summary of the sediment sub-sampling locations is presented on Table 1 and a summary of the water sampling locations is presented on Table 2, at the end of this report. Locations of sediment sampling are presented on Plates 3 through 13 of this report. Water sampling locations were located in close proximity to the sediment sub-sampling locations and are also indicated on these plates.

Logs of Sampling from all sub-sampling locations are presented on Plates A-1 through A-59 in Appendix A.

Daily progress Reports (DPR) detailing the daily progress of the field operations are presented in Appendix B.

2.2 Vessels and Equipment

Sampling operations were conducted from:

- A subcontracted 70-foot class Lift Boat (L/B) Shallow Draft 17; and
- Benchmark's 24–foot Water Sampling Vessel.

Drilling operations were completed using Fugro's Central Mining Equipment (CME)-75 Truck-Mounted Drill Rig. The rig was positioned on the L/B such that drilling operations could be conducted over the front deck through a "stinger" and "moon pull" on the work platform. The drill rig was secured to the deck of the L/B during transits. The drilling equipment consisted of 4.5-inch diameter Hollow Stem Augers (HSA), 4.0-inch by 5-ft long Bearing Head CME continuous sample tube system, Modified California Sampler and split spoon samplers.

The L/B Shallow Draft 17 was subcontracted through Shallow Draft Elevating Boats of Louisiana. L/B Shallow Draft 17 is a 70 Class Jack Up type vessel, with a twin 671 diesel engine, length 64 ft, beam 24 ft and draft of 4.4 ft. The L/B has a 10-ton crane. Facilities aboard the L/B consist of a work deck, small tea/mess room, portable potty, and drilling and ancillary equipment. L/B operations were supported by 32-foot support boat operated by Shallow Draft and powered by Yamaha outboards with 7,000 lb deck payload capacity. The support boat was used to transport personnel from/to the land points and the sampling vessel. The support boat was on standby near the L/B during drilling operations at all times.

Water samples were collected using the aforementioned 24-foot sample vessel operated by Benchmark Ecological Services, Inc. of Houston, Texas. Benchmark's boat was used to collect water samples at all sample locations. For all sampling events, Benchmark's boat was equipped with a sub-meter Trimble Geo XH 6000 GPS unit, appropriate sample containers, coolers with ice to store processed samples, field data sheets, and drink cooler.

Specifications for the vessels and equipment used for the nearshore sampling investigation are presented in in the Project Execution Plan.

2.3 Staging Areas

The L/B Shallow Draft 17 was mobilized at Martin's dock in Galveston, TX where the drill rig was driven onto, and secured to the deck. The bases of operations for the project in HSC were several marinas and public docks across the channel where supplies and personnel were loaded and unloaded during the field services on daily bases. The L/B was also demobilized at Martin's dock after concluding drilling operations on locations North of Morgan's Point.

2.4 Permits & Coordination

All permits for drilling and sampling were provided by AECOM JV prior to commencement of the project. However, Fugro was responsible and involved in meetings and calls with the United States Coast Guard (USCG), Port of Houston Authority (POHA), and the Port of Houston Pilots Association (POHPA). Fugro also handled the daily Category II Channel Obstructions request with Vessel Traffic Service Authority (VTSA) and radio communications before each vessel movement.

2.5 Surveying and Positioning

The L/B Shallow Draft 17 utilized a GPS system to position within an acceptable range of the location. Fugro personnel used a Trimble Geo XH 6000 (sub-meter GPS) to position the L/B on location. Surveyed as-built coordinates and elevations for the marine explorations including the encountered water depths, depth elevation, and penetration depths, are presented in Tables 1 and 2 for sediment samples, and ambient water samples, respectively.

The coordinate system for reporting of the sampling program is North American Datum (NAD) 83 State Plane. All coordinates and dimensions are in feet.

2.6 Hazard Survey - Magnetometer

A basic Hazard Survey was conducted ahead of the sampling event to guaranty the safety of L/B positioning and drilling operations.

Fugro performed a magnetometer survey to identify the locations of ferrous debris and plausible pipelines that may impact future project operations within the sampling area. The survey commenced on September 5, 2018, and concluded on September 7, 2018. Magnetometer data in the nearshore areas were collected using a Geometrics G-882 marine magnetometer positioned using Differential GPS with proprietary Fugro corrections. All positioning and magnetometer data were recorded using the Hypack hydrographic and navigation software suite.

The magnetometer survey was collected in a grid pattern enclosing the locations of proposed sediment sampling locations. This pattern was designed to support the identification of linear hazards, such as pipelines, traversing the boring location areas. A minimum of three (3) survey transects were collected in North-South and East-West orientations around the proposed sampling locations. These transects were spaced at 500 foot intervals where possible. Transects were spaced closer in the upper reaches of the Houston Ship Channel west of HSCNew-NMP-02, where moored vessels and narrow channels prevented a larger grid spacing.

The magnetometer data was processed and interpreted using the SonarWiz geophysics software suite. Layback values were applied to all magnetometer data. Deflections from the ambient magnetic field within the survey area were interpreted as anomalies. The position, duration, and amplitude of each anomaly were recorded. The geometry of each anomaly was also described in terms of monopole, dipole, or complex. Data was also retrieved from the Texas Railroad Commission geospatial database purchased through their web site to aid in identifying possible pipelines associated with the mapped magnetic anomalies (RRC 2018).

The differences observed in the interpreted anomalies within this report could be the result of several unique variables. The nomogram in Plates 3 through 13 symbolized with blue dashed lines provide a visual reference of the relationship between a ferrous object and the magnetic deflection generated by the object, symbolized as magnetic anomalies plotted along the blue lines of survey to represent a potential hazard. The amplitude and signature width (duration) of a magnetic deflection are dependent upon a variety of factors that include object size and orientation, ferrous content, and distance from the sensor (Breiner 1999). Due to the multitude of potential types of objects, debris, or infrastructure that could cause the interpreted anomalies,

reliable conclusions drawn from magnetometer data alone can be limited. Extreme caution should always be taken when conducting operations in the vicinity of the locations of identified magnetic anomalies. To reduce risk of encountering buried infrastructure or debris, some locations were revised prior to the start of the survey, such as HSCNew-NMP-01, HSCNew-NMP-05, and HSCNew-NMP-11.

2.7 Water Depth and Seabed Elevation

Once the platform was positioned at a location, water depth measurements were taken prior to the commencement of drilling operations with a weighted tape. Two measurements were taken (1) deck to mudline (DTM) and (2) deck to water (DTW), where water was the surface of the water. The difference between these two measurements is registered as the measured water depth.

Elevations associated with water depths measured were calculated using nearby tide charts to ensure that the specified elevation of 41.5 to 46.5 ft below Mean Lower Low Water (MLLW) level was met. This was accomplished by using the measured elevation of the water level and subtracting the measured depth to find seafloor mudline MLLW elevations. Seafloor elevations measured and corrected for tides are presented on the Logs of Sampling on Plates A-1 through A-59 in Appendix A.

2.8 Weather Forecast

The weather forecast for the sediment sampling program was provided by Fugro's metocean division in the UK. The forecast is based on Galveston 29.32N and 94.67W coordinates. This location is close to location HSCnew-SMP-REF offshore Galveston. Seas conditions presented on these reports may not correlate directly with the sea conditions encountered at the locations located in the protected waters of Galveston Bay. Forecast reports for the days of the field sediment sampling program are presented in Appendix C. Appendix C also presents the weather report for the water sampling program conducted on October 22, 2018.

3.0 SAMPLING PROGRAM

3.1 Sampling Sediment Borings

A total of fifty-nine (59) sub-sediment sampling locations were drilled below the mudline line to collect the NMP SAP specified amount of sample. Summary of the completed locations is provided in Table 1. The Plan of Borings per Station is found on Plates 3 through 13, while a detailed description of soils found is provided on the Logs of Sampling in Appendix A. The sediment sampling was conducted from October 1 through October 8, 2018.

Sediment sub-sampling locations were selected according to the SAP. Major deviations from the SAP approach were adjusted in consultation with ERDC and the AECOM JV personnel. These deviations from the original location area described in more detail in Section 3.5.4.

The mobilization of the L/B to North of Morgan's Point Stations was conducted on October 1, 2018. Heavy rains delayed the start of operations until October 2, 2018. Fugro was able to work every day until completion on October 6, 2018. The sampling effort started at sample location HSCnew-NMP-11, followed by sample locations HSCnew-NMP-10, 9, 8, 7, 6, 5, 4, 3, 3 (DUP), 2 and 1. The vessel transited to Martin's dock in Galveston on October 7 and demobilized on October 8, 2018.

Detailed descriptions of the soils encountered in the sampling locations drilled for this study are presented on the Logs of Sampling in Appendix A on Plates A-1 through A-59. A key identifying the terms and symbols used on the Logs of Sampling is presented on Plates A-60 and A-61. Field activities related to sampling locations, drilling and sampling methods, and borehole completion are discussed herein.

Drilling Methods. Drilling was performed through the "moon pull" of the L/B Shallow Draft 17 using a CME-75 drill rig as described in Section 2.2. Hollow Stem Augers (4.25-in) were run from deck level to the seafloor.

The objective of the drilling operations was to obtain the maximum amount of information on the subsurface conditions and to recover the SAP specified volume of core samples (up to 35 gallons) per location. Sediment sampling was accomplished by lowering a CME 4" by 5-ft long Bearing Head Continuous Sample Tube System (CME 4" sampler) through the Hollow Stem Augers into the seafloor. Once the sampler was secured inside the augers, the augers were rotated to the depth of the sampler length (about 5-ft), and the first sample was obtained. The auger was then rotated through the next 5 ft and sample obtained, with this process repeated to get through the target prism depth. Occasionally and due to very soft or very loose sediment conditions at and below seafloor, augers did not need to be rotated. Augers and samples were just lowered to the next sampling depth using their own weight or by pushing them with the drill rig.

Augers were used as casing to stabilize the upper/near surface of the boreholes. At the completion of the borehole all augers were recovered. Sampling was mainly performed with the CME 4" continuous sample tube sampler, however driven sampling techniques were used as a last resort. Sampler for driven sampling techniques included the sample penetration test (SPT) split

spoon and the Modified California Sampler (2-ft long by 3" inside diameter). The hollow stem auger and CME 4" sampler configuration was modified at one point of the investigation, in all efforts to maximize sample recovery on the loose sands and very soft clays. Hammering of the 4" sampler damaged the equipment. Fugro replaced the damaged sampler immediately by a new similar unit. No rotary wash drilling techniques were used during the sediment sampling campaign.

Fugro experienced difficulties to recover sediment samples in the near seafloor underconsolidated sediments, where very soft clays, very loose sands and/or shell hash beds are present. The large volume of sediments required by the NMP SAP did not make it feasible to use smaller diameter samplers, ideal for retaining representative amounts of these soft and very loose sediments.

Sampling Methods. Sampling was performed continuously from mudline to termination depth of the boring. Both the Fugro driller and the Fugro engineer on shift kept accurate logs of all activities performed (Appendix B) and all recovered materials (Appendix A).

The augers were lowered to the seafloor and the sampler was lowered and secured inside the augers for all augered samples using the proprietary latching device of the sampler specific for this auger. Once the system was in place the augers were rotated to the desired depths or maximum of the sampler capacity (5-ft long). The sampler was retrieved by pulling it out of the augers with the drill rig up to the deck. After retrieving the sampler, the soil sample was removed, and then the sampling process was repeated for the next 5 feet through the target prism depth. Following completion of the subsample, the sampler was rinsed and cleaned before the next subsample location as described in Section 3.3.

Hammer sampling was conducted in an effort to maximize sample recovery at difficult locations. A pneumatic hammer on top of the drill string was used to drive split spoon samplers in an effort to densify the soil and allowed it to stay inside the sampler. Blow counts from this sampling method were not recorded since it was not the purpose of the field program.

Once Fugro drillers collected the sediment sample via the "sampler," the sample tube was transferred to Benchmark personnel for processing. Benchmark personnel rinsed the outside of "sampler" with site water, placed it on a sampling table and split open. Benchmark personnel characterized, described, and photo logged the core with corresponding sample ID. Geotechnical characterizations were then performed by Fugro personnel. All data collected for each sample was recorded on a sampling data sheets with the corresponding date, time, and depth for each sample. After all field data was collected and recorded, the sample was placed into pre-cleaned five-gallon buckets and immediately placed into a refrigerated trailer unit. The buckets were labeled with sample location ID, sample date, sample time, initials of sampler, and bucket number. Immediately after sample collection, bucket lids were sealed on each sample container.

After the sample was split open, but prior to Benchmark processing the sample, pocket penetrometer tests were conducted when possible in the recovered soil materials. The unconfined compressive strength readings are reported on the respective Logs of Sampling presented in Appendix A.

- Pocket Penetrometer Tests. This test is performed by slowly pressing a small flat-ended cylindrical metal rod (6.3-mm diameter) into the flat surface of the soil sample through a spring until it is embedded to a predetermined depth (¼ inch of the device) within the sample. The resistance to device penetration is recorded by the spring that is calibrated to read the unconfined compressive strength of the soil based on spring compression. This testing tool is only used for soils with shear strength above 1 kips per square foot. Test results should be taken just as an indication of soil strength since none of the sediment samples were undisturbed.

3.2 Borehole Completion

Boreholes were not backfilled with grout, and the borings were allowed to cave-in once the drilling and sampling was completed.

3.3 Sample Storage and Shipping

Fugro's field engineer visually classified and logged the recovered soil samples collected at each location. Fugro personnel extruded sediment cores in either 2 or 5 foot sections. Benchmark personnel processed the sediment samples from all of the channel stations onboard the L/B. Sediment core sections were placed in PVC troughs lined with clean aluminum foil. Prior to sample processing, each sediment core section was photographed and a Fugro logger recorded sediment characteristics in a bore log. Photos of the collected samples are presented in Appendix G. Pre-cleaned stainless-steel spoons and spatulas (cleaned as described in Section 3.3) were used to cut the core into 5 to 6 inch sections and placed immediately into two (2) gallon buckets. All sample containers were labeled with the sample location ID, collection date, time, and any additional information required by the analytical laboratory outlined the NMP SAP, Section 5.0, such as preservative used and analyses requested. Chain of Custody (COC) forms were completed for all samples collected and processed. The total volume of sediment collected from each channel sample location is 6 gallons. An additional 6 gallons of sediment were collected and processed from one of the channel sample locations for QA/QC analysis at HSCnew-NMP-03 (DUP).

Prior to sample collection, all containers and sampling equipment were cleaned using a new scrub brush, tap water, Alconox Detergent Powder and rinsed with distilled water based on protocols described in Plumb (1981). Any equipment that came into contact with sediment samples was deconned between channel sample locations. Care was taken to avoid contamination to sampling devices from the barge deck or other surfaces. Powderless latex or nitrile gloves were worn during sample collection and sample handling.

One (1) sediment sample equipment blank was prepared using 1) deionized water (provided by the laboratory) and 2) the pre-cleaned equipment that was in contact with the sediment samples (i.e., stainless steel spoon, core tube, nitrile glove), consistent with the frequency of one per 20 samples per environmental matrix or one per 20 samples per day, whichever is less, outlined in the NMP SAP Section 4.3.5. The equipment rinsate blank was collected to evaluate field sampling and decontamination procedures by pouring deionized water over the decontaminated sampling equipment used for sample collection.

Immediately after the sediment samples had been collected and processed, the two-gallon buckets were placed in a refrigerated trailer (2-4 ˚C) onboard the L/B and transported to shore every three days. Once on shore the buckets were transferred to the refrigerated truck where they were delivered to the analytical laboratory at USACE ERDC in Vicksburg, Mississippi on 23 October 2018 as described in Section 3.5.1. The refrigerated trailer was only accessible by project personnel and a padlock was used on the refrigerated truck while transporting the samples to the laboratory.

3.4 Water Samples

A single site water sample was collected at each of the eleven (11) sediment sample locations shown in Plate 2, chemically analyzed by the lab, and used in the preparation of elutriate samples. These were at sample locations HSCnew-NMP-01, NMP-02, NMP-03, NMP-04, NMP-05, NMP-06, NMP-07, NMP-08, NMP-09, NMP10, and NMP-11. Sediment that might have been produced during sediment sampling and processing, water samples were collected more than 24 hours after the last sediment sample was collected. Water samples were collected from Benchmark's 24ft aluminum boat equipped to collect clean water samples.

Sample containers for chemical analysis were provided by the laboratory and new five (5) gallon cubitainers were used to collect bulk water samples. Care was taken to avoid contamination to sampling devices (tubing, sample containers, pumps) from the boat deck or other surfaces, and sampling equipment deconned between sample locations as described in detail in Section 3.5.1. Powderless nitrile gloves were worn during sample collection and handling.

Prior to conducting the sampling event, actual sediment sample location coordinates were loaded onto a sub-meter GPS and used to navigate the sample vessel to each water sample location. Water samples from all water sample locations were collected on 22 October 2018.

Water samples were collected from mid-depth at each sample location. Mid-depth was determined using a weighted line and measuring tape, marking the line as needed to identify mid-depth. Water samples were collected using high-volume geo-pumps, tubing and filters. Water samples which were field filtered were those being submitted for all chemical analyses except Total Mercury, Total Selenium, and Total Suspended Solids in accordance with Section 4.3.2. In addition, filters were not used when collecting bulk water samples into 5 gallon cubitainers. New tubing and filters were used at each sample location and site water was flushed through the tubing with a volume of at least five times the volume of the sample tubing prior to using it for sample collection. Flushing water was discarded back into the ship channel after each sample was collected. Water samples were collected into laboratory-supplied pre-cleaned sample containers and new 5-gallon cubitainers.

Immediately after completing sample collection for each location, water samples were delivered to shore and loaded into a refrigerated truck. The refrigerated truck was kept at a temperature of 4°C from the time the samples were loaded into the truck starting on 22 October 2018 until the samples were delivered to the laboratory at USACE ERDC in Vicksburg, MS, on 23 October 2018.

Field parameters including dissolved oxygen (DO), pH, salinity, conductivity, and water temperature were recorded at each water sample location.

- DO – ranged from 2.74 mg/L at HSCnew-NMP-09SW to 5.63 mg/L at HSCnew-NMP-03SW;
- pH - ranged from 7.47 at HSCnew-NMP-08SW to 8.06 at HSCnew-NMP-07SW;
- Salinity – ranged from 1.13 ppt at HSCnew-NMP-11SW to 4.59 ppt at HSCnew-NMP-02SW;
- Conductivity – ranged from 2.289 mS/cm at HSCnew-NMP-07SW to 8.123 mS/cm at HSCnew-NMP-02SW; and
- Water Temperature – ranged from 19.28 °C at HSCnew-NMP-01SW to 23.09 °C at HSCnew-NMP-10SW.

In addition, field data including: sample date, sample time, water depth, sample depth, location ID, sample ID were recorded on field data sheets. Field parameters and general sample data are listed in Table 2.

3.5 Quality Control Methods

3.5.1 Sample Preservation and Storage

Sediment samples were placed into pre-cleaned two (2) gallon buckets and sample jars provided by analytical laboratory. Sediment samples were collected and processed for the following analysis:

- Metals;
- Pesticides;
- Dioxins/Furans;
- PAH/PCPs;
- PCBs;
- TOC;
- Grain Size;
- Ammonia;
- pH; and
- Total Solids.

The buckets were labeled with sample location ID, sample date, sample time, initials of sampler, and bucket number. Immediately after sample collection, bucket lids were sealed on each sample container. Sealed sample buckets were placed into a refrigerated trailer located on the barge. The refrigerated trailer was kept at a temperature of 2°C to 4°C. The refrigerated box truck was locked with a padlock. Custody seals were not used on individual sample coolers. At a minimum, the temperature of the refrigerated trailer was checked once a day and recorded on a temperature log data form. Sediment samples were stored in the refrigerated trailer from the time of sample collection until they were shipped to the analytical laboratory.

Sediment samples from locations HSCnew-NMP-07, NMP-08, NMP-09, NMP-10, and NMP-11 were collected on 2 October and 3 October 2018 and shipped via FedEx on 4 October 2018 and delivered to the analytical laboratory on 6 October 2018.

Sediment samples from locations HSCnew-NMP-01, NMP-02, NMP-03, NMP-03 (DUP), NMP-4, NMP-5, and NMP-6 were collected on 4 October through 6 October 2018. Sediment samples were offloaded from the sample barge on 8 October 2018 and immediately placed in a refrigerated box truck set at 2°C to 4°C. Sediment samples were stored in the refrigerated box truck and delivered to the laboratory by Benchmark on 9 October 2018.

Water samples were collected into sample containers provided by the laboratory for the following chemical analyses:

- Dissolved Organic Carbon
- Dissolved Ammonia
- Dissolved Metals
- Dissolved Sulfides
- TPH (preserved with HCL)
- VOC (preserved with HCL)
- Chromium III and VI
- TOC (preserved with sulfuric acid)
- Total Hg and Se (preserved with nitric acid)
- TSS

Bulk water samples for the additional analysis listed above and in the NMP SAP Table 2, and elutriate samples were collected into new five (5) gallon cubitainers. A total of five (5) five (5) gallon cubitainers (in addition to the sample containers provided by the laboratory) were collected at each sample location. All sample containers were labeled with sample date, sample time, sample location, and with the initials of the sampler. Immediately after sample collection, water samples were placed into a refrigerated box truck set at 4°C. Water samples were kept at 4°C in the refrigerated truck and transported by Benchmark to the USACE ERDC laboratory at Vicksburg, MS on 23 October 2018.

Samples were delivered within the recommended holding times, as listed in the SAP. Contract personnel verified and confirmed all sample handling, storage and preservation requirements with the analytical facility performing the project analyses. The SAP describes recommended procedures for sample collection, preservation, and storage in Section 4.3 and Table 2. Sample preservation and storage methods described in the SAP were followed without deviation. Samples were homogenized by USACE ERDC at Vicksburg, MS prior to sending it to the analytical laboratory.

3.5.2 Field Quality Control

A duplicate sediment sample was collected at sediment sample location HSCnew-NMP-03. A total of six (6) two (2) gallon buckets were filled with sediment at sample location HSCnew-NMP-03 and NMP-03 (DUP).

A duplicate water sample was collected at sample location NMP-03. Two sets of sample containers provided by the laboratory and ten (10) five (5) gallon cubitainers were processed at sample location HSCnew-NMP-03.

One (1) sediment equipment blank was processed associated with the sample collection of sediment samples using the drill rig. The equipment blank was prepared by pouring deionized water (provided by the laboratory) over sample and processing equipment that came into contact with the sediment while collecting and processing the samples (e.g. drill rig sampler device, stainless steel spoon, plastic bucket, and nitrile gloves).

One (1) sample equipment blank for water was prepared using deionized water provided by the laboratory and equipment that contacted water samples (e.g. tubing, filter, and nitrile gloves).

Field duplicate and equipment blank sample data were recorded on field data sheets. Field duplicate data are listed in Tables and 2 for sediment and water samples, respectively.

3.5.3 Chain of Custody/Shipping

Chain of Custody (COC) protocols were followed while conducting the field sampling event. Guidance can be found in the references cited in USACE (1995) as well as Plumb (1981). COC forms and sample labels were provided by the laboratory prior to sample collection. COC forms were filled out and signed by contract personnel from Benchmark as the samples were collected and processed. COC forms were signed by laboratory personnel upon transfer of samples to the USACE ERDC laboratory at Vicksburg, MS. Copies of the COCs are included with the final laboratory data packet.

Sediment and water samples were shipped as listed in Section 3.5.1. Deviations associated with the storage and shipment of sediment samples are listed in Section 3.5.4. A temperature log for Quality Assurance purposes is presented in Appendix F.

3.5.4 Deviations from NMP SAP Procedures

The following deviations exists during the sediment collection field campaign when compared with the procedures outlined in the NMP SAP:

- **Project Area.** Sediment samples were collected at the given sample locations whenever possible. These had to be adjusted for reasons summarized below and discussed in more detail in Sections 2.1 and 3.1. At the time of sampling Fugro, AECOM JV and ERDC personnel jointly agreed to:

  a. eliminate Samples “B” located in the middle of the HSC (NMP SAP, line 349) on all sampling locations;

b. shift sub-sampling locations to one side of the channel (“A” or “C”) at Locations HSCnew-NMP-01, and NMP-07; and

c. move sub-sampling locations the least distance possible from given locations, to accommodate for pipeline obstructions, steep channel slopes or difficult sampling conditions, while remaining within the dredge prism. This last agreement affected all the sampling locations except HSCnew-NMP-02, NMP-09 and NMP-11.

d. Sub-sample locations were relocated to avoid improve poor sediment recovery; Sub-sample locations were pulled away from existing pipelines whose locations were determined by the hazard survey described in Section 2.6; and

e. Sub-sample locations near existing, high occupancy ship docks were relocated, to not impede their use and to not force sampling operations to move frequently.

- **Schedule.** Sediment samples were collected in close coordination between Fugro, AECOM JV and ERDC personnel. Water samples were collected in close coordination with ERDC laboratory personnel to work with the days that favor shipment strategy and openings in the laboratory testing schedule. There were no deviations from the NMP SAP or planned Fugro schedule.
- **Sample Storage.** Sediment sample collection was completed on October 6, 2018. Sediment samples remained on the LB in the refrigerated trailer until they were delivered to the offloading dock in Galveston, TX on Monday October 8, 2018. Benchmark employees arrived at the LB first thing Monday morning to unload the sediment samples from the refrigerated trailer into a refrigerated box truck for delivery to the ERDC laboratory in Vicksburg. At this point, it was discovered that the refrigerated trailer on the barge was not running. Benchmark employees immediately began placing ice on the samples to keep the samples cool. Benchmark employees measured the temperature in one of the smallest sample jars and the temperature was 3.9 °C which is within the acceptable temperature range of 1 to 4 °C. Benchmark notified the appropriate AECOM, USACE, ERDC, and Fugro personnel of the issue on October 8, 2018. Sediment samples were removed from the LB, placed into a refrigerated box truck and delivered to the ERDC Vicksburg laboratory on October 9, 2018.
- **Sample Delivery.** In order to meet sample hold times, sediment samples collected on October 2 and 3, 2018 were shipped via FedEx to the ERDC Vicksburg laboratory on October 4, 2018. The samples were scheduled to be delivered to the laboratory first thing October 5, 2018. Nine coolers were packed with ice and shipped from Houston to Vicksburg. Two of the nine coolers arrived at the laboratory within temperature on October 5, 2018. The remaining seven coolers were held-up in Memphis, TN and were not delivered to the laboratory on October 5, 2018. Benchmark employees worked with FedEx employees and arranged to have the seven coolers held in Memphis to be delivered to Jackson, MS on October 6, 2018. A Benchmark employee picked the sample coolers at 0900hrs on October 6, 2018 from a FedEx shipping center. The sample coolers were opened immediately, and ice was observed in all seven coolers. The temperature of the samples was measured below 4 °C. The coolers were repacked with fresh ice and driven

to Vicksburg, MS. The sediment samples were delivered to ERDC personnel in Vicksburg midday on October 6, 2018. The sediment samples arrived within temperature, in time to conduct the analysis, and within the acceptable temperatures defined in the SAP. No impact to the analysis resulted.

- **Sampling (approach and collection).** Fugro used a 4" CME sampler in conjunction with a hollow stem auger system. This system is ideal to collect large volumes of sample throughout the soil column. There were no deviations from the NMP SAP or planned Fugro schedule. There were deviations from the originally planned sampling method Fugro proposed due to soft soil conditions. The use of hammer sampling to handle these conditions is described in Section 3.1. However, it was challenged by the soft and loose sediment located close to the mudline or within strata at deeper depths. Deviations included corrective actions taken to replace the 4" CME sampler damaged by percussive driving for which it wasn't designed during attempts to densify the material and maximize sample recovery. Fugro also attempted, the use of smaller percussion split spoon samplers in an effort to maximize sample recovery and selective re-sampling of missing sample intervals at adjacent locations. Missing sample intervals would affect sample representativeness of the intended dredged prism if not addressed.

- **Chain of Custody and Shipping.** Appropriate chain of custody protocols was followed. Samples were shipped, and samples were received in the facility with holding times met. No deviations reported on this field activity except by occurrence explained in the Sample Delivery bullet item.

Relocations proposed and discussed by AECOM JV in coordination with ERDC ensured new locations were in the same study segment and would have new work material at the same targeted depths as the original. Therefore, relocation would not impact the ability to obtain representative samples.

Sediment samples collected from sample locations HSCnew-NMP-07 through HSCnew-NMP-11 were shipped via FedEx leaving Houston on 4 October 2018. A total of nine (9) coolers were packed with ice and shipped to arrive overnight at the ERDC Vicksburg, MS laboratory. Due to a FedEx sorting error in Houston, only one cooler was delivered to the laboratory on 5 October 2018. The other eight (8) sample coolers were held in the FedEx Memphis, TN distribution center until they were delivered to the FedEx Richland, MS distribution center on 6 October 2018. Benchmark personnel retained custody of the coolers at 0900 hrs on 6 October 2018 from the Richland FedEx facility. The coolers were opened and inspected for the presence of ice and the water temperature of a temperature blank was measured and recorded. Ice was observed in all eight (8) sample coolers and the temperature blank was 1°C. Additional ice was added to each of the eight (8) coolers and the coolers were delivered to Vicksburg, MS around noon on 6 October 2018. While all the samples did not arrive at the laboratory on 5 October 2018, the samples were delivered to the analytical lab on 6 October 2018 within the appropriate temperature range and were analyzed within the appropriate hold times.

Sediment samples collected from sample locations HSCnew-NMP-01 through HSCnew-NMP-06 were collected on 4 October through 6 October 2018. The sample barge travelled from sample

location HSCnew-NMP-01 to a dock located on Pelican Island in Galveston, TX on 7 October 2018. Benchmark personnel arrived at the sample barge located on Pelican Island at 0800 hrs on 8 October 2018 and discovered the refrigerated trailer holding the sediment samples was not working when arrival. A thermometer was placed in one of the smaller sample jars and the temperature was recorded as 3.8°C. Ice was immediately placed on all the sediment samples. Sediment samples were offloaded from the sample barge on 8 October 2018 and immediately placed in a refrigerated box truck set at 2°C to 4°C. Sediment samples were stored in the refrigerated box truck and delivered to the laboratory on 9 October 2018. While the refrigerated trailer stopped working sometime between 7 October and the morning of 8 October, the samples did not exceed a temperature of 4°C. Samples were delivered to the analytical laboratory within the appropriate temperature range and were analyzed within the appropriate hold times.

4.0 GENERAL SUBSURFACE CONDITIONS

The register subsurface conditions based on our field exploration program are provided in this section. No geotechnical laboratory testing was conducted to confirm our field observations.

4.1 Subsurface Conditions

The subsurface conditions presented in this report are based on the information obtained from the Sampling Locations performed during this field program. The generalized subsurface stratigraphy at the Sampling is summarized in the following tables for each sampling location and discussed in the following paragraphs. The percentage of sample recovery was estimated based on our interpretation of the subsurface stratigraphy and length of sediment sample recovery on each of the samplers obtained at the sub-sample locations.

Sampling Location HSCnew-NMP-01 (HSC Station 500+00)

Table 4-1: Summary of Soil Conditions – HSCnew-NMP-01AH3 (1 through 4)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silt – with clay	0	3 to 6	100%
II	Sand – loose, with silt	3	End (5 to 6.5')	50%

Stratum I consists of silt generally extending from the mudline to a depth of about 3 to 6 ft. This stratum contains sand and it is black. Stratum II consists of loose sand with silt. Measured water depths ranged from 33.0 ft to 36.1 ft below MLLW.

Sampling Location HSCnew-NMP-02 (HSC Station 730+00)

Table 4-2A: Summary of Soil Conditions – HSCnew-NMP-02A (1 and 2)

Generalized Stratum	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silt – with clay	10	End (15)	100%

Stratum I consists of silt from mudline to 15 ft. The top 10 ft were discarded as per sampling specifications. Measured water depths ranged from 34.2 ft to 34.7 ft below MLLW.

Table 4-3C: Summary of Soil Conditions – HSCnew-NMP-02C (1)

Generalized Stratum	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Sandy clay – very soft	11	21	100%
II	Clay – very stiff to hard	21	End (34)	100%

Stratum I consists of soft sandy clay from 11 ft to 21 ft below mudline. Stratum II consist of very stiff to hard overconsolidated clay with calcareous and ferrous nodules. The top 11 ft were discarded as per sampling specifications. Measured water depths was 16.1 ft below MLLW.

Sampling Location HSCnew-NMP-03 (HSC Stations 791+00 and 796+00)

Table 4-4A: Summary of Soil Conditions – HSCnew-NMP-03A-1 and HSCnew-NMP-03A-1 (DUP)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Sand - loose, with plastic trash	0	5 to 7	50%
II	Clay – very stiff to hard	5 to 7	End (18 to 19)	74%

Stratum I consists of loose sand to clayey sand with plastic trash. Stratum II consists of very stiff to hard overconsolidated clay with calcareous nodules. Hard drilling was reported at 15 ft below mudline and refusal at 18 ft in one of the boring locations. Measured water depths ranged from 30.6 ft to 31.2 ft below MLLW at this sub-sample locations.

Table 4-5C: Summary of Soil Conditions – HSCnew-NMP-03C-1 and HSCnew-NMP-03C-1 (DUP)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Sand - loose, with silt and shell fragments	0	17 to 18	60%
II	Clay – very stiff to hard	17 to 18	19 to end (27)	86%
III	Sand	19	End (28)	72%

Stratum I consists of loose sand to clayey sand with silt and shell fragments. A silt layer was present at shallowest water location from mudline to 4-ft penetration and from 6- to 7.5ft penetration. Stratum II consists of stiff to hard overconsolidated clay. Stratum II was the end of drilling for HSCnew-NMP-03C-1. Stratum III was present on HSCnew-NMP-03C-1 (DUP) and

consist of dense sand. Measured water depths ranged from 19.7 ft to 22.0 ft below MLLW at this sub-sample locations.

Sampling Locations HSCnew-NMP-04 (HSC Station 873+00)

Table 4-4: Summary of Soil Conditions – HSCnew-NMP-04A (1 and 2) and 04C (1 through 5)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silt – with clay	1 to 14	5 to 16	76%
II	Clay – very stiff, with silt and sand	5 to 16	End (6 to 19)	80%

Stratum I consists of silt with clay and traces of sand. Hydrocarbons were noticed on Stratum I at location HSCnew-NMP-04C-3. Stratum II consists of very stiff clay with silt and sand. A thin sand layer was generally encountered between Strata I and II. Measured water depths ranged from 30.5 ft to 43.7 ft below MLLW.

Sampling Location HSCnew-NMP-05 (HSC Station 959+00)

Table 4-5A: Summary of Soil Conditions – HSCnew-NMP-05A (1 through 3)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silt – with clay	5 to 8	End (9 to 12)	100%

The “A” locations are characterize by the presence of silt from mudline to the final explored depths. Stratum I consists of silt with traces of clay. Measured water depths ranged from 37.7 ft to 40.5 ft below MLLW.

Table 4-5C: Summary of Soil Conditions – HSCnew-NMP-05C (1 through 3)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Interlayered Sand and Clay – dense and hard	25 to 33	End (9 to 12)	69%

The “C” locations are characterize by interlayer strata of hard overconsolidated clay and dense fine sand. Stratum I consists of layers of hard clay and dense sands. The top 25 to 33 ft were discarded as per sampling specifications. Measured water depths ranged from 11.5 ft to 19.5 ft below MLLW.

Sampling Location HSCnew-NMP-06 (HSC 1127+00)

Table 4-6A: Summary of Soil Conditions – HSCnew-NMP-06A (1 through 3)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silt – with clay	5 to 14	End (8 to 17)	100%

Stratum I consists of silt, with clay and organic matter. The top 5 to 14 ft were discarded as per sampling specifications. Measured water depths ranged from 27.4 ft to 36.7 ft below MLLW.

Table 4-6C: Summary of Soil Conditions – HSCnew-NMP-06C (1 and 2)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Interlayered Sand and Clay – dense and hard	29	End (33)	100%

The “C” locations are characterized by interlayer strata of hard overconsolidated clay and dense fine sand. Stratum I consists of layers of hard clay and dense sands. The top 29 ft were discarded as per sampling specifications. Measured water depths ranged from 11.6 ft to 12.0 ft below MLLW.

Sampling Location HSCnew-NMP-07 (HSC-1180+00)

Table 4-7A: Summary of Soil Conditions – HSCnew-NMP-07A (1)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silty sand to sand – loose and medium dense	4	11	83%
II	Clay– stiff, with traces of sand	11	End (14)	33%

Stratum I is characterized by the presence of medium dense silty sand to sand with clay layers and organic matter. Stratum II consists of overconsolidated stiff clay with traces of sand. The top 4 ft were discarded as per sampling specifications. Measured water depth was 32.5 ft below MLLW.

Table 4-7ALT1: Summary of Soil Conditions – HSCnew-NMP-07 (ALT1-1 through 5)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silt – with clay	20 to 21	22 to 24	100%
II	Silty sand – loose	22 to 24	End (25 to 26)	100%

Stratum I is characterized by the presence of silt with clay. Stratum II consists of medium dense silty sand. The top 20 to 21 ft were discarded as per sampling specifications. Measured water depths ranged from 19 ft to 20 ft below MLLW.

Sampling Location HSCnew-NMP-08 (HSC 1200+00)

Table 4-8A: Summary of Soil Conditions – HSCnew-NMP-08A (1 and 2)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Clay – very stiff	26	End (30)	100%

Stratum I consists of overconsolidated clay, very stiff. Stratum I in location HSCnew-NMP-08A-2 consist of silt with sand. The silt was found from 19 to 23 ft below mudline. The soil differs from the other location; however, samples were obtained from different elevations following sampling specifications. The top 19 to 26 ft were discarded as per sampling specifications. Measured water depths ranged from 14.7 ft to 22.1 ft below MLLW.

Table 4-8C: Summary of Soil Conditions – HSCnew-NMP-08C (1 through 4)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silt – with clay	2 to 3	4 to 6	86%
II	Clay – firm to very stiff, with sand pockets	4 to 6	End (7)	60%

The “C” locations are characterized by the presence of silt with organic matter on Stratum I, followed by overconsolidated firm to very stiff clay with sand pockets (Stratum II). A sand layer was found between these two strata at location HSCnew-NMP-08C-3. The top 2 to 3 ft were discarded as per sampling specifications. Measured water depths ranged from 37.6 to 38.0 ft below MLLW.

Sampling Location HSCnew-NMP-09 (HSC 1230+00)

Table 4-9: Summary of Soil Conditions – HSCnew-NMP-09A (1 through 3) and 09C (1 through 4)

Generalized Strata	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silt – with clay	2 to 3	3 to 5	100%
II	Clay – firm to very stiff, with sand pockets	3 to 5	End (6 to 7)	64%

All locations are characterized by the presence of silt with organic matter on Stratum I, followed by overconsolidated very stiff clay (Stratum II). The top 2 to 3 ft were discarded as per sampling specifications. Measured water depths ranged from 37.7 to 38.6 ft below MLLW.

Sampling Location HSCnew-NMP-10 (HSC Station 1260+00)

Table 4-10A: Summary of Soil Conditions – HSCnew-NMP-10A (1 through 4)

Generalized Stratum	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silt – with clay	3 to 4	End (7 to 8)	89%

Stratum I consists of silt from mudline to about 8 ft. Several wood fragments are present in this stratum. The top 3 to 4 ft were discarded as per sampling specifications. Measured water depths ranged from 36.4 ft to 37.4 ft below MLLW.

Table 4-10C: Summary of Soil Conditions – HSCnew-NMP-10C (1 and 2)

Generalized Stratum	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silty sand – very loose	6 to 7	7 to 9	100%
II	Clay – very stiff	7 to 9	End (11)	100%

Stratum I consists of very loose silty sand from 6 to 7 ft to 7 to 9 ft below mudline. Stratum II consist of very stiff overconsolidated clay. The top 6 to 7 ft were discarded as per sampling specifications. Measured water depths ranged from 33.6 to 34.2 ft below MLLW.

Sampling Location HSCnew-NMP-11 (HSC Station 024+00)

Table 4-11A: Summary of Soil Conditions – HSCnew-NMP-11A (1 and 2)

Generalized Stratum	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silt – with clay	4	7 to 8	100%
II	Sand – loose, medium grained	7 to 8	End (14)	33%

Stratum I consists of silt with clay from 4 to about 8 ft. Stratum II consists of a loose medium grained sand with organics. The top 4 ft were discarded as per sampling specifications. Measured water depths ranged from 31.3 ft to 31.4 ft below MLLW.

Table 4-11C: Summary of Soil Conditions – HSCnew-NMP-11C (1 through 3)

Generalized Stratum	General Description	Depth from Mudline		Estimated Recovery (%)
		Top (ft)	Bottom (ft)	
I	Silty sand – very loose	7	10 to 11	100%
II	Clay – stiff to very stiff	10 to 11	End (12)	80%

Stratum I consists of very loose silty sand from 7 ft to 11 ft below mudline. Stratum II consist of stiff to very stiff overconsolidated clay. A soft silty clay is present in location HSCnew-NMP-11C-1 between both strata. The top 7 ft were discarded as per sampling specifications. Measured water depths ranged from 33.1 and 33.2 ft below MLLW.

A summary of specific soil stratigraphy per sub-sample location are summarized on Table 3, and in more detail on the Logs of Sampling in Appendix B. A key to the terms and symbols used on the Logs of Sampling is also presented in Appendix B.

4.2 Variations

Our interpretations of soil and depth-to-water conditions, as described in this report, are based on data obtained from the sampling locations. No laboratory classification tests were conducted for this program. It is possible that undisclosed variations in soil, and depth-to-water conditions may occur outside the Sampling locations.

5.0 REFERENCES

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TABLES

Table 1: Sediment Sampling Locations
Houston Ship Channel - North of Morgan's Point
Houston Ship Channel, TX

Sample Locations	Sample ID	Sub-sample Locations	Coordinates[1]		Coordinates		Date	Sample Time	Measured Water Depth (ft)	Corrected Water Depth MLLW (ft)	Penetration_Depth_Below_Mudline (ft)	Authorized Channel Depth MLLW (ft)	Channel Station[2]
			X - Easting (ft)	Y - Northing (ft)	LAT	LONG							
NMP-01	HSCnew-NMP-01AH3	HSCNew-NMP-01AH3-1	3,209,399	13,844,992			10/6/2018		38.30	36.02	5.50		500+00
		HSCNew-NMP-01AH3-2	3,209,391	13,845,001			10/6/2018		38.30	36.10	5.50		
		HSCNew-NMP-01AH3-3	3,209,382	13,844,988			10/6/2018		38.60	36.45	5.00		
		HSCNew-NMP-01AH3-4	3,209,370	13,844,967			10/6/2018		37.20	35.06	6.50		
NMP-02	HSCNew-NMP-02	HSCNew-NMP-02A-1	3,190,669	13,835,075			10/6/2018		37.20	34.73	15.00		720+00
		HSCNew-NMP-02A-2	3,190,674	13,835,065			10/6/2018		36.50	34.07	15.50		
		HSCNew-NMP-02C-1	3,190,740	13,835,560			10/6/2018		18.80	16.13	33.50		
NMP-03	HSCNew-NMP-03	HSCNew-NMP-03A-1	3,185,272	13,837,839	29 44 36.654	95 09 53.7	10/5/2018		33.20	31.18	18.00		800+00
		HSCNew-NMP-03A-1(DUP)	3,185,291	13,837,849			10/5/2018		33.40	30.63	19.00		
		HSCNew-NMP-03C-1	3,185,164	13,838,758	29 44 45.789	95 09 54.591	10/5/2018		24.10	22.00	27.50		
		HSCNew-NMP-03C-1(DUP)	3,185,164	13,838,762	29 44 45.826	95 09 54.588	10/5/2018		21.90	19.65	30.00		
NMP-04	HSCNew-NMP-04	HSCNew-NMP-04A-1	3,177,578	13,837,883			10/5/2018		32.90	30.54	19.00		915+00
		HSCNew-NMP-04A-2	3,177,560	13,837,887			10/5/2018		39.90	37.65	12.00		
		HSCNew-NMP-04C-1	3,177,446	13,838,353			10/5/2018		45.50	43.27	6.50		
		HSCNew-NMP-04C-2	3,177,448	13,838,374			10/5/2018		45.50	43.35	6.50		
		HSCNew-NMP-04C-3	3,177,473	13,838,383	29 44 44.562	95 11 21.931	10/5/2018		45.10	43.00	6.50		
		HSCNew-NMP-04C-4	3,177,493	13,838,377	29 44 44.500	95 11 21.709	10/5/2018		45.10	43.01	6.50		
		HSCNew-NMP-04C-5	3,177,357	13,838,356	29 44 44.338	95 11 23.254	10/5/2018		45.70	43.67	6.00		
NMP-05	HSCNew-NMP-05	HSCNew-NMP-05A-1	3,171,789	13,832,332			10/5/2018		40.10	37.66	12.00		970+00
		HSCNew-NMP-05A-2	3,171,785	13,832,337	29 43 46.566	95 12 28.651	10/5/2018		39.90	37.51	12.00		
		HSCNew-NMP-05A-3	3,171,778	13,832,329			10/5/2018		42.90	40.51	9.00		
		HSCNew-NMP-05C-1	3,171,351	13,832,522			10/4/2018		13.40	11.50	38.00		
		HSCNew-NMP-05C-2	3,171,367	13,832,517			10/4/2018		15.80	14.05	35.50		
		HSCNew-NMP-05C-3	3,171,393	13,832,512			10/4/2018		21.20	19.50	30.00		
NMP-06	HSCNew-NMP-06	HSCNew-NMP-06A-1	3,157,010	13,830,360			10/4/2018		29.60	27.43	17.00		1115+00
		HSCNew-NMP-06A-2	3,156,997	13,830,374	29 43 31.864	95 15 17.018	10/4/2018		36.60	34.52	10.00		
		HSCNew-NMP-06A-3	3,156,993	13,830,383	29 43 31.949	95 15 17.065	10/4/2018		38.70	36.66	8.00		
		HSCNew-NMP-06C-1	3,157,267	13,830,791			10/4/2018		13.90	11.64	33.00		
		HSCNew-NMP-06C-2	3,157,252	13,830,786			10/4/2018		14.20	11.95	33.00		
NMP-07	HSCNew-NMP-07	HSCNew-NMP-07A-1	3,151,931	13,829,808			10/2/2018		33.70	32.52	14.00		1160+00
		HSCNew-NMP-07 (ALT 1-1)	3,151,936	13,829,813	29 43 27.908	95 16 14.594	10/3/2018		21.40	19.39	25.50		
		HSCNew-NMP-07 (ALT 1-2)	3,151,936	13,829,809	29 43 27.876	95 16 14.602	10/3/2018		22.10	20.19	24.50		
		HSCNew-NMP-07 (ALT 1-3)	3,151,924	13,829,798			10/3/2018		21.70	19.83	25.00		
		HSCNew-NMP-07 (ALT 1-4)	3,151,916	13,829,792			10/3/2018		21.50	19.67	25.00		
		HSCNew-NMP-07 (ALT 1-5)	3,151,921	13,829,775			10/3/2018		21.20	19.41	25.00		
NMP-08	HSCNew-NMP-08	HSCNew-NMP-08A-1	3,149,974	13,831,274			10/3/2018		16.90	14.73	30.00		1200+00
		HSCNew-NMP-08A-2	3,150,021	13,831,253			10/3/2018		24.10	22.05	23.00		
		HSCNew-NMP-08C-1	3,150,638	13,831,379			10/3/2018		39.90	37.70	7.00		
		HSCNew-NMP-08C-2	3,150,649	13,831,382			10/3/2018		40.20	37.96	6.50		
		HSCNew-NMP-08C-3	3,150,637	13,831,389			10/3/2018		39.80	37.56	7.00		
		HSCNew-NMP-08C-4	3,150,629	13,831,393			10/3/2018		39.90	37.73	7.00		
NMP-09	HSCNew-NMP-09	HSCNew-NMP-09A-1	3,149,149	13,833,987			10/2/2018		39.70	38.22	6.00		1230+00
		HSCNew-NMP-09A-2	3,149,153	13,833,975			10/2/2018		39.10	37.67	7.00		
		HSCNew-NMP-09A-3	3,149,159	13,833,976			10/2/2018		39.10	37.76	7.00		
		HSCNew-NMP-09C-1	3,149,514	13,834,136			10/3/2018		40.40	37.98	7.00		

Table 1: Sediment Sampling Locations
Houston Ship Channel - North of Morgan's Point
Houston Ship Channel, TX

Sample Locations	Sample ID	Sub-sample Locations	Coordinates[1]		Coordinates		Date	Sample Time	Measured Water Depth (ft)	Corrected Water Depth MLLW (ft)	Penetration_Depth_Below_Mudline (ft)	Authorized Channel Depth MLLW (ft)	Channel Station[2]
			X - Easting (ft)	Y - Northing (ft)	LAT	LONG							
		HSCNew-NMP-09C-2	3,149,510	13,834,140			10/3/2018		41.00	38.63	6.00		
		HSCNew-NMP-09C-3	3,149,513	13,834,137			10/3/2018		40.80	38.47	6.00		
		HSCNew-NMP-09C-4	3,149,511	13,834,149			10/3/2018		40.60	38.36	6.50		
NMP-10	HSCNew-NMP-10	HSCNew-NMP-10A-1	3,147,880	13,836,082			10/2/2018		39.00	37.39	7.00		1260+00
		HSCNew-NMP-10A-2	3,147,882	13,836,063			10/2/2018		38.50	36.92	7.50		
		HSCNew-NMP-10A-3	3,147,894	13,836,050			10/2/2018		38.00	36.44	8.00		
		HSCNew-NMP-10A-4	3,147,894	13,836,063	29 44 31.028	95 16 58.166	10/2/2018		38.00	36.44	8.00		
		HSCNew-NMP-10C-1	3,147,863	13,836,670			10/2/2018		35.40	33.59	11.00		
		HSCNew-NMP-10C-2	3,147,862	13,836,675			10/2/2018		35.90	34.22	10.50		
NMP-11	HSCNew-NMP-11	HSCNew-NMP-11A-1	3,145,331	13,838,513			10/2/2018		33.50	31.30	14.00		024+00
		HSCNew-NMP-11A-2	3,145,340	13,838,513			10/2/2018		33.50	31.36	14.00		
		HSCNew-NMP-11C-1	3,145,773	13,839,568			10/2/2018		35.10	33.05	11.50		
		HSCNew-NMP-11C-2	3,145,774	13,839,559			10/2/2018		35.20	33.20	11.50		
		HSCNew-NMP-11C-3	3,145,774	13,839,567			10/2/2018		35.10	33.20	11.50		

Notes: (1): Coordinates reported in NAD83 State Plane, Texas South Central, US Feet
(2): All stationing shown are Houston Ship Channel (HSC) stations.

Table 2: Water Sampling Locations and Parameters
Houston Ship Channel - North of Morgan's Point
Houston Ship Channel, TX

Sample Locations	Sample ID	Coordinates[1]		Coordinates		Date	Sample Start Time	Sample End Time	Water Depth (ft)	Sample Depth (ft)	Water Parameters		Time Sample placed in Refrigerated Truck	Comment	Authorized Channel Depth MLLW (ft)	Channel Station[2]
		X - Easting (ft)	Y -Northing (ft)	LAT	LONG											
NMP-01	HSCNew-NMP-01-SW	3,209,747	13,844,644			10/22/18	10:00	10:25	8.0	4.0	Temp (°C): Salinity (ppt): pH: Conductivity (mS/cm): ORP (mV): Turbidity (NTU): Dissolved Oxygen (mg/L): Air Temp (°F): Wind Speed:	19.28 4.03 7.62 7.301 45.3 9.0 4.57 57.9 6 mph NNE	15:00			500+00
NMP-02	HSCNew-NMP-02-SW	3,190,661	13,835,567			10/22/18	10:02	10:16	7.9	3.5	Temp (°C): Salinity (ppt): pH: Conductivity (mS/cm): ORP (mV): Turbidity (NTU): Dissolved Oxygen (mg/L): Air Temp (°F): Wind Speed:	22.84 4.59 7.56 8.123 -7.6 8.0 4.61 56.0 6 mph NE	15:00			720+00
NMP-03	HSCNew-NMP-03-SW	3,185,287	13,837,835			10/22/18	10:53	11:28	30.2	15.0	Temp (°C): Salinity (ppt): pH: Conductivity (mS/cm): ORP (mV): Turbidity (NTU): Dissolved Oxygen (mg/L): Air Temp (°F): Wind Speed:	19.93 3.93 7.72 7.050 50.1 8.2 5.63 59.0 6 mph N	15:00	*Field Duplicate Collected* Sample ID: HSCNew-NMP-03-SW-Dup		800+00
NMP-04	HSCNew-NMP-04-SW	3,177,594	13,837,940			10/22/18	10:30	11:00	25.3	12.5	Temp (°C): Salinity (ppt): pH: Conductivity (mS/cm): ORP (mV): Turbidity (NTU): Dissolved Oxygen (mg/L): Air Temp (°F): Wind Speed:	22.74 3.61 7.62 6.587 -41.6 8.4 4.50 58.0 5 mph NNE	15:00			915+00
NMP-05	HSCNew-NMP-05-SW	3,171,799	13,832,335			10/22/18	12:00	12:21	31.0	15.5	Temp (°C): Salinity (ppt): pH: Conductivity (mS/cm): ORP (mV): Turbidity (NTU): Dissolved Oxygen (mg/L): Air Temp (°F): Wind Speed:	19.68 2.84 7.82 5.221 48.5 8.6 3.68 64.0 5 mph NNE	15:00			970+00

Table 2: Water Sampling Locations and Parameters
Houston Ship Channel - North of Morgan's Point
Houston Ship Channel, TX

Sample Locations	Sample ID	Coordinates[1]		Coordinates		Date	Sample Start Time	Sample End Time	Water Depth (ft)	Sample Depth (ft)	Water Parameters		Time Sample placed in Refrigerated Truck	Comment	Authorized Channel Depth MLLW (ft)	Channel Station[2]
		X - Easting (ft)	Y -Northing (ft)	LAT	LONG											
NMP-06	HSCNew-NMP-06-SW	3,157,170	13,830,865			10/22/18	11:25	11:50	10.3	5.1	Temp (°C): Salinity (ppt): pH: Conductivity (mS/cm): ORP (mV): Turbidity (NTU): Dissolved Oxygen (mg/L): Air Temp (°F): Wind Speed:	22.87 1.76 7.59 3.345 -23.4 9.8 4.02 61.0 2 mph NNE	15:00			1115+00

Table 2: Water Sampling Locations and Parameters
Houston Ship Channel - North of Morgan's Point
Houston Ship Channel, TX

Sample Locations	Sample ID	Coordinates[1]		Coordinates		Date	Sample Start Time	Sample End Time	Water Depth (ft)	Sample Depth (ft)	Water Parameters		Time Sample placed in Refrigerated Truck	Comment	Authorized Channel Depth MLLW (ft)	Channel Station[2]
		X - Easting (ft)	Y -Northing (ft)	LAT	LONG											
NMP-07	HSCNew-NMP-07-SW	3,151,909	13,829,784			10/22/18	12:40	13:04	20.2	10.0	Temp (°C): Salinity (ppt): pH: Conductivity (mS/cm): ORP (mV): Turbidity (NTU): Dissolved Oxygen (mg/L): Air Temp (°F): Wind Speed:	19.43 1.18 8.06 2.289 62.0 9.5 3.55 66.0 6 mph NNE	15:00			1160+00
NMP-08	HSCNew-NMP-08-SW	3,150,587	13,831,357			10/22/18	12:00	12:25	40.2	20.1	Temp (°C): Salinity (ppt): pH: Conductivity (mS/cm): ORP (mV): Turbidity (NTU): Dissolved Oxygen (mg/L): Air Temp (°F): Wind Speed:	23.08 1.81 7.47 3.476 -30.2 7.6 3.56 62.0 2 mph NNE	15:00			1200+00
NMP-09	HSCNew-NMP-09-SW	3,149,158	13,833,963			10/22/18	13:10	13:30	40.1	20.0	Temp (°C): Salinity (ppt): pH: Conductivity (mS/cm): ORP (mV): Turbidity (NTU): Dissolved Oxygen (mg/L): Air Temp (°F): Wind Speed:	20.24 2.32 7.71 4.458 55.0 12.1 2.74 64.0 5 mph NNE	15:00			1230+00
NMP-10	HSCNew-NMP-10-SW	3,148,043	13,836,483			10/22/18	12:30	12:55	32.6	16.0	Temp (°C): Salinity (ppt): pH: Conductivity (mS/cm): ORP (mV): Turbidity (NTU): Dissolved Oxygen (mg/L): Air Temp (°F): Wind Speed:	23.09 1.80 7.50 3.440 -32.0 12.9 3.93 64.0 0 mph	15:00			1260+00
NMP-11	HSCNew-NMP-11-SW	3,145,766	13,839,567			10/22/18	13:40	14:00	40.3	20.1	Temp (°C): Salinity (ppt): pH: Conductivity (mS/cm): ORP (mV): Turbidity (NTU): Dissolved Oxygen (mg/L): Air Temp (°F): Wind Speed:	19.50 1.13 7.91 2.370 45.4 26.3 3.89 65.0 6 mph NNE	15:00			024+00

Table 2: Water Sampling Locations and Parameters
Houston Ship Channel - North of Morgan's Point
Houston Ship Channel, TX

Sample Locations	Sample ID	Coordinates[1]		Coordinates		Date	Sample Start Time	Sample End Time	Water Depth (ft)	Sample Depth (ft)	Water Parameters	Time Sample placed in Refrigerated Truck	Comment	Authorized Channel Depth MLLW (ft)	Channel Station[2]
		X - Easting (ft)	Y -Northing (ft)	LAT	LONG										
N/A	HSCNew-NMP-EQB	N/A	N/A	N/A	N/A	10/22/18	9:00	9:20	N/A	N/A	N/A	15:00	Water Sample Equipment Blank		N/A

Notes: (1) Coordinates reported in NAD83 State Plane, Texas South Central, US Feet.

(2) All stationing shown are Houston Ship Channel (HSC) stations.

TABLE 3.1 - STRATIGRAPHY HSCNew-NMP-01
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)
HSCNew-NMP-01AH3-1	10/06/18	1230	-33.0	5.5	5.3	1	0'-5.5 Silt, with sand	none	none	black and dark gray	none	3,209,399	13,844,992
HSCNew-NMP-01AH3-2	10/06/18	1300	-36.1	5.5	4.3	1	0'-3' Silt	none	none	black and dark gray	none	3,209,391	13,845,001
			-41.6				3'-5.5' Sand, loose with silt	none	none	gray	none		
HSCNew-NMP-01AH3-3	10/06/18	1315	-36.1	5.0	4.5	1	0' to 5' Silt	none	none	black and dark gray	none	3,209,382	13,844,988
HSCNew-NMP-01AH3-4	10/06/18	1345	-35.1	6.5	5.5	1	0'-6.5' Silt	none	none	black and dark gray	none	3,209,370	13,844,967

FOOTNOTES:

(a) See lithologic logs in Appendix A – Field Forms, Lithologic Logs for specific details.
(b) Date when work started on the sub-sample location.
(c) Time when work started on the sub-sample location.
(d) Core length represents the depth 4" CME sampler was augered or split-spoons were driven.
(e) Recovery is the measured length of the sediments, which may be compacted, not the depth the sampler was driven.
(f) Strength (ton/square foot) is not accurate due to sampling method.

NA = Not Applicable
ft. = feet
MLLW = mean lower low water

TABLE 3.2 - STRATIGRAPHY HSCNew-NMP-02
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)
HSCNew-NMP-02A-1	10/06/18	1045	-34.7	10.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,190,670	13,835,075
		1100	-44.7	5	5	1	10'-15' Silt	---	---	black	none		
HSCNew-NMP-02A-2	10/06/18	1100	-34.2	10.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,190,674	13,835,065
		1130	44.2	5.5	5	1	10'-15.5' Silt	---	---	black	none		
HSCNew-NMP-02C-1	10/06/18	0915	-16.1	11	0	1	Sample no representative of dredge prism	---	---	---	---	3,190,740	13,835,560
			-27.1	5	5	1	11'-16' Sandy Clay, very soft with shell fragments	0.227	low	gray	none		
			-32.1	5	5	1	16'-21' Sandy Clay, hard	1.09	low	light gray	none		
			-37.1	5	5	1	21'-26' Clay, hard with calcareous and ferrous nodules	0.818	low	gray and reddish brown	none		
			-42.1	5	5	1	26'-31' Clay, with gravel	1.09	low	red	none		
		1015	-47.1	2.5	2.5	1	31'-33.5' Clay, with gravel	---	low	red	none		

FOOTNOTES:

(a) See lithologic logs in Appendix A – Field Forms, Lithologic Logs for specific details.
(b) Date when work started on the sub-sample location.
(c) Time when work started on the sub-sample location.
(d) Core length represents the depth 4" CME sampler was augered or split-spoons were driven.
(e) Recovery is the measured length of the sediments, which may be compacted, not the depth the sampler was driven.
(f) Strength (ton/square foot) is not accurate due to sampling method.

NA = Not Applicable
ft. = feet
MLLW = mean lower low water

TABLE 3.3 - STRATIGRAPHY HSCNew-NMP-03
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)
HSCNew-NMP-03A-1	10/05/18	1430	-31.2	5.0	3.0	1	0'-5' Sand and Clayey Sand with plastic trash	none	none	gray	none	3,185,272	13,837,839
			-36.2	5.0	5.0	1	5'-10' Clay, stiff to hard with calcarous nodules	0.40	low	greenish gray and brown	none		
			-41.2	5.0	3.3	1	10'-15' Clay, stiff to hard with sand	0.90	low	light gray	none		
		1530	-46.2	2.0	0.7	1	15'-18' Clay, stiff to hard with calcareous nodules	---	low	reddish brown	none		
HSCNew-NMP-03C-1	10/05/18	1600	-22	2	1	1	0'-2' Sand, loose with silt and clay	none	none	gray	none	3,185,164	13,838,758
			-24	5	2	1	2'-7' Sand, loose with silt and clay	none	none	gray	none		
			-29	5	2	1	12' Clayey Sand, loose with shell fragme	none	none	gray	none		
			-34	5	3	1	12'-17' Sand, loose	none	none	gray	none		
			-39	5	5	1	17'-22' Clay, stiff	0.59	low	reddish brown and gray	none		
		1700	-44	5	4	1	22'-27' Clay, hard	1.09	low	red and yellowish red	none		
HSCNew-NMP-03A-1 (DUP)	10/05/18	0800	-30.6	5	2.5	1	0'-5' Silty Sand, loose	---	---	dark gray	none	3,185,291	13,837,849
			-35.6	5	5	1	5'-10' Clay, very stiff with silt	0.7727	low	dark gray	none		
			-40.6	5	2.5	1	10'-15' Clay, stiff to very stiff	0.5454	low	light gray	none		
		0845	-45.6	4	4	1	15'-24' Clay, stiff to very stiff	0.7272	low	brown and greenish gray	none		
HSCNew-NMP-03C-1 (DUP)	10/05/18	1700	-19.7	4	2	1	0'-4' Silt, with sand	---	---	black	none	3,185,164	13,838,762
			-23.7	5	5	1	4'- 9' Sand	---	---	gray	none		
			-28.7	5	2	1	9'-14' Sand	---	---	gray	none		
			-33.7	5	4.5	1	14'-19' Sand	---	---	gray	none		
			-38.7	5	3	1	19'-24' Sand	---	---	gray	none		
		1800	-43.7	4	3.5	1	24'-28' Sand	---	---	gray	none		

FOOTNOTES:

(a) See lithologic logs in Appendix A – Field Forms, Lithologic Logs for specific details.
(b) Date when work started on the sub-sample location.
(c) Time when work started on the sub-sample location.
(d) Core length represents the depth 4" CME sampler was augered or split-spoons were driven.
(e) Recovery is the measured length of the sediments, which may be compacted, not the depth the sampler was driven.
(f) Strength (ton/square foot) is not accurate due to sampling method.

NA = Not Applicable
ft. = feet
MLLW = mean lower low water

TABLE 3.4 - STRATIGRAPHY HSCNew-NMP-04
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)
HSCNew-NMP-04A-1	10/05/18	1000	-30.5	14.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,177,578	13,837,883
		1015	-44.5	5.0	4.0	1	14'-19' Silt, Sand, and Clay	0.77	low	black, gray, and red	none		
HSCNew-NMP-04A-2	10/05/18	1030	-37.7	7.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,177,560	13,837,887
		1045	-44.7	5.0	4.0	1	7'-12' Silt, with sand	---	---	black	none		
HSCNew-NMP-04C-1	10/05/18	1100	-43.3	1.5	0	1	Sample no representative of dredge prism	---	---	---	---	3,177,446	13,838,353
		1115	-44.8	5	2.5	1	1.5'-6.5' Silt, with clay	---	---	black	none		
HSCNew-NMP-04C-2	10/05/18	1130	-43.4	1.5	0	1	Sample no representative of dredge prism	---	---	---	---	3,177,448	13,838,374
		1145	-44.9	5	5	1	1.5'-6.5' Silt, with clay	---	---	black	none		
HSCNew-NMP-04C-3	10/05/18	1200	-43	1.5	0	1	Sample no representative of dredge prism	---	---	---	---	3,177,473	13,838,383
		1215	-44.5	5	1.5	1	1.5'-6.5' Silt, with hydrocarbons sheen	---	---	black	none		
HSCNew-NMP-04C-4	10/05/18	1230	-43	1	0	1	Sample no representative of dredge prism	---	---	---	---	3,177,493	13,838,377
		1245	-44	5	5	1	---	---	---	---	---		
HSCNew-NMP-04C-5	10/05/18	1315	-43.7	1	0	1	Sample no representative of dredge prism	---	---	---	---	3,177,357	13,838,356
		1345	-44.7	5	5	1	1'-6' Silt, with very stiff clay	---	---	black	none		

FOOTNOTES:

(a) See lithologic logs in Appendix A – Field Forms, Lithologic Logs for specific details.
(b) Date when work started on the sub-sample location.
(c) Time when work started on the sub-sample location.
(d) Core length represents the depth 4" CME sampler was augered or split-spoons were driven.
(e) Recovery is the measured length of the sediments, which may be compacted, not the depth the sampler was driven.
(f) Strength (ton/square foot) is not accurate due to sampling method.

NA = Not Applicable
ft. = feet
MLLW = mean lower low water

TABLE 3.5 - STRATIGRAPHY HSCNew-NMP-05
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)
HSCNew-NMP-05A-1	10/05/18	0730	-37.7	8.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,171,789	13,832,332
		0800	-45.7	4.0	4.0	1	8'-12' Silt with clay	---	---	black and dark gray	none		
HSCNew-NMP-05A-2	10/05/18	0815	-39.5	8.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,171,785	13,832,337
		0830	-47.5	4.0	4.0	1	8'-12' Silt with clay	---	---	black and dark gray	none		
HSCNew-NMP-05A-3	10/05/18	0845	-40.5	5.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,171,778	13,832,329
		0900	-45.5	4.0	4.0	1	5'-9' Silt with clay	---	---	black and dark gray	none		
HSCNew-NMP-05C-1	10/04/18	1215	-11.5	33.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,171,351	13,832,522
		1315	-44.5	5.0	2.5	1	33'-38' Clay, hard with sand	2.0	low	gray and red	none		
HSCNew-NMP-05C-2	10/04/18	1330	-14.1	30.5	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,171,367	13,832,517
		1430	-44.6	5.0	4.8	1	30.5'-33.0' Sand with clay pockets	---	---	brown and red	none		
			-49.6				33.0'-35.5' Clay with cemented nodules	1.7	low	red and light gray	none		
HSCNew-NMP-05C-3	10/04/18	1500	-19.5	25.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,171,393	13,832,512
		1530	-44.5	5.0	3.0	1	25'-30' Sand, fine-grained	---	---	red and gray	none		

FOOTNOTES:

(a) See lithologic logs in Appendix A – Field Forms, Lithologic Logs for specific details.
(b) Date when work started on the sub-sample location.
(c) Time when work started on the sub-sample location.
(d) Core length represents the depth 4" CME sampler was augered or split-spoons were driven.
(e) Recovery is the measured length of the sediments, which may be compacted, not the depth the sampler was driven.
(f) Strength (ton/square foot) is not accurate due to sampling method.

NA = Not Applicable
ft. = feet
MLLW = mean lower low water

TABLE 3.6 - STRATIGRAPHY HSCNew-NMP-06
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)
HSCNew-NMP-06A-1	10/04/18	0945	-27.4	14.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,157,010	13,830,360
		1015	-41.4	3.0	3.0	1	14'-17' Silt with organic matter	---	---	black and gray	none		
HSCNew-NMP-06A-2	10/04/18	1015	-34.5	7.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,156,997	13,830,374
		1030	-41.5	3.0	3.0	1	7'-10' Silt with clay	---	---	black and dark gray	none		
HSCNew-NMP-06A-3	10/04/18	1030	-36.7	5.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,156,993	13,830,383
		1045	-41.7	3.0	3.0	1	5'-9' Silt with clay and organic matter	---	---	black and dark gray	none		
HSCNew-NMP-06C-1	10/04/18	0745	-11.6	29.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,157,267	13,830,791
		0830	-40.6	4.0	4.0	1	29'-33' Clayey Sand with sandy clay	---	---	yellowish red	none		
HSCNew-NMP-06C-2	10/04/18	0845	-12.0	29.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,157,252	13,830,786
		0930	-41.0	4.0	4.0	1	29'-33' Sandy Clay with sand	0.95	low	yellowish red	none		

FOOTNOTES:
(a) See lithologic logs in Appendix A – Field Forms, Lithologic Logs for specific details.
(b) Date when work started on the sub-sample location.
(c) Time when work started on the sub-sample location.
(d) Core length represents the depth 4" CME sampler was augered or split-spoons were driven.
(e) Recovery is the measured length of the sediments, which may be compacted, not the depth the sampler was driven.
(f) Strength (ton/square foot) is not accurate due to sampling method.

NA = Not Applicable
ft. = feet
MLLW = mean lower low water

TABLE 3.7 - STRATIGRAPHY HSCNew-NMP-07
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)
HSCNew-NMP-07A-1	10/02/18	0800	-32.5	4.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,151,931	13,829,808
			-36.5	5	3.8	1	4'-9' Silt Sand with organic matter	1.05	---	black, dark gray and brown	none		
		845	-41.5	5	3	1	9'-14' Clay, stiff with sand	0.409	low	red	none		
HSCNew-NMP-07(ALT1-1)	10/03/18	1315	-19.4	21.5	0	1	Sample no representative of dredge prism	---	---	---	---	3,151,936	13,829,813
		1345	-40.9	4	4	1	21.5'-23.5' Silt with clay	---	---	black	none		
			-44.9	-	-	-	23.5'-25.5' Silty Sand, loose	---	---	black, brown, and gray	none		
HSCNew-NMP-07(ALT1-2)	10/03/18	1400	-20.2	20.5	0	1	Sample no representative of dredge prism	---	---	---	---	3,151,936	13,829,809
		1415	-40.7	4	4	1	20.5'-22' Silt, very soft, with clay and organic material	---	---	black and dark gray	none		
		1415	-44.7	-	-	-	22'-24.5' Silty Sand, loose	---	---	black, brown, and gray	none		
HSCNew-NMP-07(ALT1-3)	10/03/18	1430	-19.8	21	0	1	Sample no representative of dredge prism	---	---	---	---	3,151,924	13,829,798
		1500	-40.8	4	4	1	21'-23' Silt with clay	---	---	black	none		
			-44.8	-	-	-	23'-25' Silt Sand, loose	---	---	gray and brown	none		
HSCNew-NMP-07(ALT1-4)	10/03/18	1515	-19.7	21	0	1	Sample no representative of dredge prism	---	---	---	---	3,151,916	13,829,792
		1530	-40.7	4	4	1	21'-22' Silt with organic matter	---	---	black and dark gray	none		
			-44.7	-	-	-	22'-25' Silt Sand, loose with organic matter	---	---	gray and dark gray	none		
HSCNew-NMP-07(ALT1-5)	10/03/18	1530	-19.4	21	0	1	---	---	---	---	---	3,151,921	13,829,775
		1600	-40.4	4	4	1	21'-24' Silt with sand and clay	---	---	black and dark gray	none		
			-44.4	-	-	-	24'-25' Sand with silt	---	---	gray	none		

FOOTNOTES:

(a) See lithologic logs in Appendix A – Field Forms, Lithologic Logs for specific details.
(b) Date when work started on the sub-sample location.
(c) Time when work started on the sub-sample location.

NA = Not Applicable
ft. = feet
MLLW = mean lower low water

TABLE 3.7 - STRATIGRAPHY HSCNew-NMP-07
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)

(d) Core length represents the depth 4" CME sampler was augered or split-spoons were driven.
(e) Recovery is the measured length of the sediments, which may be compacted, not the depth the sampler was driven.
(f) Strength (ton/square foot) is not accurate due to sampling method.

TABLE 3.8 - STRATIGRAPHY HSCNew-NMP-08
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)
HSCNew-NMP-08A-1	10/03/18	1115	-14.7	26.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,149,974	13,831,274
		1200	-40.7	4.0	4.0	1	26'-30' Clay, very stiff	1.25	Low	red	---		
HSCNew-NMP-08A-2	10/03/18	1215	-22.1	19.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,150,021	13,831,253
		1245	-41.1	4.0	4.0	1	19'-23' Silt, very soft with little sand and organics	none	none	black and dark gray	petroleum		
HSCNew-NMP-08C-1	10/03/18	0930	-37.7	3.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,150,638	13,831,379
		0945	-40.7	4.0	2.5	1	3'-6' Silt, very soft with organics	0.34	none	black and dark gray	none		
HSCNew-NMP-08C-2	10/03/18	1000	-38.0	2.5	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,150,649	13,831,382
		1015	-40.5	4.0	2.8	1	2.5'-6.5' Clay, very stiff with silt layer	0.91	Low	red	none		
HSCNew-NMP-08C-3	10/03/18	1015	-37.6	3.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,150,637	13,831,389
		1030	-40.6	4.0	4.0	1	3'-7' Sand, with silt at top and clay at bottom	none	none	black and gray	none		
HSCNew-NMP-08C-4	10/03/18	1030	-37.7	3.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,150,629	13,831,393
		1100	-40.7	4.0	2.3	1	3'-7' Clay, very stiff with silt layer at top	1.02	Low	red	none		

FOOTNOTES:

(a) See lithologic logs in Appendix A – Field Forms, Lithologic Logs for specific details.
(b) Date when work started on the sub-sample location.
(c) Time when work started on the sub-sample location.
(d) Core length represents the depth 4" CME sampler was augered or split-spoons were driven.
(e) Recovery is the measured length of the sediments, which may be compacted, not the depth the sampler was driven.
(f) Strength (ton/square foot) is not accurate due to sampling method.

NA = Not Applicable
ft. = feet
MLLW = mean lower low water

TABLE 3.9 - STRATIGRAPHY HSCNew-NMP-09
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)
HSCNew-NMP-09A-1	10/02/18	1600	-38.2	2.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,149,149	13,833,987
		1630	-40.2	4.0	3.3	1	2-5' Silt, very soft with clay		none	black and brown	organic		
			-44.2				5-6' Clay, very stiff	1.25	none	red	organic		
HSCNew-NMP-09A-2	10/02/18	1630	-37.7	3.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,149,153	13,833,975
		1700	-40.7	4.0	3.0	1	3'-7' Clay, very stiff with silt at top	1.48	Low	red	none		
HSCNew-NMP-09A-3	10/02/18	1700	-37.8	2.5	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,149,159	13,833,976
		1715	-40.3	4.0	2.3	1	2.5'-6.5' Clay, very stiff with silt at top	none	Low	red	none		
HSCNew-NMP-09C-1	10/03/18	0715	-38.0	3.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,149,514	13,834,136
		745	-41.0	4.0	3.0	1	3'-7' Silt, very soft with clay at bottom	none	none	dark brown	none		
HSCNew-NMP-09C-2	10/03/18	0745	-38.6	2.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,149,510	13,834,140
		0800	-40.6	4.0	2.5	1	2'-6' Silt, very soft with organics	1.14	none	black and brown	none		
HSCNew-NMP-09C-3	10/03/18	0800	-38.5	2.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,149,513	13,834,137
		0830	-40.5	4.0	2.5	1	2'-6' Silt, very soft with clay at bottom 1.5	1.25	none	black and dark gray	none		
HSCNew-NMP-09C-4	10/03/18	0830	-38.4	2.5	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,149,511	13,834,149
		0845	-40.9	4.0	4.0	1	2'-6' Silt, with organics and very stiff clay at bottom 2'	1.36	none	black and dark gray	none		

FOOTNOTES:

(a) See lithologic logs in Appendix A – Field Forms, Lithologic Logs for specific details.
(b) Date when work started on the sub-sample location.
(c) Time when work started on the sub-sample location.
(d) Core length represents the depth 4" CME sampler was augered or split-spoons were driven.
(e) Recovery is the measured length of the sediments, which may be compacted, not the depth the sampler was driven.
(f) Strength (ton/square foot) is not accurate due to sampling method.

NA = Not Applicable
ft. = feet
MLLW = mean lower low water

TABLE 3.10 - STRATIGRAPHY HSCNew-NMP-10
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)
HSCNew-NMP-10A-1	10/02/18	1415	-37.4	3.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,147,880	13,836,082
		1430	-40.4	4.0	3.0	1	3'-7' Silt, with some clay and trace sand	none	none	black and dark gray	none		
HSCNew-NMP-10A-2	10/02/18	1445	-36.9	3.5	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,148,882	13,836,063
		1500	-40.4	4.0	4.0	1	3.5'-7.5' Silt, very soft, with organics	none	none	black and dark gray	organic		
HSCNew-NMP-10A-3	10/02/18	1500	-36.4	4.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,147,894	13,836,050
		1515	-40.4	4.0	3.5	1	4'-8' Silt, with trace clay, sand, and organics	none	none	black and dark gray	none		
HSCNew-NMP-10A-4	10/02/18	1515	-36.4	4.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,147,894	13,836,063
		1530	-40.4	4.0	3.0	1	4'-8' Silt, very soft with trace clay and organics	none	none	black and dark gray	none		
HSCNew-NMP-10C-1	10/02/18	1300	-33.6	7.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,147,863	13,836,670
		1315	-40.6	4.0	4.0	1	7'-9' Silty sand, loose	---	---	dark gray	none		
			-44.6				9'-11' Clay, very stiff	1.14	Low	red	none		
HSCNew-NMP-10C-2	10/02/15	1330	-34.2	6.5	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,147,862	13,836,675
		1345	-40.7	4.0	4.0	1	6.5'-10.5' Clay, very stiff with silty sand on top 1"	1.10	Low	red	none		

FOOTNOTES:

(a) See lithologic logs in Appendix A – Field Forms, Lithologic Logs for specific details.
(b) Date when work started on the sub-sample location.
(c) Time when work started on the sub-sample location.
(d) Core length represents the depth 4" CME sampler was augered or split-spoons were driven.
(e) Recovery is the measured length of the sediments, which may be compacted, not the depth the sampler was driven.
(f) Strength (ton/square foot) is not accurate due to sampling method.

NA = Not Applicable
ft. = feet
MLLW = mean lower low water

TABLE 3.11 - STRATIGRAPHY HSCNew-NMP-11
SUMMARY OF LITHOLOGIC SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

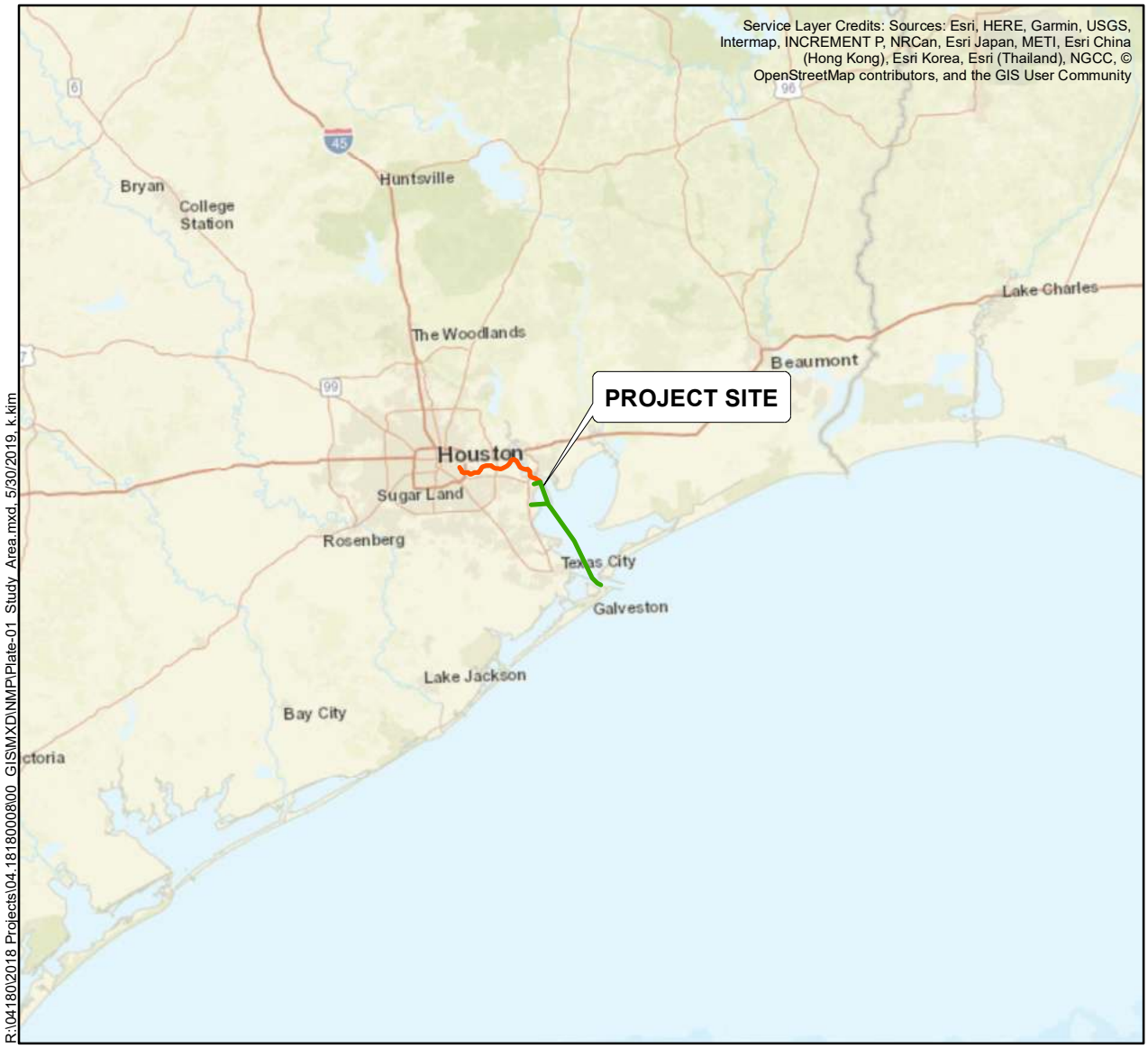
Location Identification [a]	Date [b]	Time [c]	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)[d]	Recovery (ft.) [e]	Total Number of Pushes or Drops	Typical Description	Strength (tons / sq. ft.) [f]	Plasticity	Color	Odor	GPS Coordinates (Actual) NAD83	
												X (ft)	Y (ft)
HSCNew-NMP-11A-1	10/02/18	0730	-31.4	4.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,145,331	13,838,513
		0830	-35.4	5.0	4.3	1	4'-8' Silt, with clay and sand	none	none	black and dark gray	none		
			-40.4	5.0	2.0	1	8'-14' Sand, medium-grained with few organics	none	none	dark gray	none		
HSCNew-NMP-11A-2	10/02/18	0915	-31.3	4.0	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,145,340	13,838,513
		1015	-35.3	5.0	4.3	1	4'-8' Silt, with clay and sand	none	none	black and dark gray	none		
		1030	-40.3	5.0	2.0	1	8'-14' Sand, medium-grained with few organics	none	none	dark gray	none		
HSCNew-NMP-11C-1	10/02/18	1100	-33.1	7.5	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,145,773	13,839,568
		1115	-40.6	4.0	4.0	1	7.5'-8.5' Silty sand, very loose			brown and dark gray	none		
			-44.6			1	8.5'-11.5' Silty clay and clay	1.00	none	red	none		
HSCNew-NMP-11C-2	10/02/18	1130	-33.2	7.5	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,145,774	13,839,559
		1145	-40.7	4.0	4.0	1	7.5'-10' Silty sand	none	none	black, brown, and dark gray	none		
			-44.7			1	10' to 11.5' Clay, very stiff	none	none	red	none		
HSCNew-NMP-11C-3	10/02/18	1200	-33.2	7.5	0.0	1	Sample no representative of dredge prism	---	---	---	---	3,145,774	13,839,567
		1230	-40.7	4.0	2.8	1	7.5'-11' Silty sand, very loose	none	none	brown and dark gray	none		
			-44.7				11' to 11.5' Clay, stiff to very stiff	none	none	red	none		

FOOTNOTES:

(a) See lithologic logs in Appendix A – Field Forms, Lithologic Logs for specific details.
(b) Date when work started on the sub-sample location.
(c) Time when work started on the sub-sample location.
(d) Core length represents the depth 4" CME sampler was augered or split-spoons were driven.
(e) Recovery is the measured length of the sediments, which may be compacted, not the depth the sampler was driven.
(f) Strength (ton/square foot) is not accurate due to sampling method.

NA = Not Applicable
ft. = feet
MLLW = mean lower low water

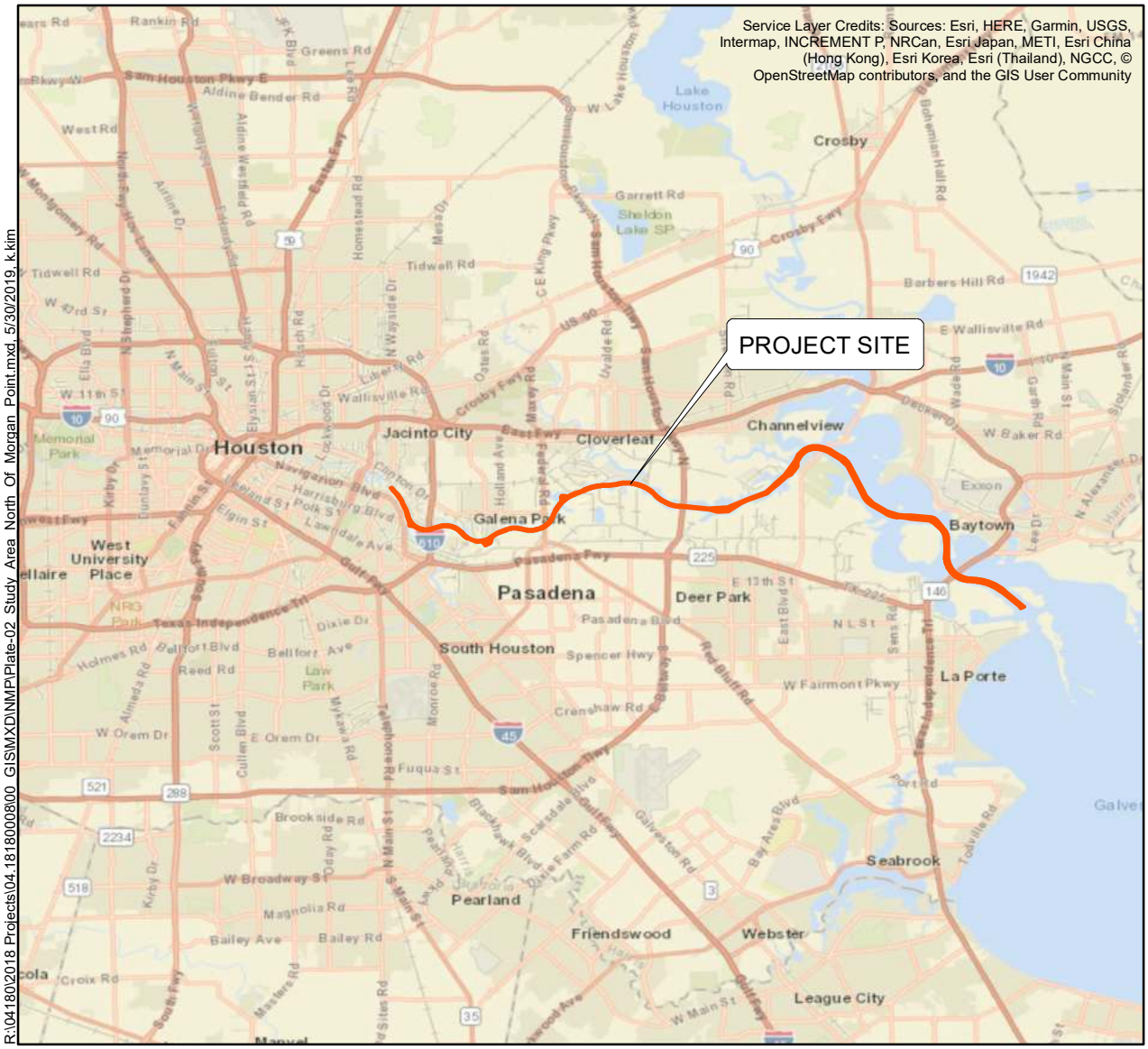
FIGURES



STUDY AREA

HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

PLATE 1



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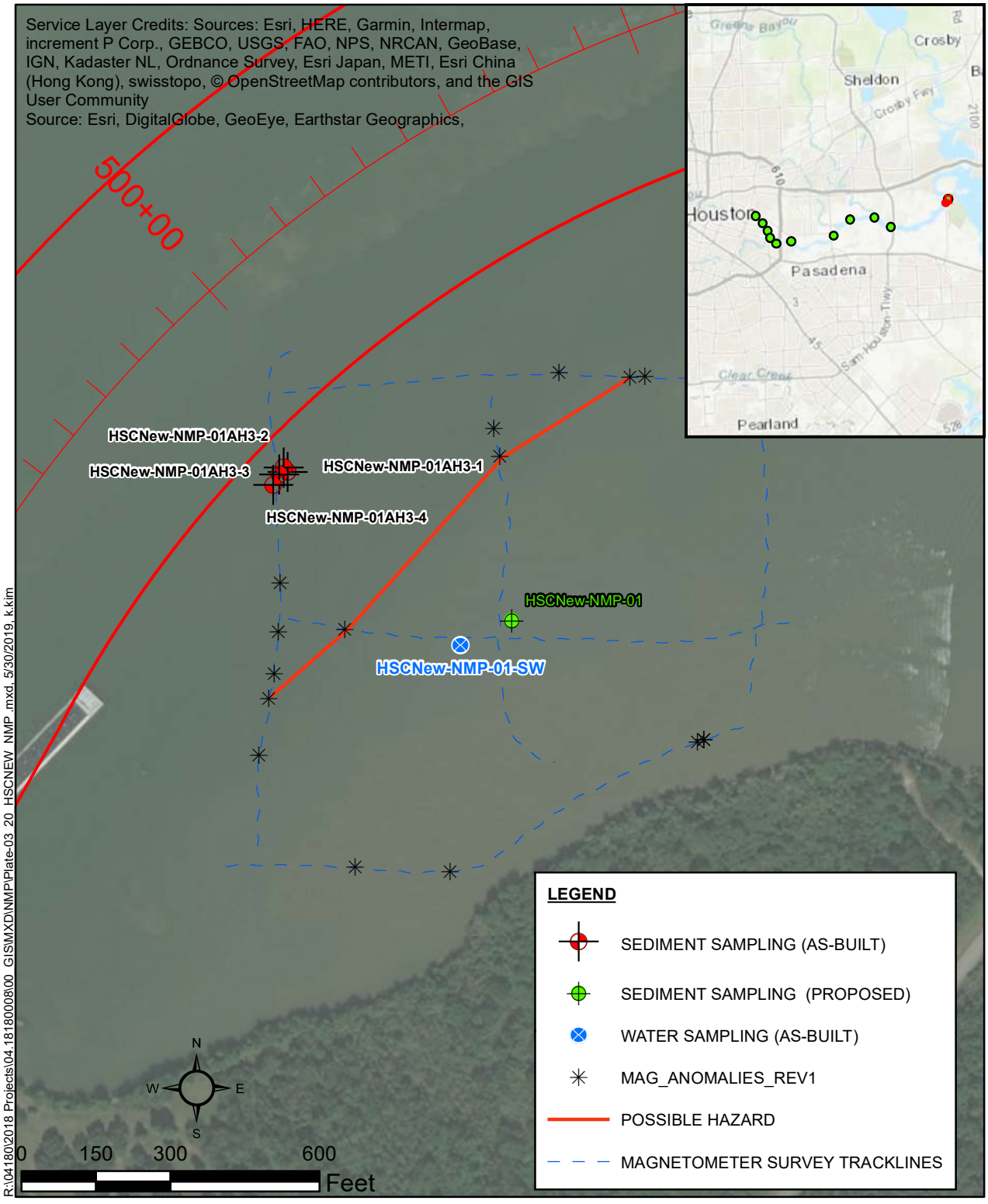
NORTH OF MORGANS POINT STUDY AREA

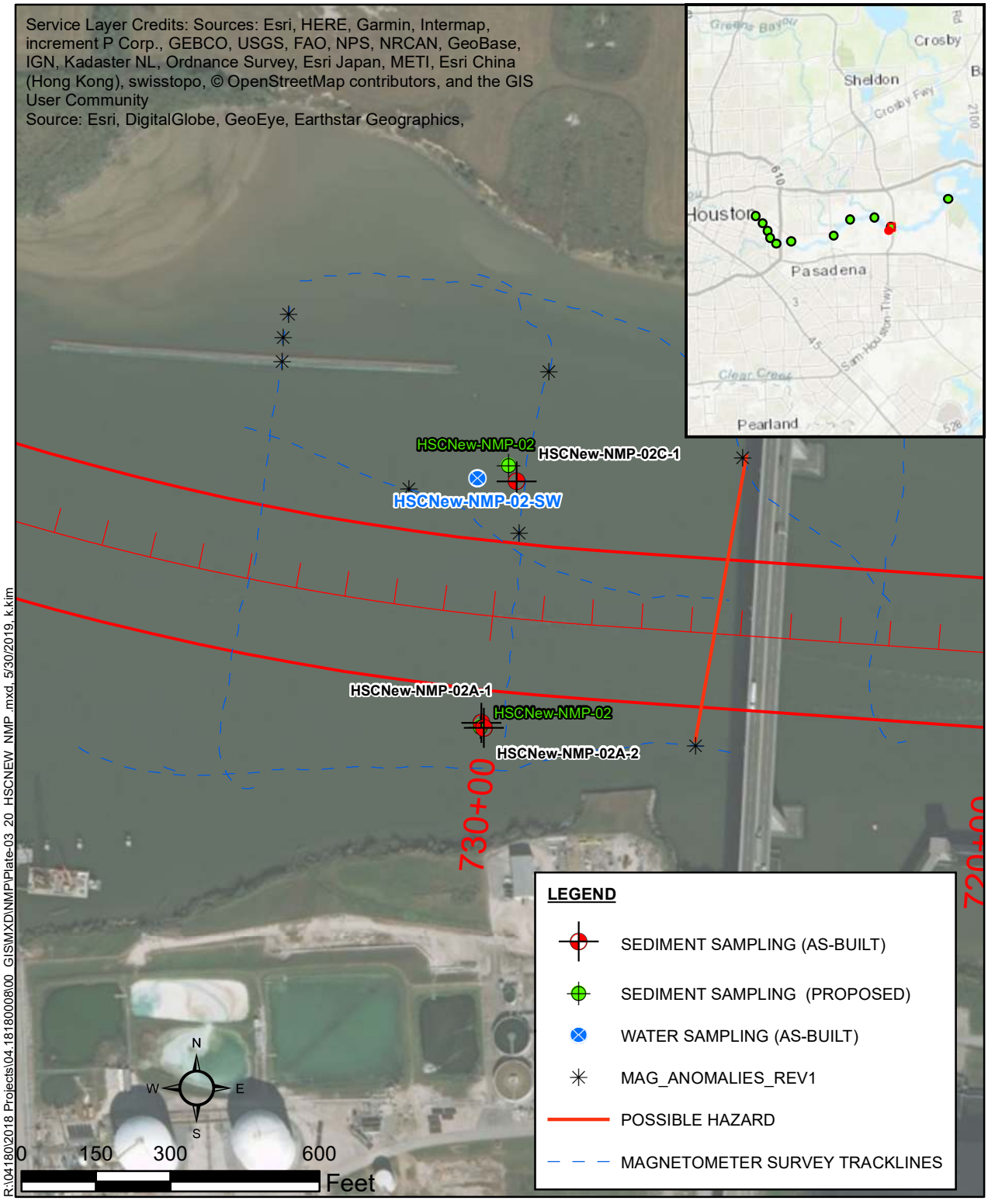
HOUSTON SHIP CHANNEL ECIP

HOUSTON SHIP CHANNEL, TEXAS

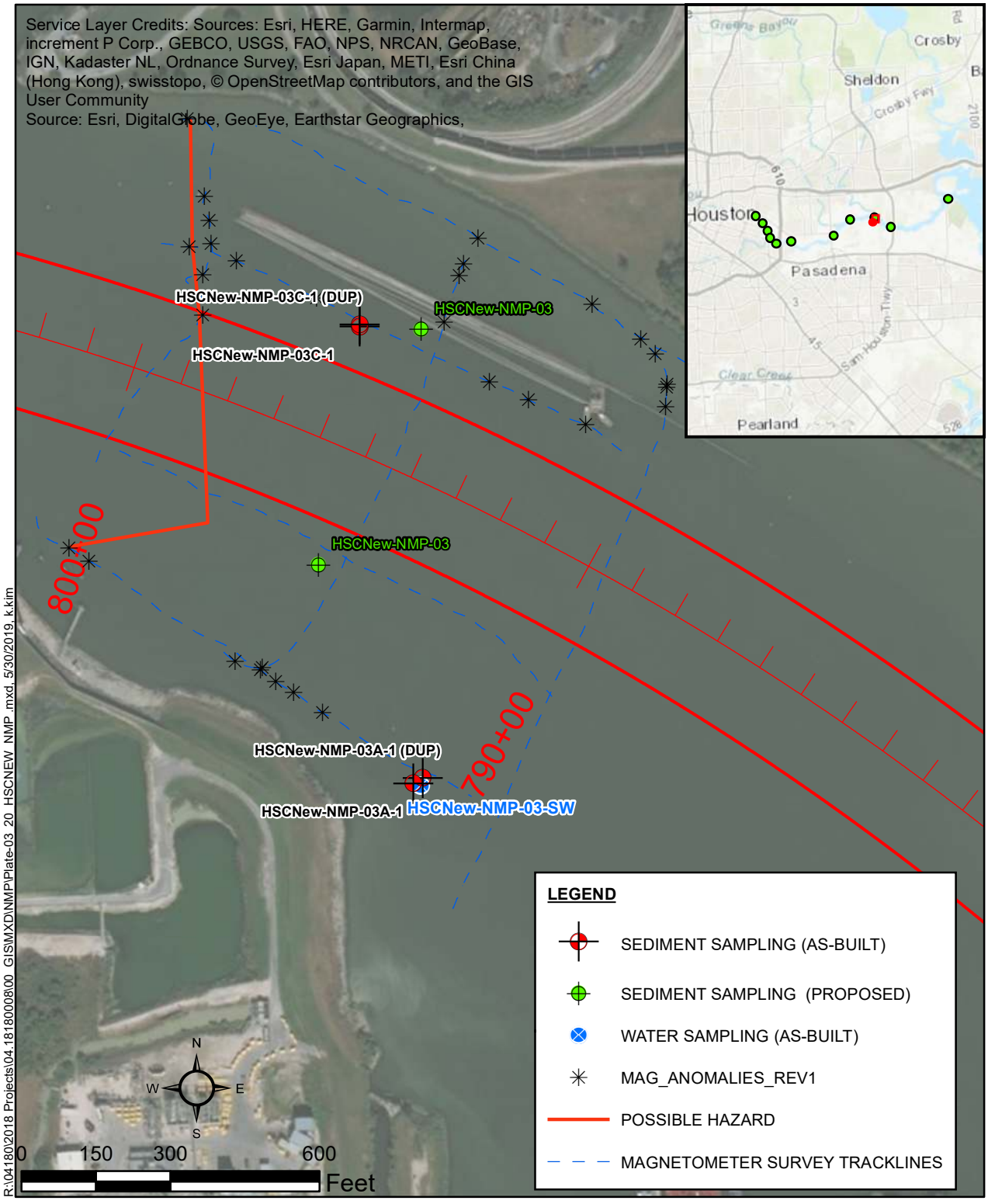
PLATE 2



LOCATION HSCNEW-NMP-01
SEDIMENT AND WATER SAMPLING LOCATIONS
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

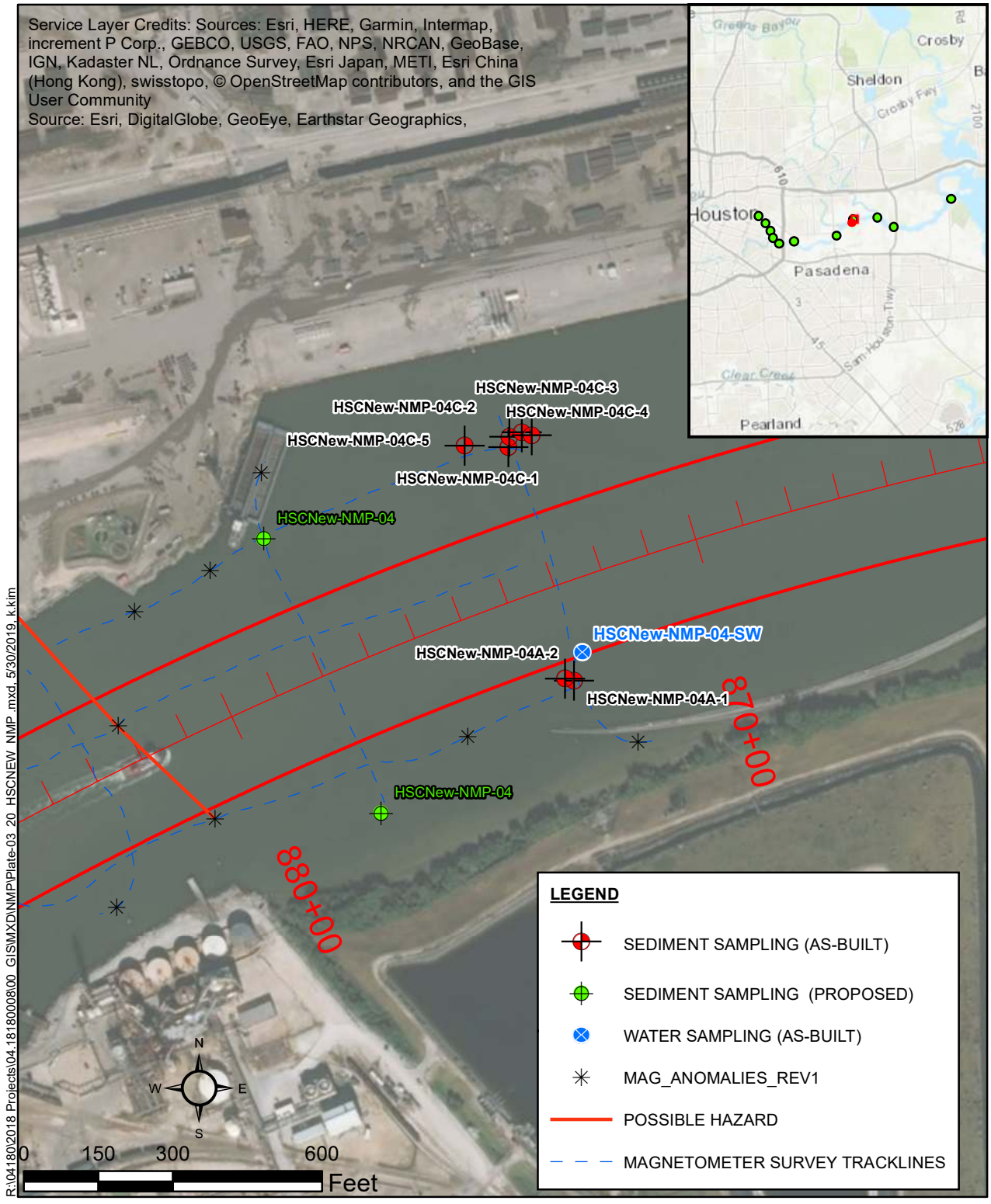


LOCATION HSCNEW-NMP-02
SEDIMENT AND WATER SAMPLING LOCATIONS
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



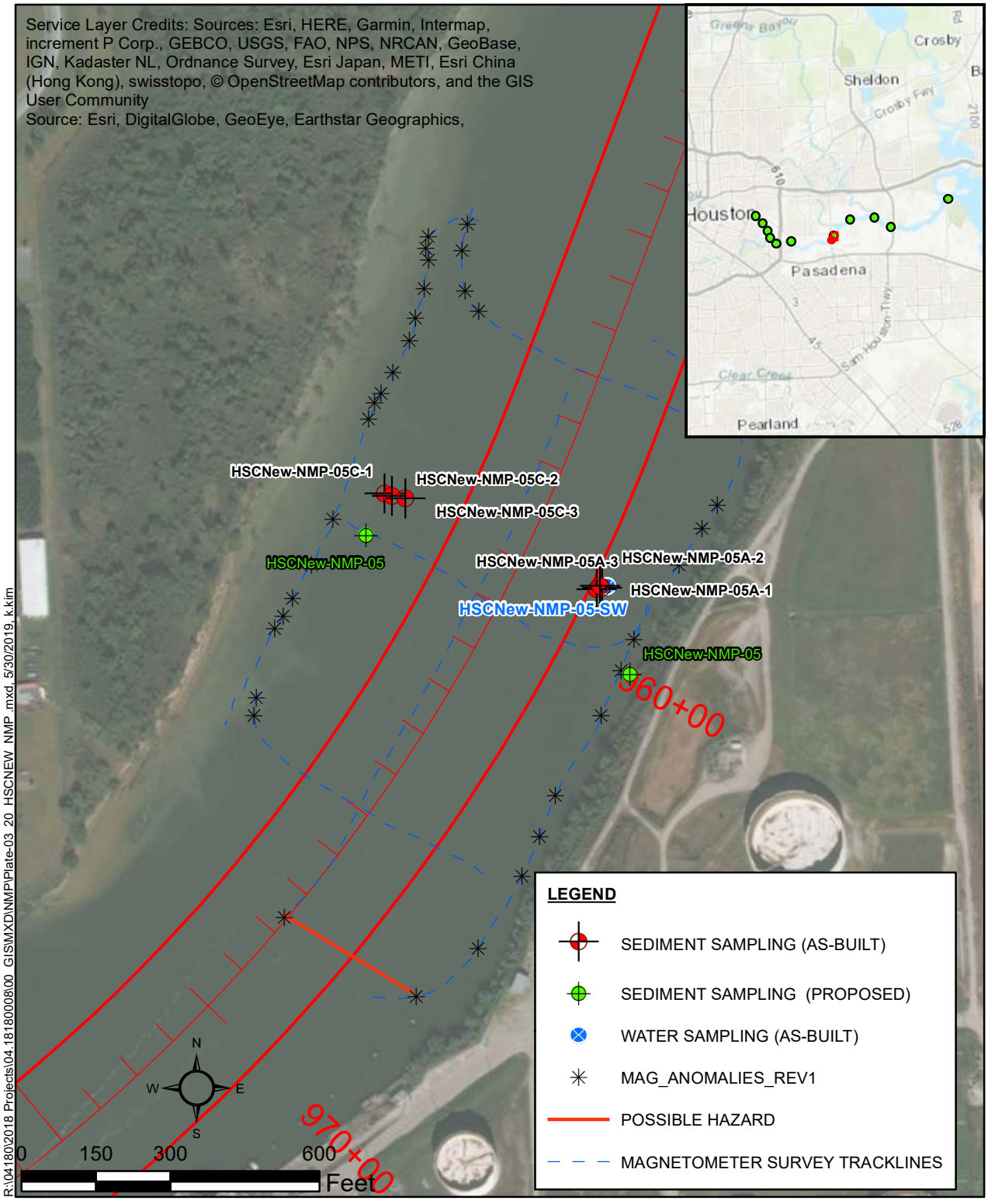
LOCATION HSCNEW-NMP-03
SEDIMENT AND WATER SAMPLING LOCATIONS
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

PLATE 5



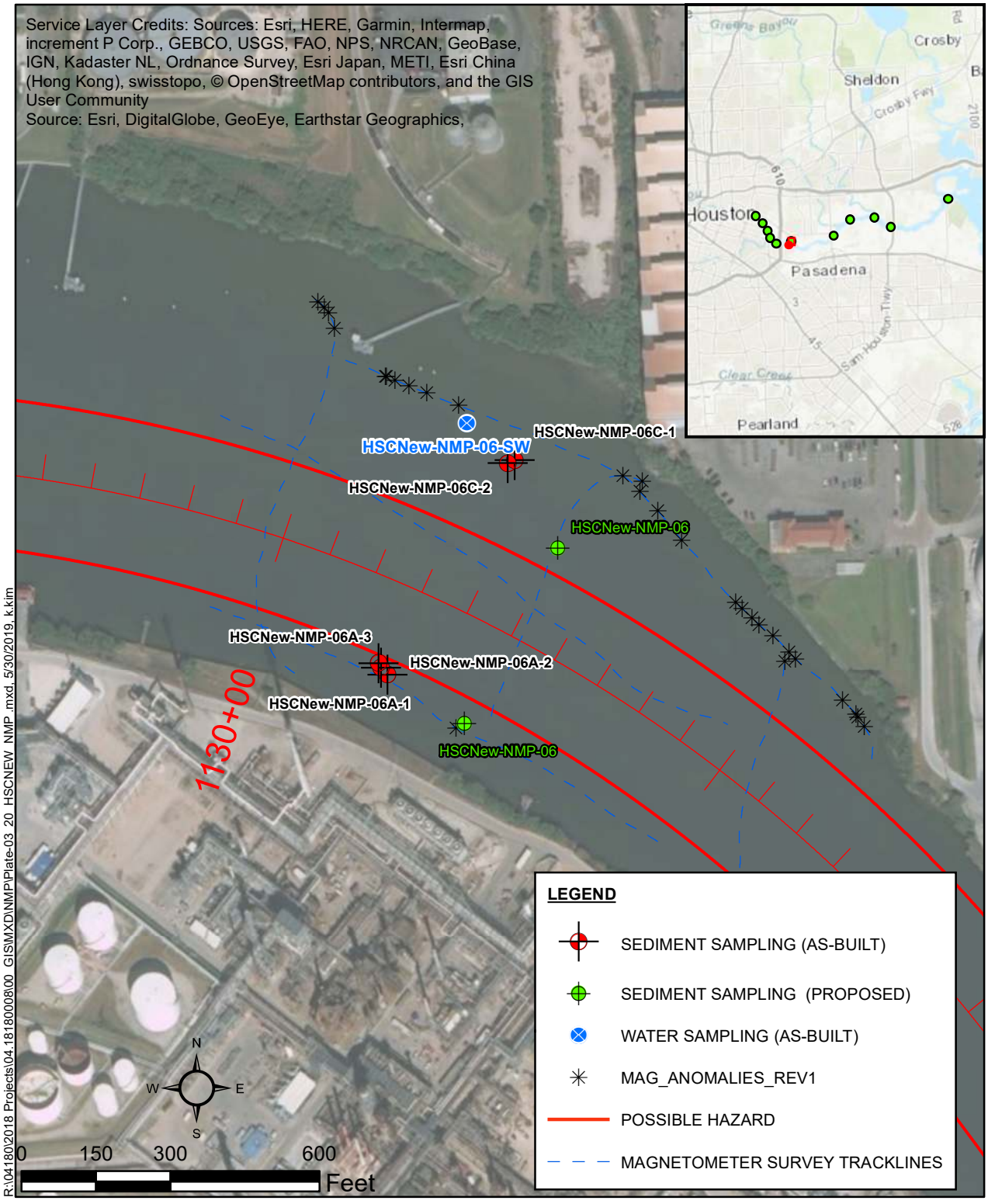
LOCATION HSCNEW-NMP-04
SEDIMENT AND WATER SAMPLING LOCATIONS
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

PLATE 6

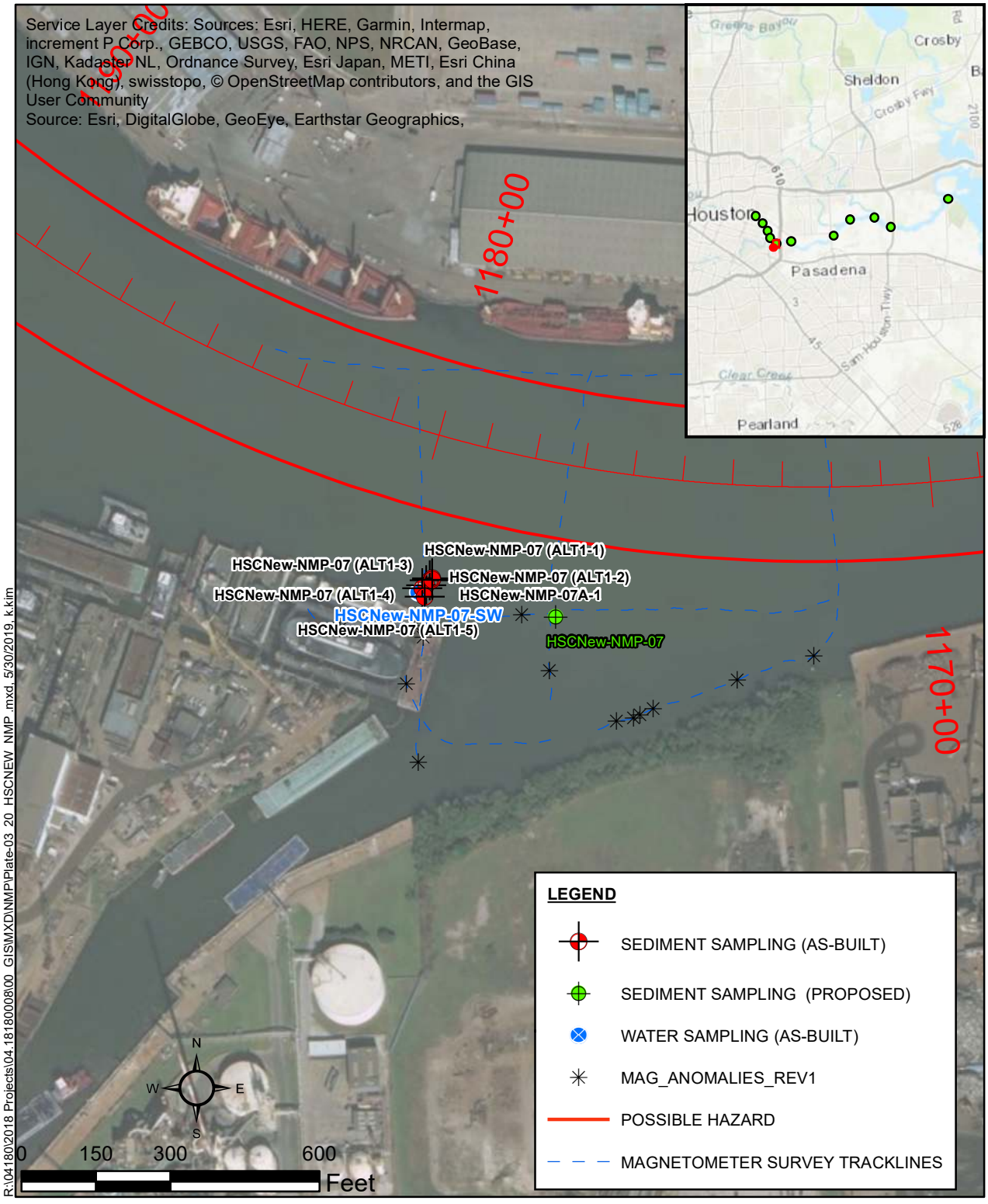


LOCATION HSCNEW-NMP-05
SEDIMENT AND WATER SAMPLING LOCATIONS
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

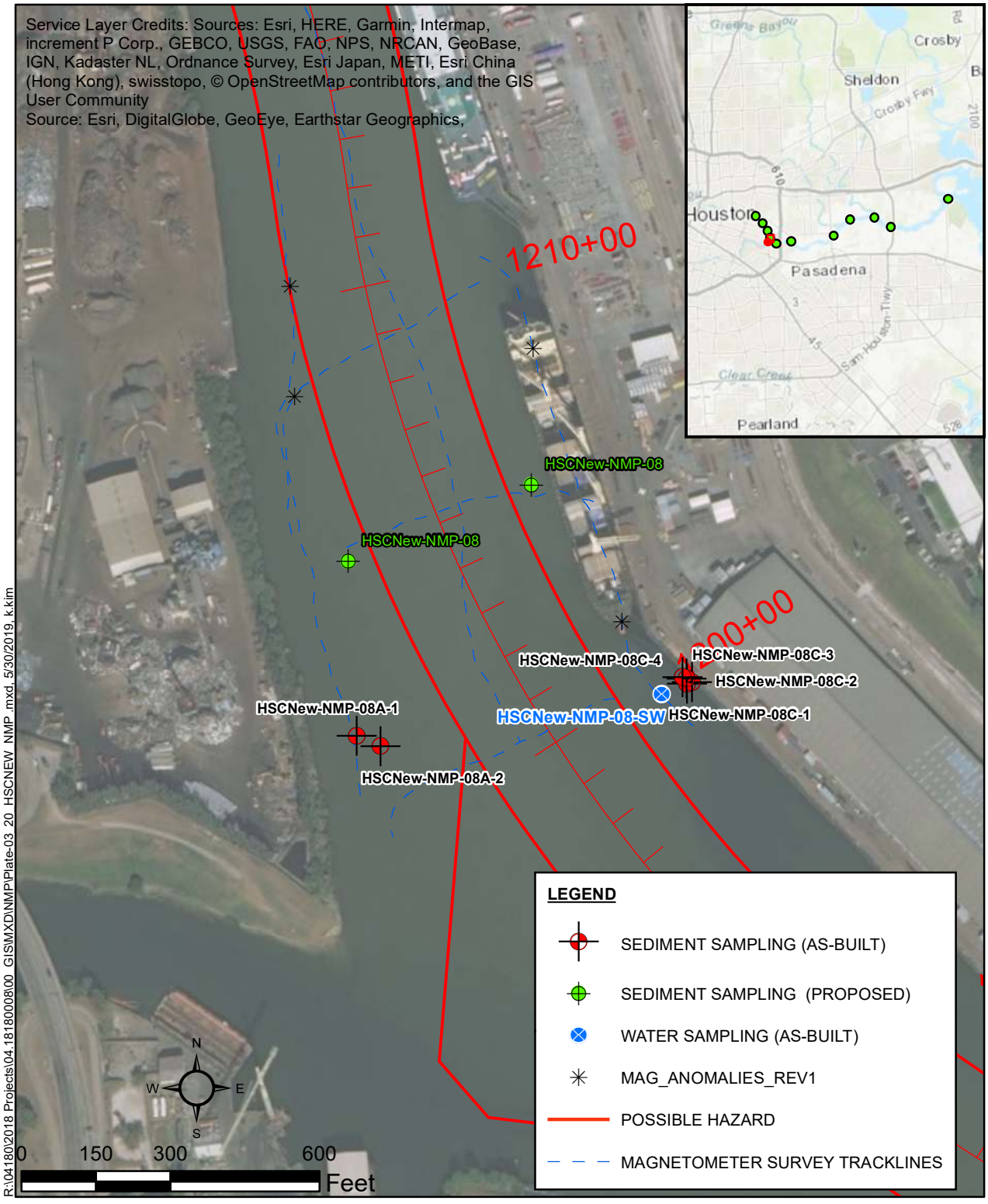
PLATE 7



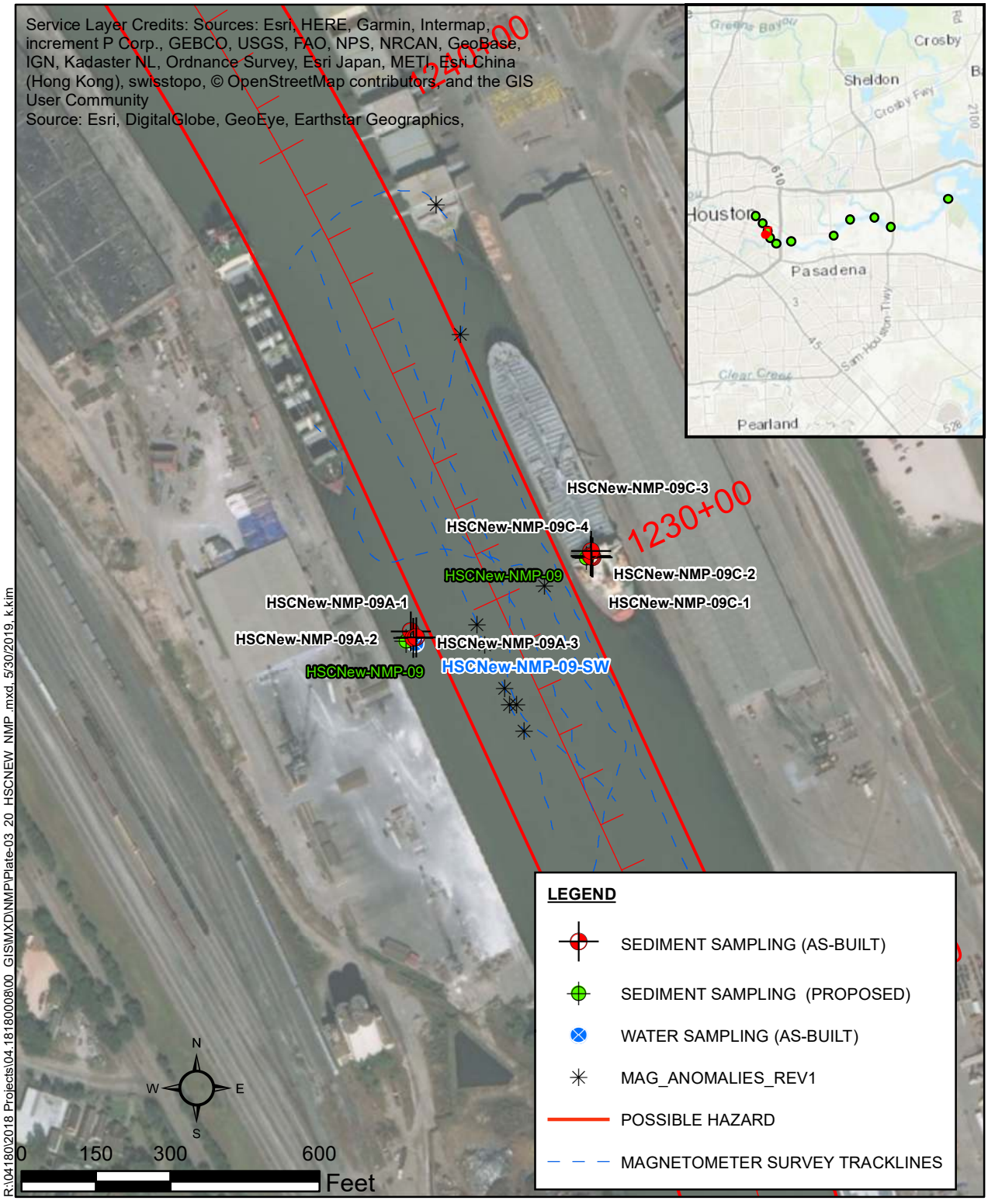
LOCATION HSCNEW-NMP-06
SEDIMENT AND WATER SAMPLING LOCATIONS
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



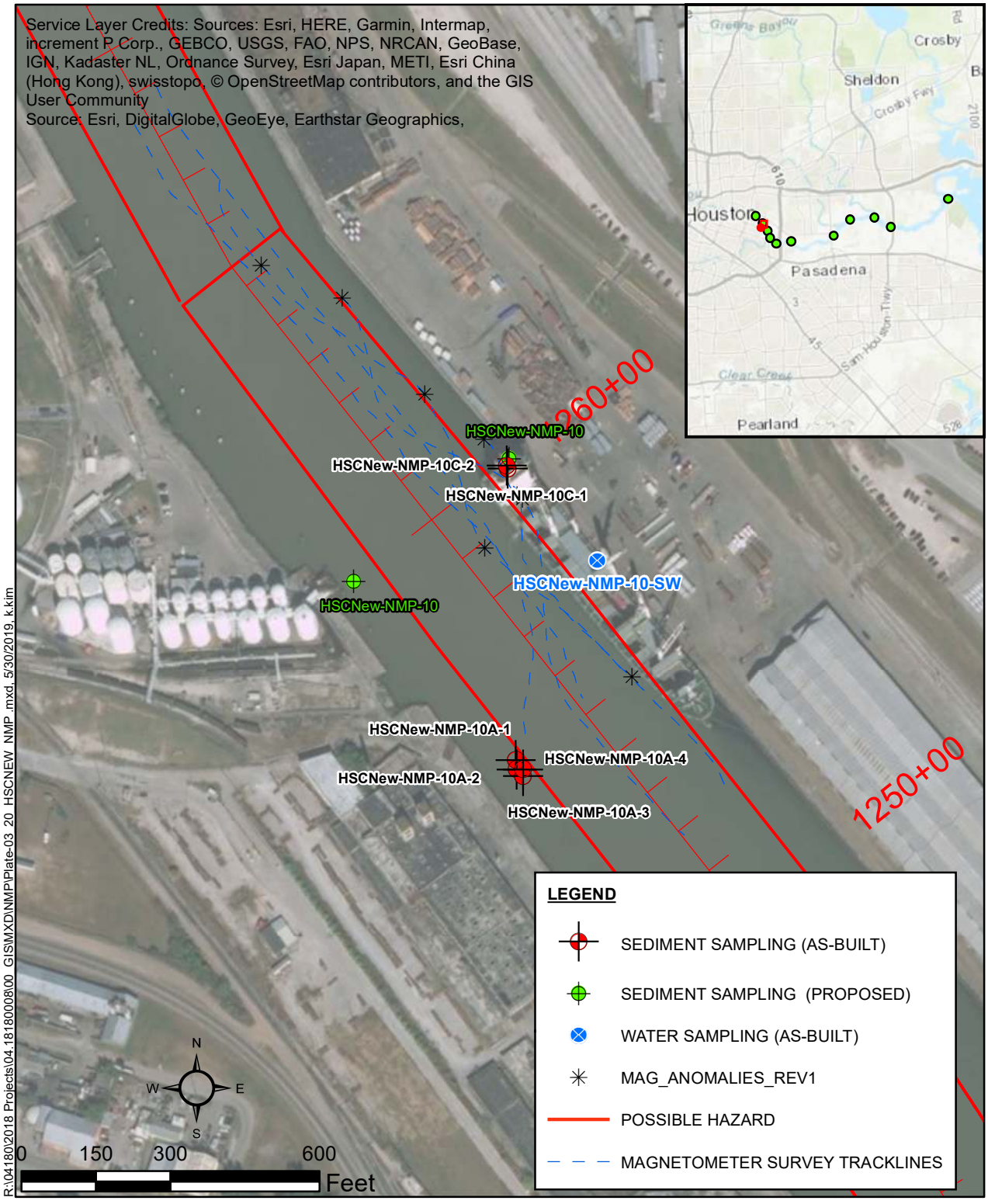
LOCATION HSCNEW-NMP-07
SEDIMENT AND WATER SAMPLING LOCATIONS
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



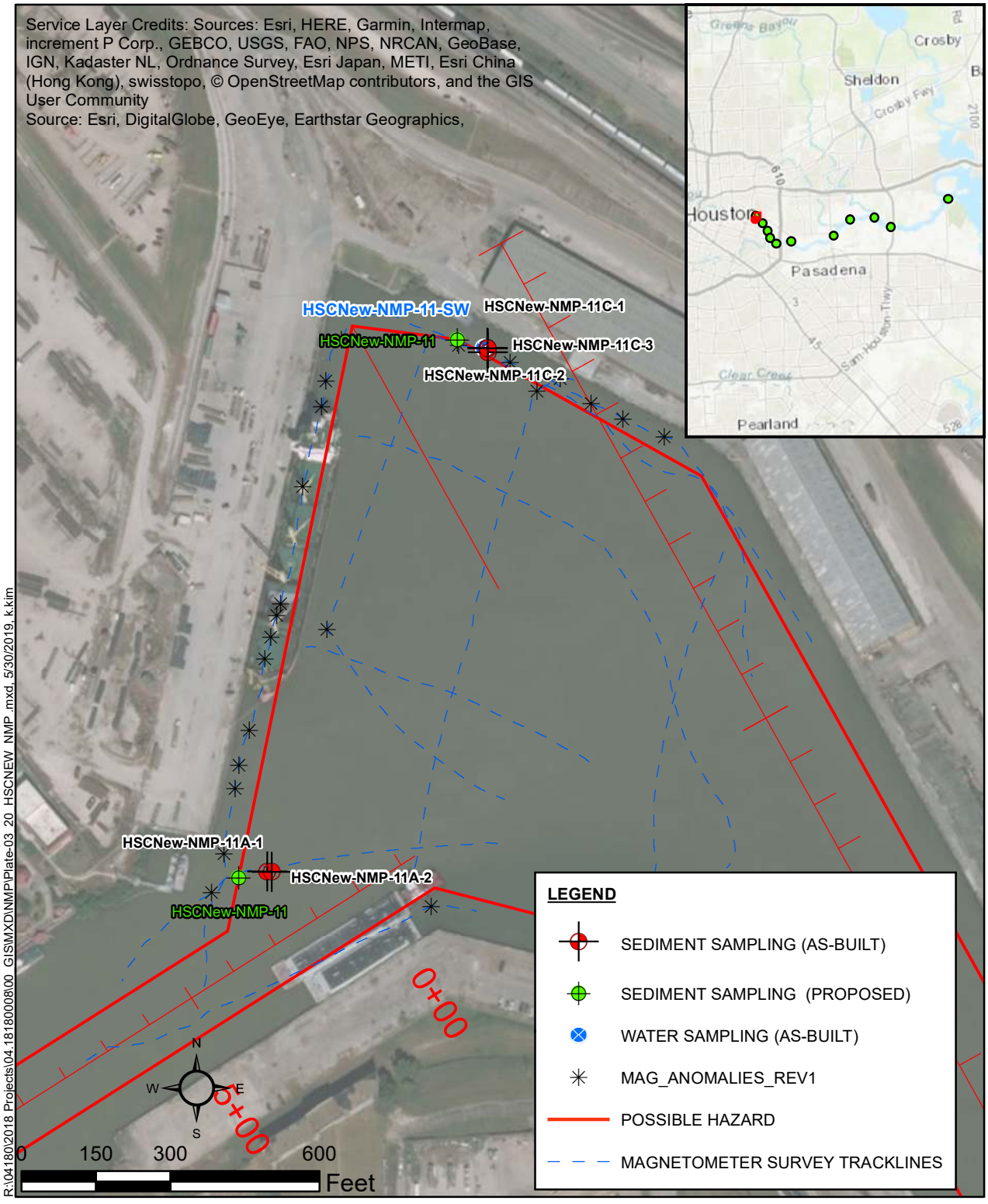
LOCATION HSCNEW-NMP-08
SEDIMENT AND WATER SAMPLING LOCATIONS
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



LOCATION HSCNEW-NMP-09
SEDIMENT AND WATER SAMPLING LOCATIONS
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



LOCATION HSCNEW-NMP-10
SEDIMENT AND WATER SAMPLING LOCATIONS
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



LOCATION HSCNEW-NMP-11
SEDIMENT AND WATER SAMPLING LOCATIONS
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

APPENDIX A

LOGS OF SAMPLING

Project specific notes used in Sample Logs:

1. WD = Water Depth

2. Sampling specifications refers to *Sampling And Analysis Plan, Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP) Channel Segment 1 (North of Morgan's Point), Segment 4, Segment 5, and Segment 6 Houston Ship Channel, TX* listed in the report references.

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,209,399'
Y = 13,844,992'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
0			S-1		5.3'	SILT (ML): black and dark gray, with sand								
5														
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 33.0' (MLLW)

DATE: October 6, 2018
TOTAL DEPTH: 5.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 5.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-01AH3-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,209,391'
Y = 13,845,001'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
0			S-1		4.3'	SILT (ML): black and dark gray								
5						SAND (SP): loose, gray, with silt								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 36.1' (MLLW)

DATE: October 6, 2018
TOTAL DEPTH: 5.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 5.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-01AH3-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,209,382'
Y = 13,844,988'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
0			S-1		4.5'	SILT (ML): black and dark gray								
5						- with a sand layer, 4.5' to 5'								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 36.1' (MLLW)

DATE: October 6, 2018
TOTAL DEPTH: 5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-01AH3-3
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,209,370'
Y = 13,844,967'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
0			S-1		5.5'	SILT (ML): black and dark gray								□ Penetrometer ▼ Unconfined ◇ Torvane ● Triaxial △ Field Vane ▲ Miniature Vane KIPS PER SQ FT 0.5 1.0 1.5 2.0 2.5
5						- with a sand layer, 6' to 6.5'								
10														
15														
20														
25														
30														
35														

NOTES:
- WD = 35.1' (MLLW)

DATE: October 6, 2018
TOTAL DEPTH: 6.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-01AH3-4
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,190,670'
Y = 13,835,075'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 10' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
10			S-1		5.0'	SILT (ML): black								

SHEAR STRENGTH: ☐ Penetrometer ◇ Torvane △ Field Vane; Unconfined ▼ Triaxial ● Miniature Vane ▲
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 34.7' (MLLW)

DATE: October 6, 2018
TOTAL DEPTH: 15'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 15'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-02A-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,190,674'
Y = 13,835,065'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
0						NOTE: SAMPLES FROM 0' TO 10.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
10					5.0'	SILT (ML): black								
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 34.2' (MLLW)

DATE: October 6, 2018
TOTAL DEPTH: 15.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 15.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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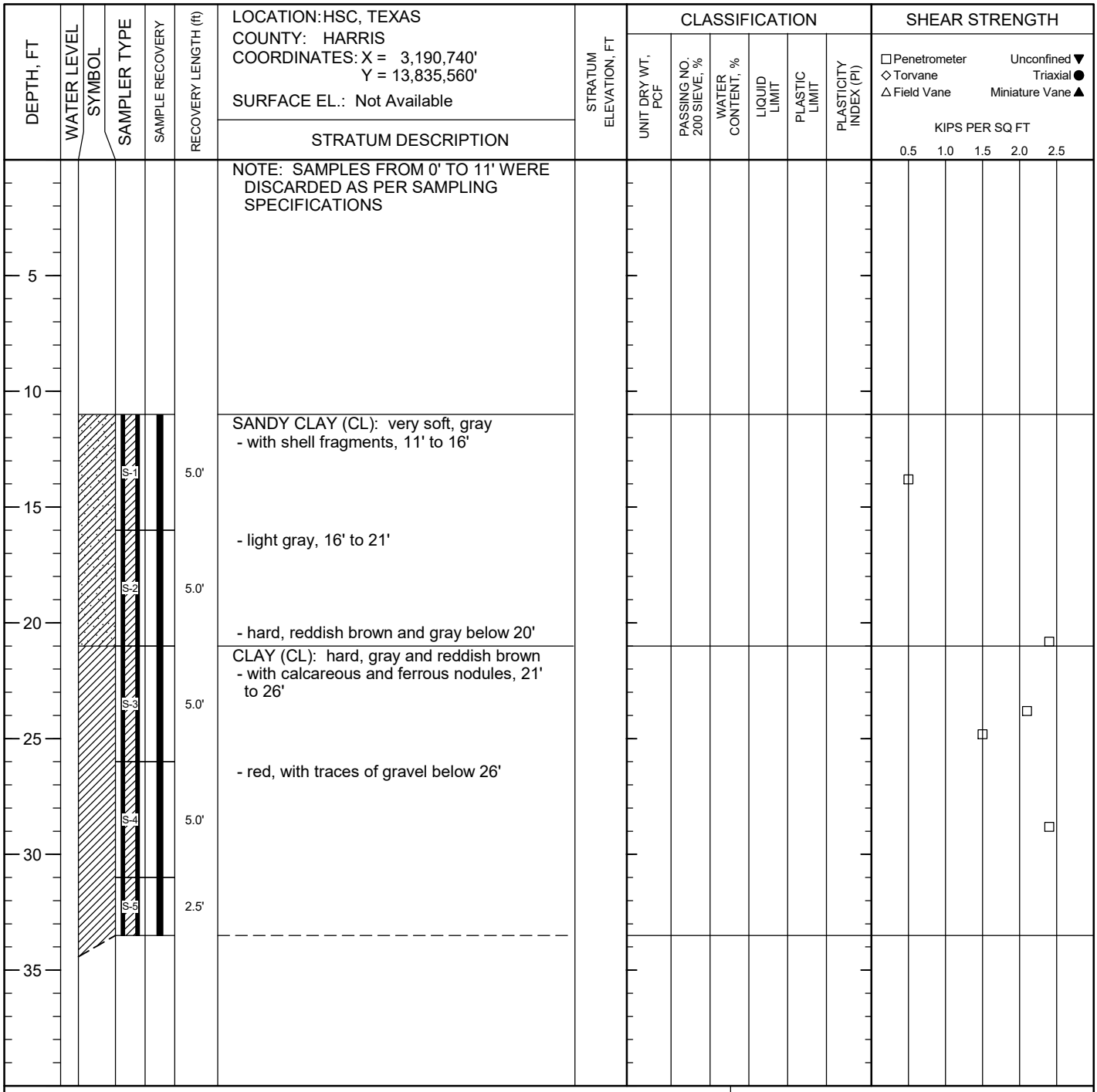
LOG OF SAMPLING NO. NMP-02A-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



NOTES:

- WD = 16.1' (MLLW)

DATE: October 6, 2018
TOTAL DEPTH: 33.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 33.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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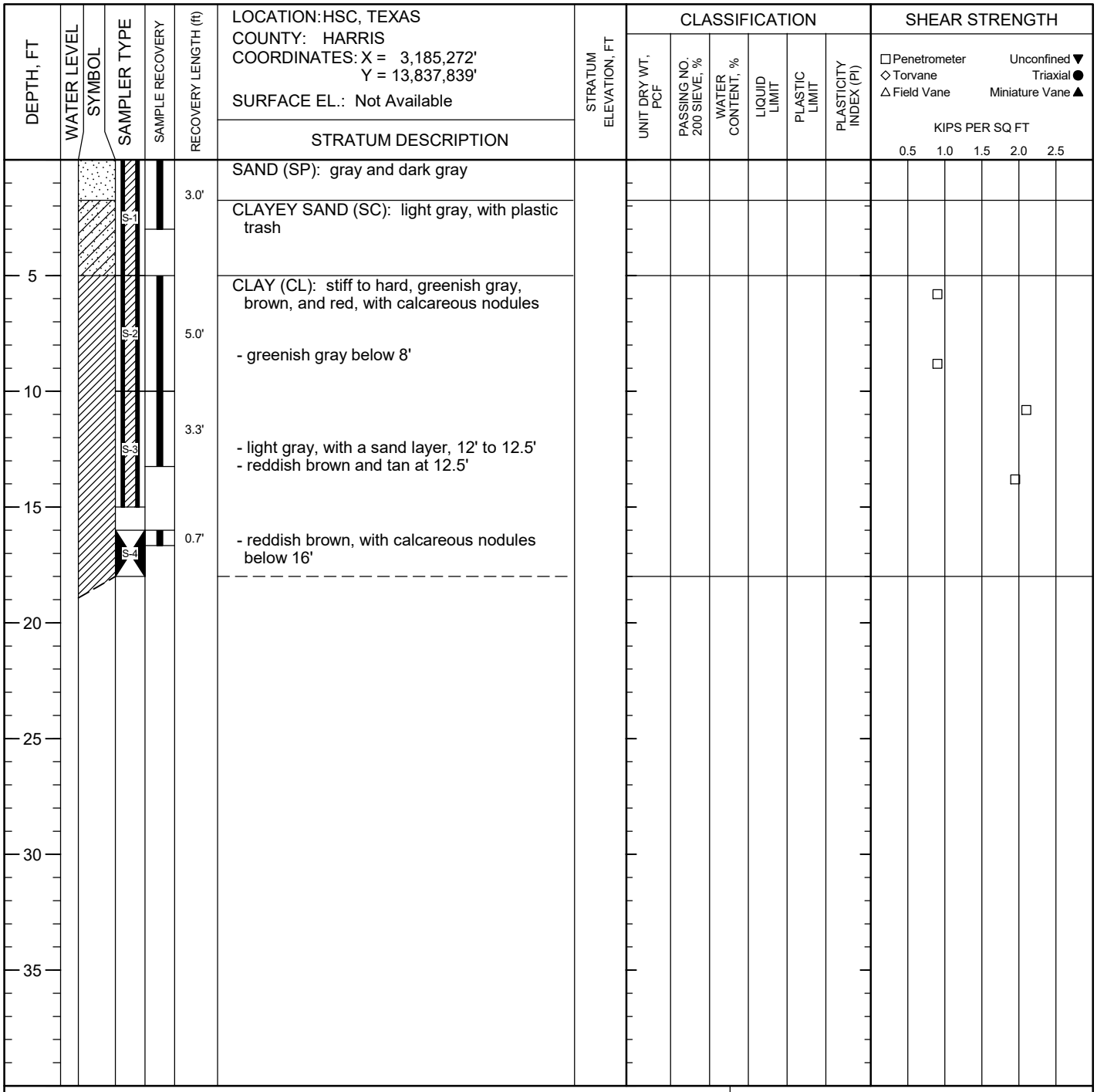
LOG OF SAMPLING NO. NMP-02C-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



NOTES:

- WD = 31.2' (MLLW)
- Refusal at 18.0 ft penetration. Over 150 blows.

DATE: October 5, 2018
TOTAL DEPTH: 18'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 18'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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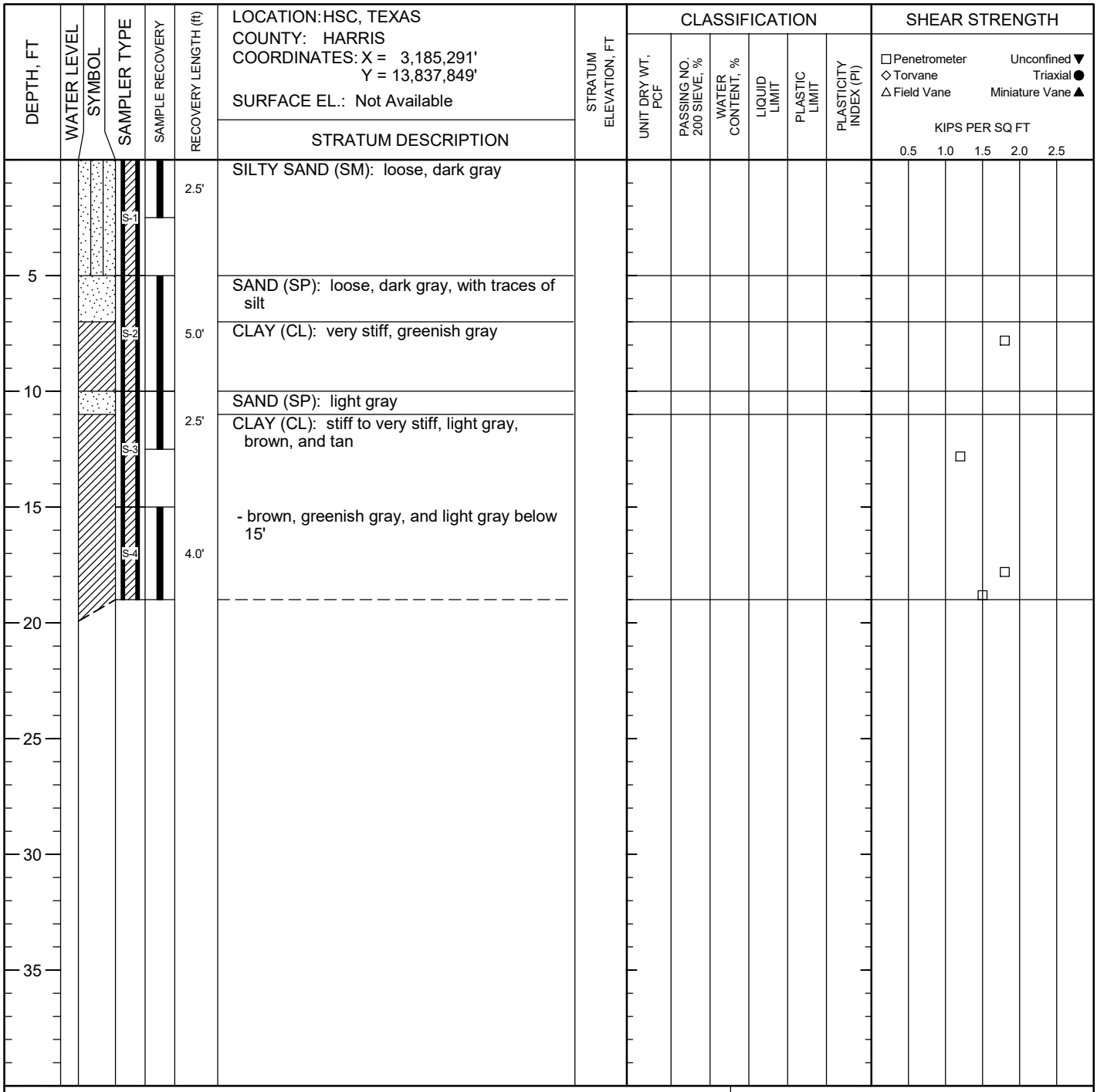
LOG OF SAMPLING NO. NMP-03A-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



NOTES:

- WD = 30.6' (MLLW)

DATE: October 6, 2018
TOTAL DEPTH: 19'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 19'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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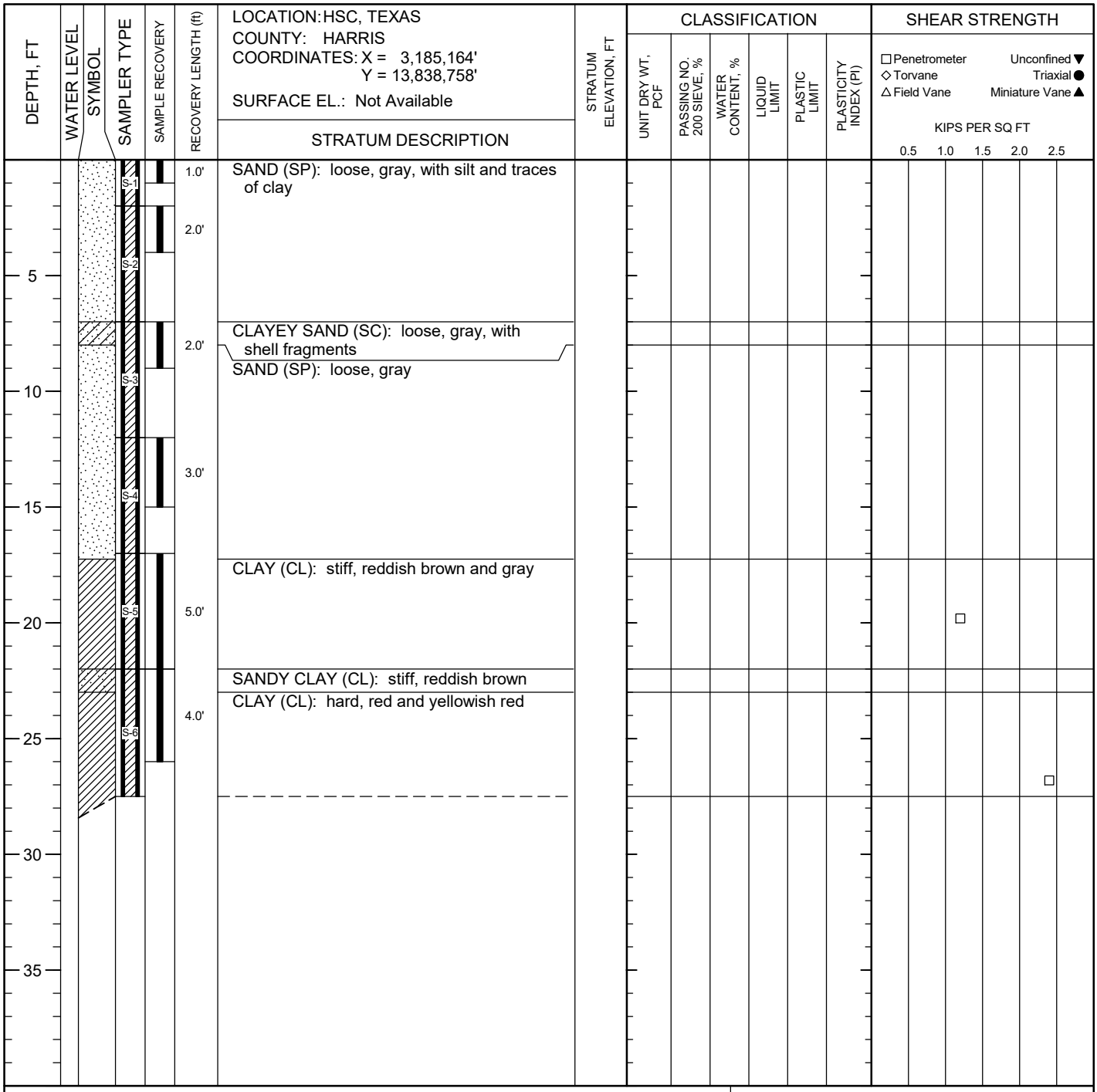
LOG OF SAMPLING NO. NMP-03A-1 (DUP)
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



NOTES:

- WD = 22.0' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 27.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 27.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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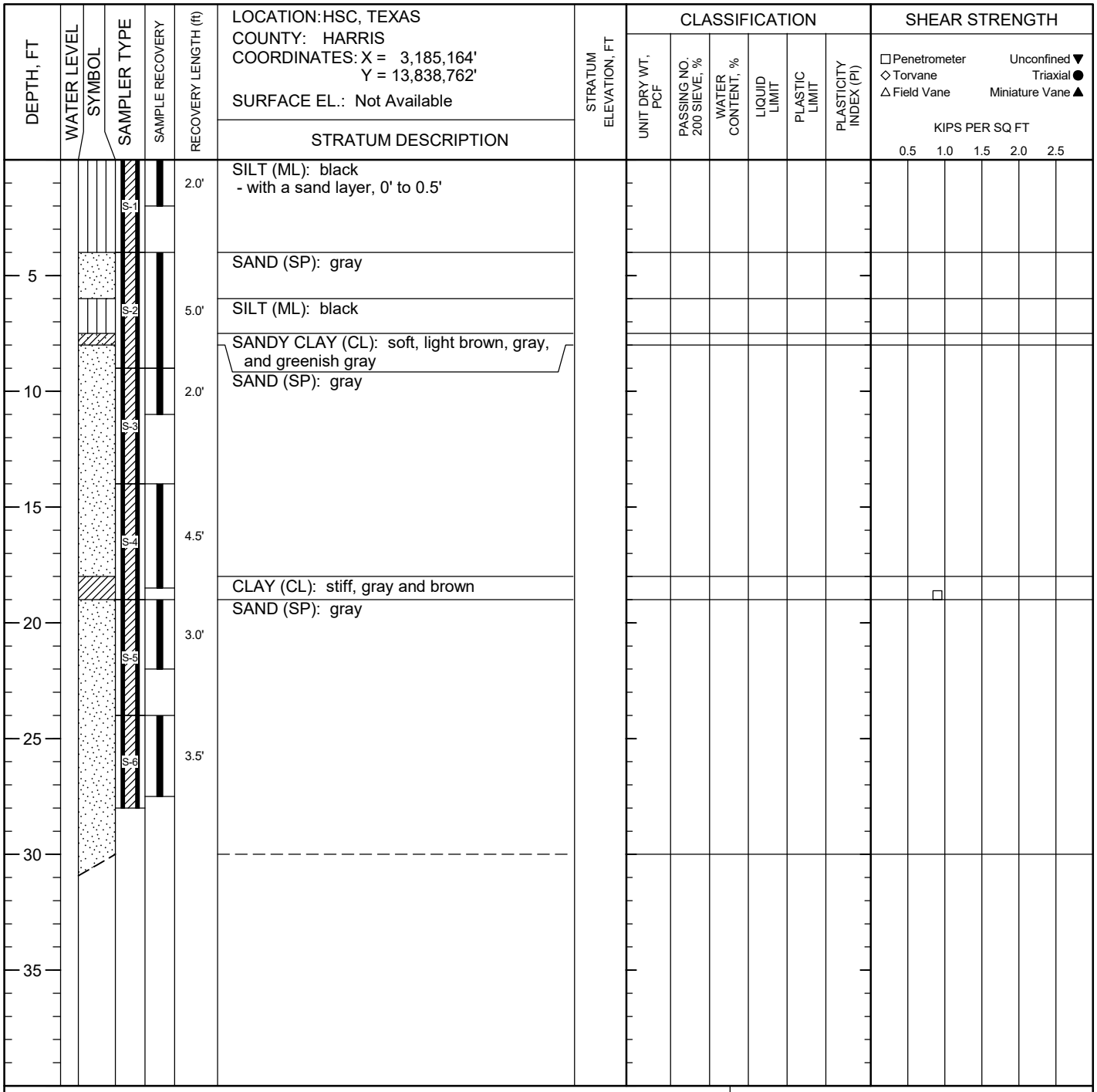
LOG OF SAMPLING NO. NMP-03C-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



NOTES:
- WD = 19.7' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 30'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 30'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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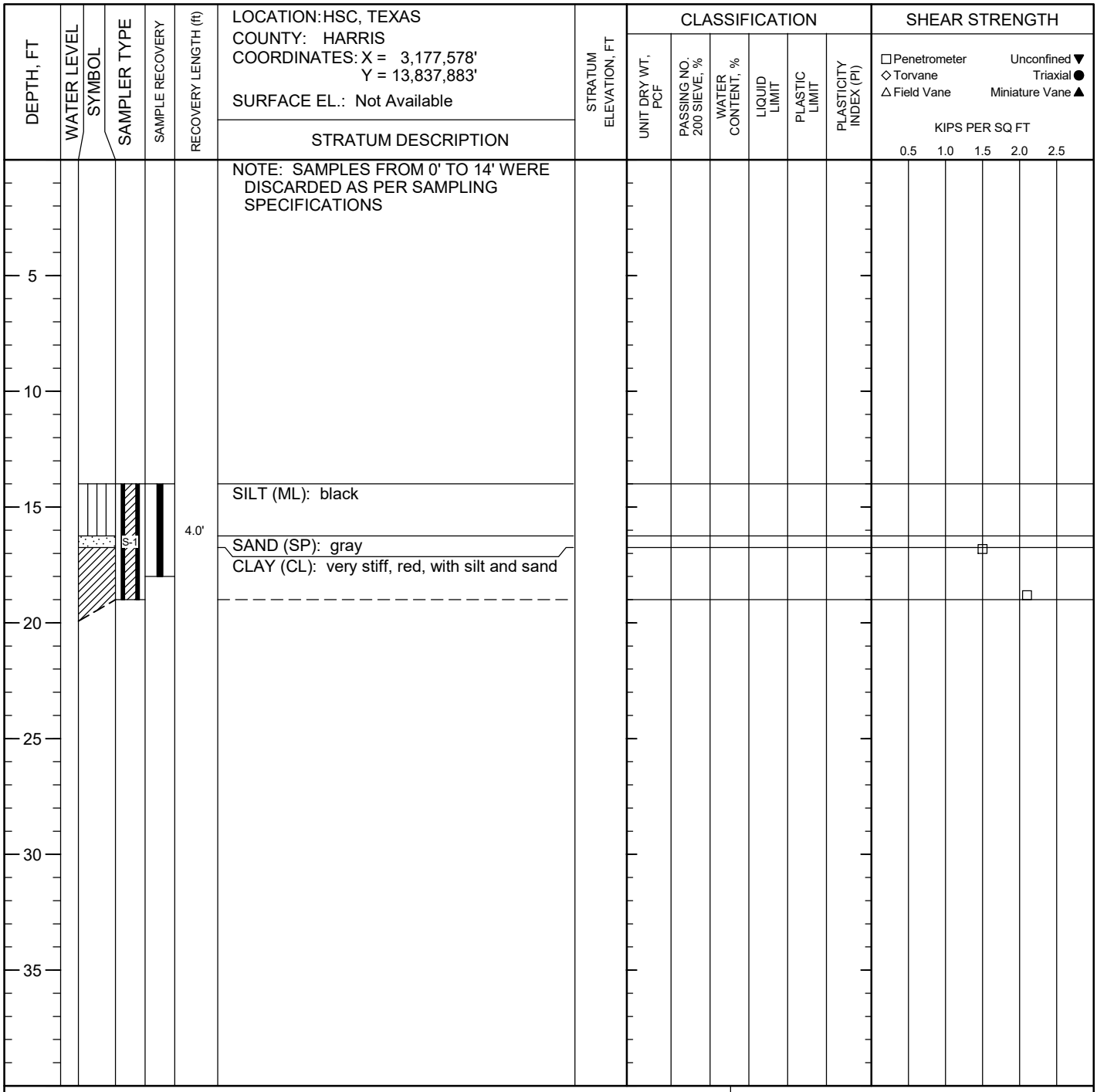
LOG OF SAMPLING NO. NMP-03C-1 (DUP)
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



NOTES:
- WD = 30.5' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 19'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 19'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-04A-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,177,560'
Y = 13,837,887'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
0						NOTE: SAMPLES FROM 0' TO 7' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5														
7			S-1		4.0'	SILT (ML): black, with traces of sand								
10						SAND (SP): gray and brown								
11						CLAY (CL): very stiff, red								
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 37.7' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 12'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 12'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-04A-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,177,446'
Y = 13,838,353'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
0						NOTE: SAMPLES FROM 0' TO 1.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS									
			S-1		2.5'	SILT (ML): black, with traces of clay								
5														
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 43.3' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 6.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-04C-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,177,448'
Y = 13,838,374'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
0						NOTE: SAMPLES FROM 0' TO 1.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS									
5			S-1		5.0'	SILT (ML): black, with traces of clay								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 43.4' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 6.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-04C-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,177,473'
Y = 13,838,383'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
0						NOTE: SAMPLES FROM 0' TO 1.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS									
			S-1		1.5'	SILT (ML): black, with hydrocarbons sheen								
5														
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 43.0' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 6.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-04C-3
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,177,493'
Y = 13,838,377'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
0						NOTE: SAMPLES FROM 0' TO 1.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		5.0'	NO RECOVERY; drill stem snapped.								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH: ☐ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 43.0' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 6.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-04C-4
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,177,357'
Y = 13,838,356'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
0			S-1		5.0'	NOTE: SAMPLES FROM 0' TO 1' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS SILT (ML): black, with traces of clay								
5						CLAY (CL): very stiff, red								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 43.7' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 6'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-04C-5
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,171,789'
Y = 13,832,332'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 8' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5														
10			S-1		4.0'	SILT (ML): black and dark gray', with traces of clay								
						- with traces of cemented nodules and a sand layer at 12'								
15														
20														
25														
30														
35														

SHEAR STRENGTH: ☐ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 37.7' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 12'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 12'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-05A-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,171,785'
Y = 13,832,337'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH (KIPS PER SQ FT)
5					NOTE: SAMPLES FROM 0' TO 8' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
10		S-1		4.0'	SILT (ML): black and dark gray, with traces of clay - with a sand layer and cemented nodules at 12'								
15													
20													
25													
30													
35													

Penetrometer ▼ Unconfined
Torvane ● Triaxial
Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 39.5' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 12'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 12'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-05A-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,171,778'
Y = 13,832,329'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		4.0'	SILT (ML): black, with traces of clay								
10						- with traces of sand at 9'								
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 40.5' (MLLW)

DATE: October 5, 2018
TOTAL DEPTH: 9'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 9'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-05A-3
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,171,351'
Y = 13,832,522'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 33' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
33			S-1		2.5'	CLAY (CL): hard, gray and red - with traces of sand at 33'								
38						- with cemented sand at 38'								

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane

KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 11.5' (MLLW)

DATE: October 4, 2018
TOTAL DEPTH: 38'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 38'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-05C-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,171,367'
Y = 13,832,517'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
					NOTE: SAMPLES FROM 0' TO 30.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
30		S-1		4.8'	SAND (SP): brown and reddish brown, with clay pockets								
35					CLAY (CL): very stiff, red and light gray, with cemented nodules								

SHEAR STRENGTH: □ Penetrometer, ◇ Torvane, △ Field Vane; Unconfined ▼, Triaxial ●, Miniature Vane ▲
KIPS PER SQ FT: 0.5, 1.0, 1.5, 2.0, 2.5

NOTES:
- WD = 14.1' (MLLW)

DATE: October 4, 2018
TOTAL DEPTH: 35.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 35.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-05C-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,171,393'
Y = 13,832,512'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 25' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
25			A-1		3.0'	CLAY (CL): very stiff, red and gray, with cemented nodules SAND (SP): red and gray, fine grained								

SHEAR STRENGTH: □ Penetrometer ◇ Torvane △ Field Vane; Unconfined ▼ Triaxial ● Miniature Vane ▲; KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 19.5' (MLLW)

DATE: October 4, 2018
TOTAL DEPTH: 30'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 30'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-05C-3
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,157,010'
Y = 13,830,360'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
0						NOTE: SAMPLES FROM 0' TO 14' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
15			S-1		3.0'	SILT (ML): dark gray, black, and light gray, with organic matter								

SHEAR STRENGTH: ☐ Penetrometer ◇ Torvane △ Field Vane; Unconfined ▼ Triaxial ● Miniature Vane ▲
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 27.4' (MLLW)

DATE: October 4, 2018
TOTAL DEPTH: 17'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 17'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-06A-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,156,997'
Y = 13,830,374'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 7' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5														
			S-1		3.0'	SILT (ML): black and dark gray, with clay								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 34.5' (MLLW)

DATE: October 4, 2018
TOTAL DEPTH: 10'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 10'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-06A-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,156,993'
Y = 13,830,383'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		3.0'	SILT (ML): black and dark gray, with some clay and organic matter								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 36.7' (MLLW)

DATE: October 4, 2018
TOTAL DEPTH: 8'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 8'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-06A-3
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,157,267'
Y = 13,830,791'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 29' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
30			S-1		4.0'	CLAYEY SAND (SC): yellowish red and red, with sandy clay								
						CLAY (CL): very stiff, red and yellowish red, with traces of sand								

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 11.6' (MLLW)

DATE: October 4, 2018
TOTAL DEPTH: 33'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 33'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-06C-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,157,252'
Y = 13,830,786'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 29' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
30			S-1		4.0'	SANDY CLAY (CL): soft, yellowish red and red, with cemented sand SAND (SP): yellowish red and red, with traces of clay CLAY (CL): very stiff, red and yellowish red								

SHEAR STRENGTH: □ Penetrometer, ◇ Torvane, △ Field Vane, Unconfined ▼, Triaxial ●, Miniature Vane ▲
KIPS PER SQ FT: 0.5, 1.0, 1.5, 2.0, 2.5

NOTES:
- WD = 12.0' (MLLW)

DATE: October 4, 2018
TOTAL DEPTH: 33'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 33'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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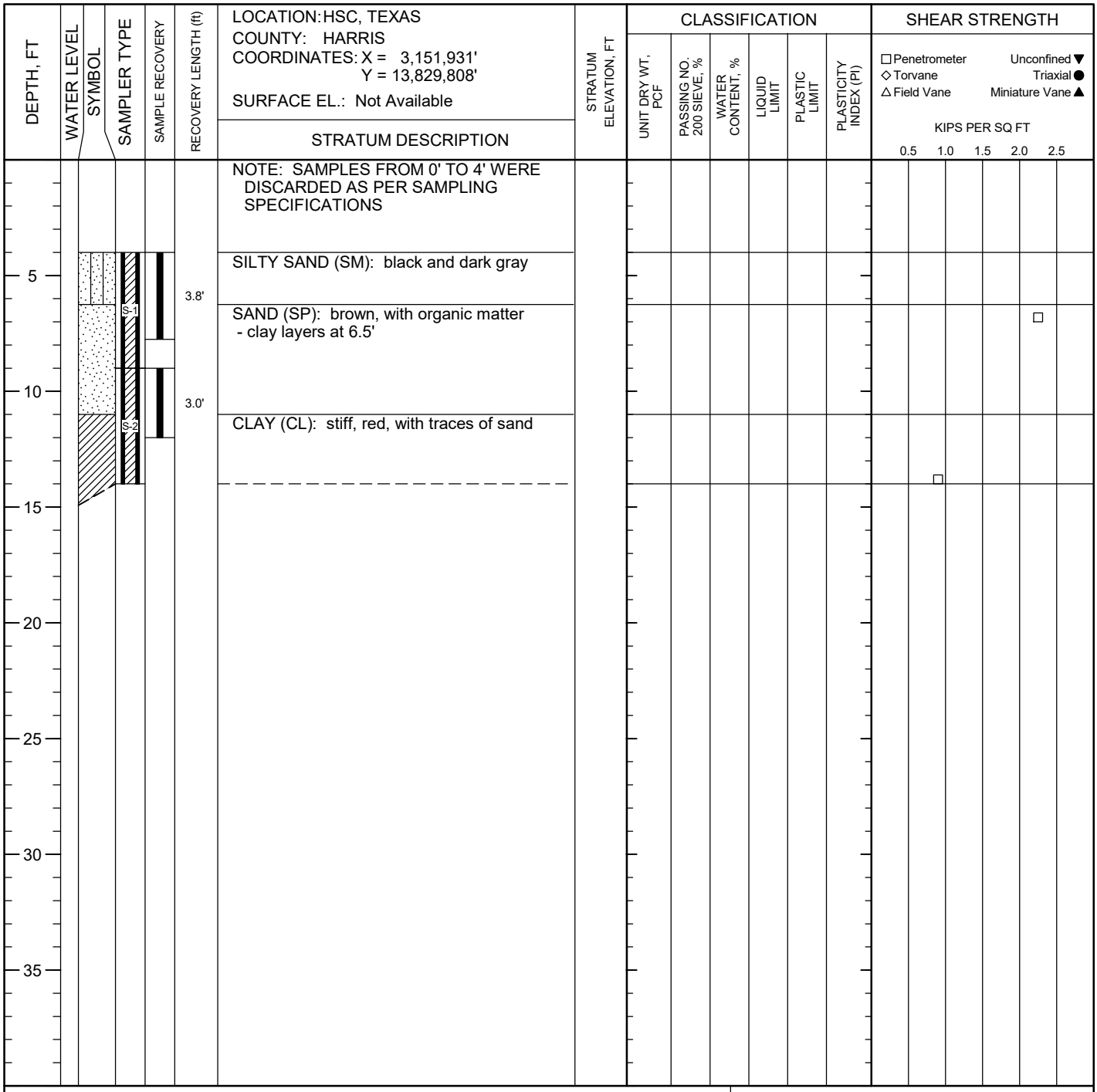
LOG OF SAMPLING NO. NMP-06C-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS



NOTES:

- WD = 32.5' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 14'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 14'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-07A-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,151,936'
Y = 13,829,813'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 21.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
20			S-1		4.0'	SILT (ML): black, with clay								
25						SILTY SAND (SM): loose, brown, gray, and black								
30														
35														

SHEAR STRENGTH: ☐ Penetrometer ◇ Torvane △ Field Vane; Unconfined ▼ Triaxial ● Miniature Vane ▲; KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 19.4' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 25.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 25.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-07 (ALT1-1)
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,151,936'
Y = 13,829,809'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 20.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
20			S-1		4.0'	SILT (ML): black and dark gray, with clay and organic matter SILTY SAND (SM): loose, black, gray, and brown								

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 20.2' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 24.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 24.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-07 (ALT1--2)
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,151,924'
Y = 13,829,798'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 21' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
20			S-1		4.0'	SILT (ML): black and dark gray, with clay								
						SILTY SAND (SM): loose, gray and brown								
25														
30														
35														

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 19.8' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 25'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 25'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-07 (ALT1-3)
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,151,916'
Y = 13,829,792'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 21' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
20			S-1		4.0'	SILT (ML): black and dark gray, with organic matter SILTY SAND (SM): loose, gray and dark gray, with organic matter								

SHEAR STRENGTH: ☐ Penetrometer ◇ Torvane △ Field Vane; Unconfined ▼ Triaxial ● Miniature Vane ▲; KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 19.7' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 25'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 25'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-07 (ALT1-4)
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,151,921'
Y = 13,829,775'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 21' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
20			S-1		4.0'	SILT (ML): black and dark gray, with traces of sand and clay								
25						SAND (SP): gray, with some silt								

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 19.4' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 25'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 25'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-07 (ALT1-5)
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,149,974'
Y = 13,831,274'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 26' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
25			S-1		4.0'	CLAY (CL): very stiff, red								
30														
35														

SHEAR STRENGTH: □ Penetrometer, ◇ Torvane, △ Field Vane, Unconfined ▼, Triaxial ●, Miniature Vane ▲
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 14.7' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 30'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 30'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-08A-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,150,021'
Y = 13,831,253'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 19' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
20			S-1		4.0'	SILT (ML): black and dark gray, with traces of sand and organic matter - with hydrocarbons odor and clay at 23'								

SHEAR STRENGTH: ☐ Penetrometer ◇ Torvane △ Field Vane; Unconfined ▼ Triaxial ● Miniature Vane ▲; KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 22.1' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 23'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 23'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-08A-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,150,638'
Y = 13,831,379'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 3' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		2.5'	SILT (ML): dark gray and black, with organic matter								
						CLAY (CL): firm, red, with sand pockets								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 37.7' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 7'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 7'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-08C-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,150,649'
Y = 13,831,382'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 2.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		2.8'	CLAY (CL): very stiff, red - with a silt layer at 2'								□
						- with wood fragments at 6.5'								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 38.0' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 6.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-08C-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,150,637'
Y = 13,831,389'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 3' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
						SILT (ML): black and dark gray								
5			S-1		4.0'	SAND (SP): black, gray, and light brown - with a layer of clay at 4.3'								
						CLAY (CL): very stiff, red								
10														
15														
20														
25														
30														
35														

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane

KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 37.6' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 7'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 7'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-08C-3
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,150,629'
Y = 13,831,393'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 3' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
			S-1		2.3'	SILT (ML): black and dark gray, with organic matter								
5						CLAY (CL): stiff, red								□
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 37.7' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 7'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 7'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-08C-4
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,149,149'
Y = 13,833,987'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
0						NOTE: SAMPLES FROM 0' TO 2' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS									
			S-1		3.3'	SILT (ML): black and brown, with clay and organic odor								□ 2.0 KIPS PER SQ FT
5						CLAY (CL): very stiff, red								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 38.2' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 6'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-09A-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,149,153'
Y = 13,833,975'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 3' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		3.0'	CLAY (CL): very stiff, red - with a silt layer at 3'								□ Penetrometer ◇ Torvane △ Field Vane; Unconfined ▼ Triaxial ● Miniature Vane ▲; KIPS PER SQ FT 0.5 1.0 1.5 2.0 2.5
10														
15														
20														
25														
30														
35														

NOTES:
- WD = 37.7' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 7'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 7'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-09A-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,149,159'
Y = 13,833,976'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 2.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		2.3'	CLAY (CL): very stiff, red - with a layer of silt at 2.5'								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 37.8' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 6.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-09A-3
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,149,514'
Y = 13,834,136'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 3' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		3.0'	SILT (ML): dark brown								
						CLAY (CL): very stiff, red and tan								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 38.0' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 7'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 7'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-09C-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,149,510'
Y = 13,834,140'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 2' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
			S-1		3.5'	SILT (ML): black and brown, with organic matter and plastic trash								
5						CLAY (CL): very stiff, red								
10														
15														
20														
25														
30														
35														

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane

KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 38.6' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 6'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

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LOG OF SAMPLING NO. NMP-09C-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,149,513'
Y = 13,834,137'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 2' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
			S-1		3.0'	SILT (ML): black and dark gray								
5						CLAY (CL): very stiff, red								□
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 38.5' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 6'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-09C-3
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,149,511'
Y = 13,834,149'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 2.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
						SILT (ML): black, dark gray, and brown, with organic matter								
5			S-1		4.0'	CLAY (CL): very stiff, red								□
10														
15														
20														
25														
30														
35														

□ Penetrometer ◇ Torvane △ Field Vane
Unconfined ▼ Triaxial ● Miniature Vane ▲
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 38.4' (MLLW)

DATE: October 3, 2018
TOTAL DEPTH: 6.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 6.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-09C-4
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,147,880'
Y = 13,836,082'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 3' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		4.0'	SILT (ML): black and dark gray, with some clay and traces of sand - with a layer of wood at 6.7'								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 37.4' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 7'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 7'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-10A-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,147,882'
Y = 13,836,063'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 3.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		3.8'	SILT (ML): black and dark gray, with traces of clay and organic matter								
						- with wood at 7.5'								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 36.9' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 7.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 7.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-10A-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,147,894'
Y = 13,836,050'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 4' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		3.5'	SILT (ML): dark gray and black, with traces of clay, sand, and organic matter								
						- with wood at 7.5'								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 36.4' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 8'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 8'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-10A-3
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,147,894'
Y = 13,836,063'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 4' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		3.0'	SILT (ML): dark gray and black, with traces of clay and organic matter								
10														
15														
20														
25														
30														
35														

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane
KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 36.4' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 8'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 18'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-10A-4
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,147,863'
Y = 13,836,670'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 7' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5														
			S-1		4.0'	SILTY SAND (SM): very loose, dark gray and dark brown, with traces of clay								
10						CLAY (CL): very stiff, red								
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 33.6' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 11'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 11'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-10C-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,147,862'
Y = 13,836,675'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 6.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		4.0'	CLAY (CL): very stiff, red - with a layer of silty sand at 6.5'								
10														
15														
20														
25														
30														
35														

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane

KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 34.2' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 10.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 10.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-10C-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,145,331'
Y = 13,838,513'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 4.0' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		4.3'	SILT (ML): black, brown and very dark gray, with clay and some sand								
10			S-2		1.7'	medium grained SAND (SP): brown, with few organic leaves - medium to fine grained, dark gray below 9' - with 3" of clay at bottom								
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 31.30' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 14'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 14'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-11A-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,145,340'
Y = 13,838,513'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 4' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5			S-1		4.3'	SILT (ML): black, brown, and dark gray, with clay and sand								
10			S-2		1.7'	SAND (SP): brown, medium grained, with few organics - dark gray, fine to medium grained below 10' - with clay layer at 12.0'								
15														
20														
25														
30														
35														

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane

KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 31.4' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 14'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 14'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-11A-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,145,773'
Y = 13,839,568'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 7.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5														
			S-1		4.0'	SILTY SAND (SM): very loose, dark gray and brown								
10						SILTY CLAY (CL-ML): soft, gray and black								
						CLAY (CL): stiff to very stiff, red								
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 33.1' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 11.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 11.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-11C-1
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,145,774'
Y = 13,839,559'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 7.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5														
			S-1		4.0'	SILTY SAND (SM): dark gray, brown, and black								
10						CLAY (CL): stiff to very stiff, red								
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
- WD = 33.2' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 11.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 11.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-11C-2
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

LOCATION: HSC, TEXAS
COUNTY: HARRIS
COORDINATES: X = 3,145,774'
Y = 13,839,567'
SURFACE EL.: Not Available

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLER TYPE	SAMPLE RECOVERY	RECOVERY LENGTH (ft)	STRATUM DESCRIPTION	STRATUM ELEVATION, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
						NOTE: SAMPLES FROM 0' TO 7.5' WERE DISCARDED AS PER SAMPLING SPECIFICATIONS								
5														
			S-1		2.8'	SILTY SAND (SM): very loose, gray and dark gray								
10						CLAY (CL): stiff to very stiff, red								
15														
20														
25														
30														
35														

SHEAR STRENGTH
□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane
KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

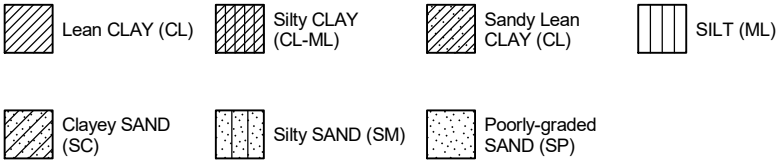
NOTES:
- WD = 33.2' (MLLW)

DATE: October 2, 2018
TOTAL DEPTH: 11.5'
CAVED DEPTH: Not Applicable
DRY AUGER: 0 to 11.5'
WET ROTARY: N/A
BACKFILL: N/A
LOGGER: A. Bull
DRILL RIG: CME 75

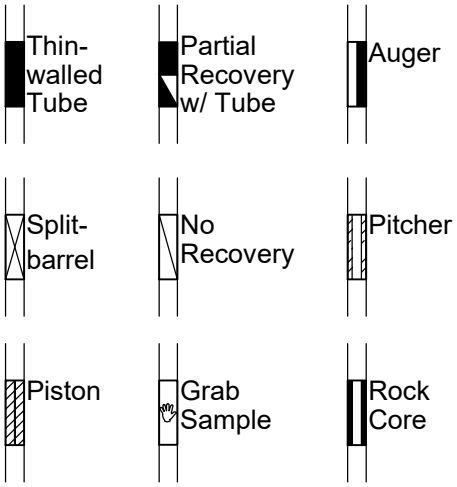
R:\04180\2018 PROJECTS\04.18180008\00_GIS\GINT\04.18180008 - NORTH.GPJ HOU SHIP CHANNEL 11/15/2018

LOG OF SAMPLING NO. NMP-11C-3
HOUSTON SHIP CHANNEL ECIP
HOUSTON SHIP CHANNEL, TEXAS

SOIL TYPES

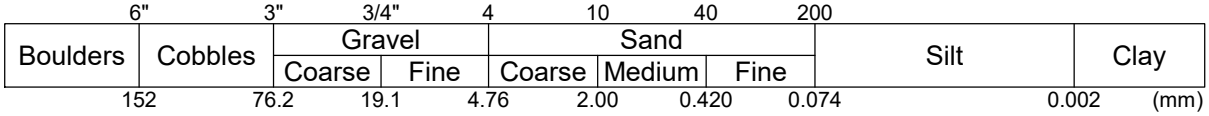


SAMPLER TYPES

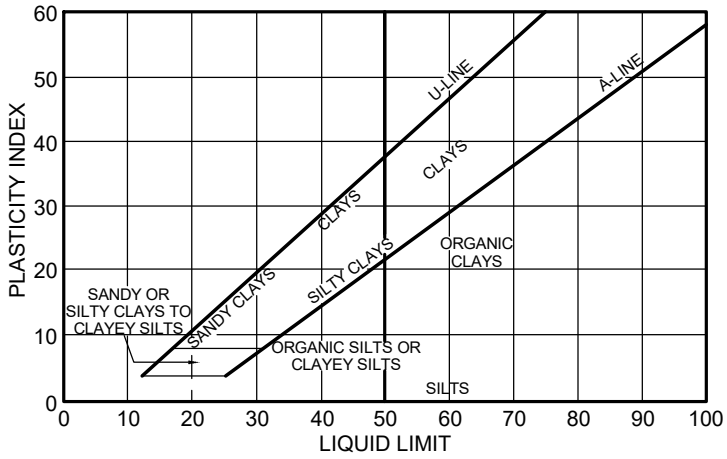


SOIL GRAIN SIZE

U.S. Standard Sieve



PLASTICITY CHART



SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 1/8 inch thick extending through the sample.
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer	Inclusion greater than 3 inches thick extending through the sample.
Laminated	Soil sample composed of alternating partings or seams of different soil type.
Interlayered	Soil sample composed of alternating layers of different soil type.
Intermixed	Soil sample composed of pockets of different soil type and layered or laminated structure is not evident.
Calcareous	Having appreciable quantities of carbonate.
Carbonate	Having more than 50% carbonate content.

TERMS AND SYMBOLS USED ON BORING LOGS

SOIL CLASSIFICATION (1 of 2)

PLATE A-60

STANDARD PENETRATION TEST (SPT)

A 2-in.-OD, 1-3/8-ID split spoon sampler is driven 1.5 ft into undisturbed soil with a 140-pound hammer free falling 30 in. After the sampler is seated 6 in. into undisturbed soil, the number of blows required to drive the sampler the last 12 in. is the Standard Penetration Resistance or "N" value, which is recorded as blows per foot as described below.

SPLIT-BARREL SAMPLER DRIVING RECORD

Blows Per Foot	Description
25	25 blows drove sampler 12 inches, after initial 6 inches of seating.
50/7"	50 blows drove sampler 7 inches, after initial 6 inches of seating.
Ref/3"	50 blows drove sampler 3 inches during initial 6-inch seating interval.

NOTE: To avoid damage to sampling tools, driving is limited to 50 blows during or after seating interval.

DENSITY OF GRANULAR SOILS

Descriptive Term	*Relative Density, %	**Blows Per Foot (SPT)
Very Loose	< 15	0 to 4
Loose	15 to 35	5 to 10
Medium Dense	35 to 65	11 to 30
Dense	65 to 85	31 to 50
Very Dense	> 85	> 50

*Estimated from sampler driving record.

**Requires correction for depth, groundwater level, and grain size.

STRENGTH OF COHESIVE SOILS

Term	Undrained Shear Strength, ksf	Blows Per Foot (SPT) (approximate)
Very Soft	< 0.25	0 to 2
Soft	0.25 to 0.50	2 to 4
Firm	0.50 to 1.00	4 to 8
Stiff	1.00 to 2.00	8 to 16
Very Stiff	2.00 to 4.00	16 to 32
Hard	> 4.00	> 32

SHEAR STRENGTH TEST METHOD

U - Unconfined Q = Unconsolidated - Undrained Triaxial

P = Pocket Penetrometer T = Torvane V = Miniature Vane F = Field Vane

HAND PENETROMETER CORRECTION

Our experience has shown that the hand penetrometer generally overestimates the in-situ undrained shear strength of over consolidated Pleistocene Gulf Coast clays. These strengths are partially controlled by the presence of macroscopic soil defects such as slickensides, which generally do not influence smaller scale tests like the hand penetrometer. Based on our experience, we have adjusted these field estimates of the undrained shear strength of natural, overconsolidated Pleistocene Gulf Coast soils by multiplying the measured penetrometer reading by a factor of 0.6. These adjusted strength estimates are recorded in the "Shear Strength" column on the boring logs. Except as described in the text, we have not adjusted estimates of the undrained shear strength for projects located outside of the Pleistocene Gulf Coast formations.

Information on each boring log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as from laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines on the logs may be transitional and approximate in nature. Water level measurements refer only to those observed at the time and places indicated, and can vary with time, geologic condition, or construction activity.

TERMS AND SYMBOLS USED ON BORING LOGS

SOIL CLASSIFICATION (2 of 2)

APPENDIX B

DAILY PROGRESS REPORTS

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER:	PROJECT
9/[illegible]/18	04.1818[illegible]08	HSC Sediment Sampling

CREW

		PAYROLL	PER DIEM	
DRILLER:	D. Edwards	[illegible]	☐ YES	☐ NO
HELPER:	BW. B[illegible] & W. Wilburn	[illegible]	☐ YES	☐ NO
TECHNICIAN:	A. Bu[illegible]	[illegible]	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	MATERIALS USED: GROUT	MATERIALS USED: OTHER

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	INVOICE DATA: TIME/FOOTAGE
07:00	09:00	Travel to Gulf Copper		
09:00	[illegible]:45	Position Barge @ Dock & prepare to load		
10:45	14:00	Weather Stand By		
14:00	15:00	Move to Martin Dock for ~~saftey~~ safety concern when loading truck rig onto barge		
15:00	16:30	Load up truck rig onto barge		
16:30	19:00	Wait for A.I.S installer to finish		
19:00	19:30	Test & verify AIS is working		
19:30	20:00	Travel to Hotel		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER	PROJECT:
9/1/1[illegible]	[illegible]	[illegible]

CREW		PAYROLL	PER DIEM	
DRILLER	D. Edwards	hrs	☐ YES	☐ NO
HELPER	W Bretzel & W. Wilbur[illegible]	hrs	☐ YES	☐ NO
TECHNICIAN	A. Bell	hrs	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	MATERIALS USED: GROUT	MATERIALS USED: OTHER

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	INVOICE DATA: FOOTAGE
06:30	07:00	Travel to ~~Doct~~ Dike & coordinate meeting place w/ field crew		
07:30	08:30	Kickoff meeting w/ USACE/Fugro/Benchmark		
0[illegible]	1[illegible]	Weather Standby		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER:	PROJECT:
9/12/18	04.18.8078	USA SCCP

CREW	PAYROLL	PER DIEM	
DRILLER: D. Edwards	hrs	YES	NO
HELPER: W. Bratzel & W. Wilburn	hrs	YES	NO
TECHNICIAN: A. Bush	hrs	YES	NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	MATERIALS USED: GROUT	MATERIALS USED: OTHER

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	INVOICE DATA: UNITS/FOOTAGE
06:45	07:30	Travel from Hotel to Eagle Point Launch		
07:30	11:00	Weather Standby		
11:00	11:45	Load up support vessel & transport to jack up boat		
11:45	13:30	Work deck prep & orientation		
13:30	14:00	Transport to dock		
14:00	18:00	Weather delay ; heavy rain		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER:	PROJECT:
9/13/18	[illegible]	HSC ECIP

CREW		PAYROLL	PER DIEM	
DRILLER:	D. Edwards	hrs	☐ YES	☐ NO
[illegible]:	W. Bretzel & [illegible]	hrs	☐ YES	☐ NO
TECHNICIAN:	A. Buli	hrs	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	GROUT	OTHER
~~SMP-02C~~	~~0~~	~~50'~~	~~✓~~				
~~(HH)~~		~~MLLW~~					
SMP02C-1	0	37'	✓		WD = 13.25'	MLLW	

TIME SUMMARY

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	INVOICE DATA: [illegible]
06:15	07:00	Travel to Top Water Grill & Marina		
	08:00	JHA Travel to Jack Up		
	09:00	Position SMP.02C		
09:00	12:15	Drill & Sample SMP-02C down to 50'		
		Below MLLW		
12:15	12:45	Pull up auger pipe		
12:45	13:30	Load up & ~~travel~~ travel back to dock		
13:30	18:00	Weather standby (sea conditions unfavorable)		

(Continued on back)

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT
9/14/18	04.1018000g	HSC ECIP

AREA	PAYROLL	PER DIEM	
DRILLER: D. Edwards	hr	☐ YES	☐ NO
HELPER: W. Bratcel & W. Wilburn	hr	☐ YES	☐ NO
TECHNICIAN: A. Bull	hr	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	MATERIALS USED: GROUT	MATERIALS USED: OTHER

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	INVOICE DATA: UNITS/FOOTAGE
06:15	07:00	Travel to Topwater Grill/Launch		
07:00	07:15	Wait for USACE Reps		
07:15	07:30	Discuss best way to proceed; decided to ~~meet up~~ check		
		back at 11:00 & decide window to proceed		
17:30	~~17:00~~ 19:00	Weather standby		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER	PROJECT:
9/15/18	04.18170008	HSC ECTP

CREW		PAYROLL	PER DIEM	
DRILLER: D Edwards		hrs	☐ YES	☐ NO
HELPER: N. Bretzel & W. Wilburn		hrs	☐ YES	☐ NO
ECHNICIAN: A. Bull		hrs	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED MUD	MATERIALS USED GROUT	OTHER
SMP02A-1	0	34'	✓		WD = 16.17'	MLLW	
SMP02A-2	0	31'	✓		WD = 16.65'	MLLW	
SMP02C-2	0	33'	✓		WD = 13.03'	MLLW	
SMP02C-3	0	33'	✓		WD = 12.81'	MLLW	
~~SMP02A-1~~	~~0~~						

TIME SUMMARY

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA ITEM	INVOICE DATA TIME/FOOTAGE
06:30	07:00	Travel to Topwater Grill / Marina		
07:00	07:15	Wait on USACE / Refuel ~~/ JHA~~		
07:15	07:30	JHA		
07:30	08:00	Transit to jack-up boat		
08:00	08:30	Position jack up onto SMP02C-2		
08:30	08:45	Allow jack up boat to settle		
08:45	11:00	Drill & sample SMP02C-2 Down to 51'		
		Below MLLW		
11:00	11:15	Pull augers / pipe out of hole		
11:15	11:30	Reposition jack up ~~rig~~ to SMP02C-3		
11:30	12:00	Allow jack up to settle & move spare outboard		
		out of ~~move~~ the way to move ideal location		
12:00	13:15	Drill & sample SMP02C 3 down to -50' MLLW		
13:15	13:30	Pull up pipe / augers		
13:30	14:00	Relocate jack up to SMP02A-1		
14:00	14:15	Allow jack up to settle		
14:15	16:00	Drill & sample SMP02A-1 to -50' MLLW		
~~16:00~~	16:	& Pull pipe & auger		
16:00	16:15	Reposition jack up on location SMP02A 2		
16:15	16:30	Allow jack up to settle		
16:30	18:00	Drill & sample down SMP02A 2 down to -50' MLLW		
18:00	18:30	Pick up pipe & auger		
18:30	18:45	Discuss plan of action for tomorrow & Load up on		
		support vessel		
18:45	19:15	Travel to Topwater Grill / Marina		
19:15	19:45	Travel to Hotel		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER:	PROJECT:
9/16/18	04 1918[illegible]	HSC ECI 7

CREW		PAYROLL	PER DIEM	
DRILLER:	D. Edwards	[illegible]	☐ YES	☐ NO
HELPER:	M. Bartee[illegible] & Wilburn	[illegible]	☐ YES	☐ NO
TECHNICIAN:	A. Bu[illegible]	[illegible]	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	GROUT	OTHER
SMP01-1	0	34'	✓		WD = 16.7' MLLW		
SMP01-2	0	34'	✓		WD = 16.25' MLLW		

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA ITEM	UNIT EXTENDED
06:30	07:00	Travel to Transfer Drill & Marina		
07:00	07:15	Load up on support vessel & TK4		
07:15	07:45	Transport to jack up boat		
07:45	08:00	Radio in to VTS for movement clearance		
08:00	09:30	Relocate to SMP01-1		
09:30	09:45	Position on SMP01 & Allow jack up to settle		
09:45	12:30	Drill & sample SMP01-1 down to -50'MLLW		
12:30	13:00	Pull pipe & Auger / Pick up arms		
13:00	13:15	Relocate to SMP01-2		
13:15	15:00	Drill & sample down to ~~[illegible]~~ -50' MLLW at SMP01-2		
15:00	15:45	Pull pipe & Augers up		
15:45	16:00	~~Load up~~ Wait & Load up onto support vessel		
16:00	17:30	Travel to Dock (Topwater)		
17:30	17:45	~~Travel to Hotel~~ Discuss Plan of Action for the morning		
17:45	18:15	Travel to Hotel		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER	PROJECT:
9/17/12	[illegible]	HSC CCIP

CREW		PAYROLL	PER DIEM	
DRILLER	D. Edwards	[illegible]	YES	NO
HELPER	W. Bretzel & W. [illegible]	[illegible]	YES	NO
TECHNICIAN:	A. Bu[illegible]	[illegible]	YES	NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED MUD	MATERIALS USED GROUT	OTHER
SMPOIRZ-1	0	31'	✓		WD= 20.35'	MLLW	
SMPOIRZ-2	0	31'	✓		WD = 19.6'	MLLW	

TIME SUMMARY

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA ITEM	INVOICE DATA TIME/FOOTAGE
06:30	07:15	Travel to Galveston Yacht Basin to Drop off Shallow Draft support boat captain		
07:15	09:30	Travel to Gulf Copper to [illegible] repair		
09:30	10:00	Repair [illegible] on SD 104 [illegible]		
10:00	10:15	Travel to Texas City Dike Launch		
10:15	11:15	Wait for support vessel & everyone to arrive		
11:15	11:30	Load up & JHA		
11:30	11:45	Travel to Jack up boat		
11:45	12:00	Set up & unload to jack up		
12:00	12:15	Position on SMPOIRZ-1		
12:15	14:45	Drill & sample SMPOIRZ-1 down to -50' MLLW		
14:45	15:00	Pick up augers / pipe		
15:00	15:30	[illegible] jack up on SMPOIRZ-2		
15:30	18:30	Drill & sample SMPOIRZ-2 down to -50' MLLW		
18:30	18:45	Pick up / discuss sampling procedure for tomorrow to prevent wash out		
18:45	19:00	Transport to Texas City Dike Launch		
19:00	19:15	Unload support vessel & discuss plan for tomorrow		
19:15	19:45	Travel to hotel		

(Continued on back)

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT
9/18/18	[illegible]	HSC ECIP

CREW	PAYROLL	PER DIEM	
DRILLER: D. Edwards	[illegible]	☐ YES	☐ NO
HELPER: W. Britzel & W. Wilburn	[illegible]	☐ YES	☐ NO
TECHNICIAN: A. B-1	[illegible]	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	MATERIALS USED: GROUT	MATERIALS USED: OTHER
SMP01-3	0	35'	✓		WD = 15.44'	MLLW	
SMP01-4	0	15'	✓		WD = 15.49'	MLLW	
SMP01-5	0	15'	✓		WD = 15.46'	MLLW	

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	INVOICE DATA: TIME/FOOTAGE
06:30	07:00	Travel to Texas City Dike launch		
07:00	07:15	JHA		
07:15	07:30	Wait for Cheryl to discuss sampling plan & plan of action for today		
07:30	07:45	Transport to jack up boat		
07:45	08:00	[illegible] on jack up		
08:00	08:15	Position jack up on SMP01-3 (North alt. position)		
08:15	10:30	Drill & sample SMP01-3 down to -50' Mudline		
10:30	10:45	Pick up pipe & Augers		
10:45	11:00	Reposition Barge on SMP01-4		
[illegible]	12:00	Drill & sample down to 15' Below Mudline to collect sample washed out previously on Hole 3		
12:00	12:15	Pull pipe & Augers		
12:15	12:30	Reposition on SMP01-5		
12:30	13:00	Drill & sample down to 15' Below mudline to collect lost sample from previous hole locations		
13:00	13:15	pull pipe & Augers		
13:15	13:30	Decontaminate drilling tools & sampling tools. Unload samples from ODMS & Ref stations & load up to go back / transport to dock		
13:30	14:30	Travel to Gulf Copper to pick up packages		
14:30	[illegible]	Travel to Hotel		

(Continued on back)

[illegible]

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT:
09/15/18	04.18180039	H&C ECIP

CREW		PAYROLL	PER DIEM	
DRILLER: D. Edwards			☐ YES	☐ NO
HELPER: W. Gretzel & W. Wilburn			☐ YES	☐ NO
TECHNICIAN: A. Bull			☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	MATERIALS USED: GROUT	MATERIALS USED: OTHER
SMP036-1	0	40'	✓		WD = 10.6' MLLW		
SMP036-2	0	39'	✓		WD = 10.3' MLLW		
SMP036-3	0	30'	—	✓	WD = 12.54' MLLW		(Hair terminated early b/c of refusal)

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	INVOICE DATA: UNIT QUANTITY
06:00	06:30	Travel to Eagle Pt Fishing Club Dock		
06:30	06:45	Load up Boat		
06:45	07:00	JHA / Safety meeting		
07:00	07:15	Travel to Jack up		
07:15	07:30	Unload gear & supplies		
07:30	07:45	Position jack up on location SMP036-1		
07:45	11:45	Drill & Sample Down to -50' MLLW at SMP036-1		
11:45	12:00	Pull pipe & Augers		
12:00	12:30	Discuss How to proceed b/c of lack of recovery		
12:30	12:45	Position jack up on SMP036-2		
12:45	15:45	Drill & sample down to -50' MLLW on SMP036-2		
15:45	16:00	Pull pipe / augers		
16:00	16:15	Load up on support boat		
16:15	16:30	Travel to Eagle Pt. Fishing Club Dock		
16:30	17:15	Travel to hotel		

(Continued on back)

FUGRO

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT:
9/20/18	04.1817[illegible]	HSC ECIP

CREW		PAYROLL	PER DIEM	
DRILLER: D. Edwards		[illegible]	☐ YES	☐ NO
HELPER: W. Bretzel & C. Wilburn		[illegible]	☐ YES	☐ NO
TECHNICIAN: A. Bull		[illegible]	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	MATERIALS USED: GROUT	MATERIALS USED: OTHER
SMP03C-4	0	-20'		✓	WD = -4.93'	MLLW	(Also see sample log SHW in log)
SMP03A-1	0	14'		✓	WD = 13.47	MLLW	(Sampler broke off in hole)

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	INVOICE DATA: TIME/FOOTAGE
05:45	06:30	Travel to Eagle Pt. Dock		
06:30	06:45	Load up support vessel		
06:45	07:00	JHA & Transport to ~~Dock~~ Jack Up		
07:00	07:15	Unload gear & pipe onto Jack up		
07:15	07:45	Position on SMP03C-3		
07:45	12:15	Drill & sample SMP03C-3 down to -50' MLLW		
12:15	12:30	Pull pipe & augers		
12:30	12:45	Reposition barge		
12:45	13:00	Barge to settle		
13:00	14:30	Drill & Sample Down ~~at~~ SMP03C-4		
		(Hole terminated Early b/c of lack/misrepresented		
		samples)		
14:30	14:45	Pick up pipe / augers		
14:45	15:00	Relocate to SMP03A-1		
15:00	16:00	Drill down to 14' below mudline; sampler broke.		
		[illegible] hole b/w 14-19' interval		
16:00	16:15	Discuss how to proceed		
16:15	16:30	pick up pipe / augers / load up on support [illegible]		
16:30	17:00	Travel to Eagle Pt. Dock		
17:00	17:30	Travel to Hotel		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE	JOB NUMBER	PROJECT:
9/21/18	04.18180028	HSC ECIP

CREW		PAYROLL	PER DIEM	
DRILLER: D. Edwards			☐ YES	☐ NO
HELPER: W. Brtza! & W. Wilkins			☐ YES	☐ NO
TECHNICIAN: A. Bui			☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	MATERIALS USED: GROUT	OTHER
SMP04C-1	0	40'	✓		WD = 10.30'	MLLW	
SMP04C-2	0	40'	✓		WD = 9.65'	MLLW	
SMP04A-1	0	36'	✓		WD = 14.13'	MLLW	

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA ITEM	INVOICE DATA TIME/FOOTAGE
06:00	06:30	Travel to Eagle Pt Dock to Drop off Everett		
06:30	07:00	Travel to Sylvan Beach Launch		
07:00	07:30	Wait for Everett to arrive w/ support Boat		
07:30	07:45	Load up on support Boat / JHA		
07:45	08:15	Travel to jack up near SMP04C		
08:15	08:30	Position jack up on location @ SMP04C-1		
08:30	10:30	Drill & sample down to -50' MLLW on SMP04C-1		
10:30	10:45	Reposition on SMP04C 2		
10:45	12:30	Drill & Sample SMP04C 2 Down to -50' MLLW		
12:30	12:45	Pull pipe & Augers		
12:45	13:00	Move to SMP04A-1		
13:00	14:00	~~Drill~~ Weather Standby (Rain & Lightning)		
14:00	15:15	Drill & sample SMP04A-1 Down to -50' MLLW		
15:15	15:45	Travel Back to Sylvan Beach Launch		
15:45	16:00	Unload & figure out where to tie off Boat		
16:00	16:30	Travel Back to hotel		

(Continued on back)

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT:
9/22/12	[illegible]	[illegible]

CREW	PAYROLL	PER DIEM
DRILLER: D. Edwards	hrs	[illegible]
HELPER: N. Bretzel & W. Walburn	hrs	[illegible]
TECHNICIAN: A. Bull	hrs	[illegible]

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED MUD	MATERIALS USED GROUT	MATERIALS USED CASING

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INFO DATA ITEM	INFO DATA INFORMATION
06:00	06:30	Travel to deck (Sylvan Beach)		
06:30	15:30	Weather Delay (rain / lightning)		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER:	PROJECT
9/23/18	[illegible]	HSC [illegible]

CREW		PAYROLL	PER DIEM	
DRILLER:	D. Edwards		☐ YES	☐ NO
HELPER:	W. Bretzel & W. Wilburn		☐ YES	☐ NO
TECHNICIAN:	A. Bull		☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	GROUT	OTHER
SMP04a-2	0	38'	✓		WD = 13.3'	MLLW	
DUP04a-1	0	37'	✓		WD = 13.78'	MLLW	
DUP04a-2	0	38'	✓		WD = 13.38'	MLLW	
DUP04c-1	0	41'	✓		WD = 9.67'	MLLW	
DUP04c-2	0	41'	✓		WD = 9.67	MLLW	

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	UNIT/FOOTAGE
[illegible]	06:30	Travel to Sylvan Beach Dock		
06:30	06:45	Load up support vessel & JHA		
06:45	07:00	Travel to jack up Boat		
07:00	07:15	Unload from support Boat		
07:15	07:30	Position jack up on SMP04a-2		
07:30	08:45	Drill & Sample SMP04a-2 down to -50' MLLW		
08:45	09:00	Pick up pipe & Augers		
09:00	09:30	Decon & Reposition jack up for Duplicate (Dup4a-1)		
09:30	10:30	Drill & Sample Dup4a-1 Down to -50' MLLW		
10:30	10:45	Pick up pipe & augers		
10:45	11:00	Reposition on DUP04a-2		
11:00	12:00	Drill & Sample DUP04a-2 -50' MLLW		
12:00	12:15	Pick up pipe & augers		
12:15	12:45	Relocate to DUP04c-1		
12:45	14:00	Drill & Sample DUP04c-1		
14:00	14:15	Pick up Augers & pipe		
14:15	14:30	Reposition Jack up boat onto DUP04c-2		
14:30	16:15	Drill & Sample DUP04c-2 down to -50' MLLW		
16:15	16:45	Pick up pipe & Augers & Decon		
16:45	17:00	Travel to Sylvan Beach Dock		
17:00	17:15	Unload people & gear		
17:15	17:45	Travel to Hotel		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER:	PROJECT:
9/24/18	04.18180278	HSC ECIP

CREW

	PAYROLL hrs	PER DIEM	
DRILLER: D. Edwards		☐ YES	☐ NO
HELPER: W. Bretzel & W. Wilburn		☐ YES	☐ NO
TECHNICIAN: A. Bull		☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED MUD	MATERIALS USED GROUT	OTHER
SMP05A-1	0	37'	✓		WD = 13.59'	MLLW	
SMP05A-2	0	37'	✓		WD = 14.12'	MLLW	
SMP05C-1	0	39'	✓		WD = 11.88'	MLLW	
SMP05C-2	0	15'	✓		WD = 9.23'	MLLW (replaces lost sample from SMP05C-1)	
SMP05C-3	0	41'	✓		WD = 9.6'	MLLW	
SMP06RZ-1	0	41'	✓		WD = 10.06'	MLLW	

TIME SUMMARY

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA ITEM	INVOICE DATA TIME/FOOTAGE
06:00	06:30	Travel to Sylvan Beach Dock		
06:30	06:45	Load up & JHA		
06:45	07:00	Travel to Jack up Boat ~~& unload~~		
07:00	07:30	Unload & Position jack upon SMP05A-1		
07:30	08:45	Drill & Sample SMP05A-1 down to -50' MLLW		
08:45	09:00	Pick up pipe/augers & Reposition on SMP05A-2		
09:00	10:00	Drill & sample SMP05A-2 down to -50' MLLW		
10:00	10:15	Pick up augers & pipe		
10:15	10:30	Relocate Barge to SMP05C-1		
10:30	11:45	Drill & Sample ~~down to~~ SMP05C-1 down to -50' MLLW		
11:45	12:00	Pick up pipe & augers		
12:00	12:15	Reposition on SMP05C-2		
12:15	13:00	Drill & Sample SMP05C-2 Down to -15' MLLW (complete rep. sample from SMP05C-1)		
13:00	13:15	Reposition on SMP05C-3		
13:15	14:30	Drill & Sample SMP05C-3 down to -50' MLLW		
14:30	15:15	Relocate to SMP06RZ-1		
15:15	16:45	Drill & Sample SMP06RZ-1		
16:45	17:00	Pick up pipe & augers		
17:00	17:15	Finish ~~stu~~ putting samples in Buckets		
17:15	17:30	Load up on support boat		
17:30	17:45	Travel Back to Sylvan Beach Dock		
17:45	18:00	Travel to Hotel		

(Continued on back)

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT
9/25/18	04.4818xxx08	HSC GCIP

CREW	PAYROLL	PER DIEM	
DRILLER D. Edwards		☐ YES	☐ NO
HELPER W. Bradford & W. Wilburn		☐ YES	☐ NO
TECHNICIAN:		☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED MUD	MATERIALS USED GROUT	MATERIALS USED OTHER
SMPOGRZ-2	0'	40'	✓		WD = 10.44'	MLLW	
SMPOGRZ-3	0'	41'	✓		WD = 10.12'	MLLW	
SMPOGRZ-4	0	10'		✓	WD = 10.66' MLLW (sliding back into SMPOGRZ-3)		moved barge & restarted)
SMPOGRZ-5	0	40'	✓		WD = 10.99'	MLLW	

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA TAX	INVOICE DATA [illegible]
06:00	06:30	Travel to dock		
06:30	06:45	Load up on support boat / JHA		
06:45	07:00	Travel in, jack up		
07:00	07:15	Unload & position on SMPOGRZ-2		
07:15	09:00	Drill & sample SMPOGRZ-2 down to -50' MLLW		
09:00	09:15	pick up augers & pipe		
09:15	09:30	Reposition on SMPOGRZ-3		
09:30	10:00	Load porta Pottys up on support vessel to bring		
	11:45	to dock to get serviced		
10:00	~~11:45~~	Drill & sample down SMPOGRZ-3 down to		
~~11:45~~	~~12:15~~	~~Weather Standby (Rain)~~		
~~12:15~~		~~Continue drilling SMPOGRZ-3~~		
11:45	12:15	Weather Standby; Rain		
12:15	12:30	pick up pipe & augers / Transfer porta potties		
12:30	12:45	Reposition Barge on SMPOGRZ-4		
12:45	13:00	Wait on ~~Repo~~ support vessel to return from		
		getting gas		
13:00	13:45	Drill & Sample SMPOGRZ-4 cancelled (@ 10') Bashes Pipeline		
13:45	15:00	Drill & Sample SMPOGRZ-5 Down to -50' MLLW		
15:00	15:15	pick up pipe & augers		
15:15	15:45	Pick up / clean deck / Finish packing in sample		
15:45	16:00	Travel to Dock (Sylvan Beach)		
16:00	16:15	Unload		
16:15	17:00	Travel to Bayland Marina for next docking		
		location		
17:00	17:30	Travel to Hotel		

(Continued on back)

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT:
9/26/18	[illegible]	[illegible]

CREW		PAYROLL	PER DIEM	
DRILLER	D. Edwards	hrs	☐ YES	☐ NO
HELPER	W. Bretzel & W. Wilborn	hrs	☐ YES	☐ NO
TECHNICIAN	A. B[illegible]	hrs	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	MATERIALS USED: GROUT	MATERIALS USED: OTHER
SMP07RZ-1	0	26'	✓		WD = 14.7[illegible]'	MLLW	
SMP07RZ-2	1	36'	✓		WD = 1[illegible]	MLLW	

TIME SUMMARY

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	INVOICE DATA: TIME/FOOTAGE
06:00	06:30	Travel to Bayland Marina Dock		
06:30	07:15	Weather Standby (Rain)		
07:15	07:30	Load up on support boat/JHA.		
07:30	08:00	Travel to jack up / [illegible] set up		
08:00	08:45	Relocate move ~250' west of provided location		
		(unsafe for jack up; on slope of channel)		
08:45	10:45	Drill & sample SMP07RZ-1 Down to -70' MLLW		
10:45	11:00	Pick up pipe & Augers		
11:00	11:15	Reposition to SMP07RZ-2.		
11:15	12:30	Drill & sample SMP07RZ-2 down to -50 MLLW		
12:30	12:45	Pick up pipe & put away sample		
12:45	13:00	Reposition to SMP07RZ-3		
13:00	14:00	Drill and sample SMP07RZ-3 starting @ 20' Below mudline		
14:00	18:00	Weather Standby Rain & Lightning		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER:	PROJECT
9/27/18	01.1[illegible]3000[illegible]	HSC ECIP

CREW		PAYROLL	PER DIEM	
DRILLER:	D. Edwards	[illegible]	☐ YES	☐ NO
HELPER:	W. Bretzel & L. Willis	[illegible]	☐ YES	☐ NO
TECHNICIAN:	A. Bula / J. Soto	[illegible]	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	GROUT	OTHER

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	TIME/FOOTAGE
06:00	06:30	Travel to Bayland Marina		
06:30	07:00	Load up onto support boat		
07:00	07:15	Travel to jack up		
07:15	07:30	Unload & JHA		
07:30	07:45	Reposition Barge on SMP07R2-4		
07:45	09:00	Drill & sample SMP07R2-04 down to -50' MLLW		
09:00	09:15	Pull pipe & reposition on SMP07R2-5		
9:15	10:55	Drill & sample SMP07R2-5 0' to -50' MLLW; Remove augers & drill pipe		
10:55	11:00	Position on to SMP07R2-6		
11:00	13:~~00~~15	Drill + sample SMP07R2-6 0' - 50' MLLW; remove augers + drill pipe		
13:15	13:30	Position on to SMP07R2-7		
13:30	14:30	Set up for vibracore sample collection, After assembly of		
		vibracore, assessment of current lead to descision not to use		
		vibracore. (Drive box has very ~~low tolerance / fit in moonpool~~		
		tight fit in moonpool, increasing difficulty ~~fo~~ with retreiving sampler)		
14:30	16:00	Drill + sample SMP07R2-07 0 to ~~16~~ 36 ~~below~~ below MLLW		
16:00	~~16:~~ 16:30	Clean up area, pack up for end of day		
16:30		Travel to ~~Oneill~~ Bayland Marina		

(Continued on back)

FUGRO

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT
9/28/18	04-10180008	HSP ECIP

CREW	PAYROLL	PER DIEM	
DRILLER: Don Edwards	[illegible]	☐ YES	☐ NO
HELPER: W. Bretzl, L. Willis	[illegible]	☐ YES	☐ NO
TECHNICIAN: J. Soto	[illegible]	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED MUD	MATERIALS USED GROUT	MATERIALS USED OTHER
SMP03AR1-1	0	40	✓				
SMP03AR1-2	0	40	✓				

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA ITEM	INVOICE DATA TIME/FOOTAGE
5:15	6:30	Travel to site		
6:30	6:45	Load equipment on to support vessel		
6:45	7:15	Travel to Jack Up		
7:15	7:45	JHA safety meeting; discuss days ~~plan~~ agenda		
7:45	9:30	Travel to SMP03AR2; trouble shooting location coordinates		
9:30	11:30	Drill & sample SMP03AR1-1 0ft to ~~40ft~~ 50ft below MLLW; remove augers & drill pipe		
11:30	11:45	Position on to SMP03AR1-2		
11:45	~~14:30~~	Drill & sample SMP03AR1-2 0ft to 50ft MLLW;		
	~~15:00~~ 15:00	remove augers & drill pipe *		
~~14:30~~	~~14:45~~	Clean up work area		
15:00	15:30	* Roll pin sheared during ~~sample~~ 2nd to last sample;		
		able to hammer last sample but no ~~fert~~ additional sampling		
15:30	16:00	possible		
~~15:00~~	~~15:45~~	Load up support vessel, travel to Eagle Pass		
16:00	16:15	Meet with Fugro management		
16:15	17:00	Travel to San Leon Marina; meet w/dock manager and		
		discuss use of dock and facilities		
17:00	18:30	Travel from site		

(Continued on back)

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT:
9/30/18	04.1815008	HSC ~~Sediment Sampling~~ SCIP

CREW	PAYROLL	PER DIEM	
DRILLER: D. Edwards		☐ YES	☐ NO
HELPER: L. Willis; W. Bretzl		☐ YES	☐ NO
TECHNICIAN: J. Soto		☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	GROUT	OTHER
SMP03ARI-3	0	35	✓				
SMP03CR1-1	0	42	✓				
SMP03CR1-2	0	42	✓				

TIME SUMMARY

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	TYPE OF DATA: ITEM	TIME/FOOTAGE
5:30	6:30	Travel to Eagle point Dock		
6:30	6:45	Load support vessel		
6:45	7:15	Travel to Jack Up		
7:15	7:30	Unload support vessel; Fix deck (boards became loose		
		during the night as barge settled in to water, boards		
		floated loose)		
7:30	7:45	JHA safety meeting		
7:45	~~10:00~~	Drill and sample SMP03ARI-3 0 to -50.5 MLLW;		
	10:15	~~etc~~ remove augers and drill pipe		
10:15	10:30	Move to SMP03CR1-1		
10:30	14:30	Drill + sample SMP03CR1-1 0' to -50.5 MLLW;		
		Trouble w/ sampler ~~stu~~ sand-locked in auger 12:00 - 13:45 ~~30~~		
		Complete hole, remove augers + drill pipe		
14:30	14:45	Position on to ~~N~~ SMP03CR1-2		
14:45	17:00	Drill + sample SMP03CR1-2 0 to -50.5 MLLW		
~~14:30~~		Remove augers + drill pipe		
17:00	17:15	Clean drilling area; prepare for barge movement		
		to Marina		
17:15	17:45 ~~30~~	~~Tow~~ Load support vessel, travel to Eagle point dock		
17:45	~~20~~ 19:45	Jack up barge travel to Topwater Marina ~~for refuel~~,		
19:45	20:15	Unload all collected samples from Jack up to		
		refridgerated truck; Refuel Jack up		
20:15	21:15	Travel from site		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER:	PROJECT:
10/2/18	04.18180008	HSC ECIP pg 1/2

CREW	PAYROLL	PER DIEM
DRILLER: D. Edwards	TK	YES / NO
FITTER: W. Bretzel & L. Willis	hm	YES / NO
TECHNICIAN: A. Bull	lm	YES / NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	MATERIALS USED: GROUT	MATERIALS USED: OTHER
NMP11A-1	04'	14'	✓		WD = 32.52'	MLLW	
NMP11A-2	4'	14'	✓		WD = 31.36'	MLLW	
NMP11C-1	7.5'	11.5'	✓		WD = 33.25'	MLLW	
NMP11C-2	7.5'	11.5'	✓		WD = 33.21'	MLLW	
NMP11C-3	7.5'	11.5'	✓		WD = 33.21'	MLLW	
NMP10C-1	7.5'	11.0'	✓		WD = 33.59'	MLLW	
NMP10C-2	6.5'	10.5'	✓		WD = 34.12	MLLW	
NMP10A-1	3'	7'	✓		WD = 37.39'	MLLW	
NMP10A-2	3.5'	7.5'	✓		WD = 36.92'	MLLW	
NMP11A-3	4'	8'	✓		WD = 32.14	MLLW	

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	DAMAGE DATA: ITEM	DAMAGE DATA: TIME/FOOTAGE
06:00	06:30	Travel to Houston Mooring Company		
06:30	06:45	Load up on support vessel		
06:45	07:15	JHA & Travel to jack up		
07:15	07:30	Unload onto jack up		
07:30	07:45	Position jack up on NMP11a-1		
07:45	08:00	Allow jack up to settle		
08:00	08:45	Drill & sample NMP11A-1 down to 44.5' MLLW		
08:45	09:00	pull pipe & augers		
09:00	09:15	Reposition on NMP11A-2		
09:15	10:15	Drill & sample NMP11A-2 down to -44.5' MLLW		
10:15	10:30	Pick up pipe & augers		
10:30	10:45	Relocate to NMP11C-1		
10:45	11:00	allow jack up to settle		
11:00	11:15	Drill & sample from -40.5' to -44.5' MLLW (NMP11C-1)		
11:15	11:30	pick up pipe/augers & rotate barge to NMP11C-2		
11:30	12:00	Drill & sample NMP11C-2 -40.5' to -44.5' Below MLLW		
12:00	12:30	Position & Drill/Sample NMP11C-3 to -40.5' to 44.5' MLLW		
12:30	13:00	Travel to NMP10C-1/Position on location		
13:00	13:15	Drill & sample NMP10C-1 -40.5' to -44.5' MLLW		
13:15	13:30	pull pipe/augers & reposition on NMP10C-2		
13:30	14:00	Drill/sample Down to -40.5 to -44.5' MLLW @ NMP10C-2		
14:00	14:15	Relocate to NMP10A-1 (move ~500' SSE of coords b/c of ship docked		
14:15	14:45	Drill & sample NMP10A-1 -40.5' to -44.5' & relocate to NMP10A-2		
14:45	15:00	Drill & sample NMP10A-2 -40.5' to -44.5' & relocate to NMP10A-3		
15:00	15:15	Drill & sample NMP10A-3 -40.5' to 44.5'		
15:15	15:45	Drill & sample NMP10A-4 & Pick up pipe & Decon		
15:45	16:00	Relocate to NMP09A-1		pg-1/2

(CONTINUED ON BACK)

FUGRO

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT	
10/2/18	[illegible]	NSC EXT P	Pg 2/2

CREW	PAYROLL	PER DIEM	
DRILLER: B. Edwards	hrs	YES	NO
HELPER: W. Bretzel & L. Willis	hrs	YES	NO
TECHNICIAN: A. Bell	hrs	YES	NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED MUD	MATERIALS USED GROUT	MATERIALS USED OTHER
NMP16B-4	4	8'	✓		WD = 36.41'	MLLW	
NMP09A-1	2	6'	✓		WD = 38.12'	MLLW	
NMP09A-2	3	7'	✓		WD = 37.67'	MLLW	
NMP09A-3	2.5'	6.5	✓		WD = [illegible]	MLLW	

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA ITEM	INVOICE DATA UNIT/QUANTITY
16:00	16:30	Drill & sample NMP09A-1 from -40.5' to -44.5' MLLW		
16:30	17:00	Reposition to NMP09A-2 & Drill & Sample -40.5' to -44.5' MLLW		
17:00	17:15	Reposition on NMP09A-3 & Drill & sample -40.5' to -44.5' MLLW		
17:15	17:30	Picking up augers & pipe		
17:30	18:00	Travel to Dock		
18:00	18:30	Travel to Hotel		

(Continued on back)

FUGRO

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT:	
10/3/16	04.[illegible]	HSC ECI 7	pg. 1/2

CREW	PAYROLL	PER DIEM	
DRILLER:	hrs	☐ YES	☐ NO
HELPER:	hrs	☐ YES	☐ NO
TECHNICIAN:	hrs	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	WATER/PLUG USED MUD	WATER/PLUG USED GROUT	OTHER
NMP09C-1	3	7'	✓		WD = 37.93'	MLLW	
NMP09C 2	2	6'	✓		WD - 38.63'	MLLW	
NMP09C-3	2	6'	✓		WD = 38.49'	MLLW	
NMP09C-4	2.5	6.5'	✓		WD = 38.90'	MLLW	
NMP08C-1	3'	7'	✓		WD = 37.4'	MLLW	
NMP08C-2	2.5'	6.5'	✓		WD = 37.96'	MLLW	
NMP08C-3	3	7'	✓		WD = 37.58'	MLLW	
NMP08C-4	3	7'	✓		WD = 37.73'	MLLW	
NMP08A-1	26	30	✓		WD = 14.93'	MLLW	
NMP08A-2	19'	23'	✓		WD = 20.05'	MLLW	

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA ITEM	INVOICE DATA UNITS/FOOTAGE
06:00	06:30	Travel to Houston Mooring Company Dock		
06:30	06:45	Stop & Load up on support vessel		
06:45	07:15	Travel to pick up & [illegible]		
07:15	07:45	Drill & Sample NMP09C-1 -40.5' to -44.5' MLLW		
07:45	08:00	Drill & sample NMP09C-2 (-40.5' to -44.5' MLLW)		
08:00	08:30	Drill & Sample NMP09C-3 (-40.5' to -44.5' MLLW)		
08:30	08:45	Drill & sample		
08:45	09:00	Pick up augers & pipe		
09:00	09:30	Relocate to NMP08C-1 ~44' East of coord. (not enough soil / too deep @ given coord)		
09:30	09:45	Drill & sample NMP08C-1 -40.5' to -44.5' MLLW		
09:45	10:00	Pick up & move to NMP08C-2		
10:00	10:15	Drill & sample NMP08C-2 -40.5' to -44.5' MLLW		
10:15	10:30	Drill & sample NMP08C-3 -40.5' to -44.5' MLLW		
10:30	11:00	Drill & sample NMP08C-4 -40.5' to -44.5' MLLW		
11:00	11:15	Relocate to NMP08A-1		
11:15	12:00	Drill & sample NMP08A-1		
12:00	12:15	Pick up pipe / Augers		
12:15	12:45	Drill & sample NMP08A-2 -40.5' to -44.5'		
12:45	13:00	Pick up pipe / Augers		
13:00	13:15	Travel to NMP07AH1-1		
13:15	13:45	Drill & sample NMP07AH1-1 (-40.5' to -44.5' MLLW)		
13:45	14:00	Pick up & shift to NMP07AH1-2		
14:00	14:15	Drill & sample NMP07AH1-2 ~~[illegible]~~ (-40.5' to -44.5')		
14:15	14:30	pick up augers & pipe		
14:30	15:00	Reposition & Drill NMP07AH1-3 -40.5' to -44.5' MLLW		
15:00	15:05	pick up pipe & Reposition to NMP07AH1-4		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER:	PROJECT:
10/3/19	04.1318003	HSC ECSP pg 1/2

CREW		PAYROLL	PER DIEM	
DRILLER:	D. Edwards	hrs	YES	NO
HELPER:	W. Bretzel & L.Willis	hrs	YES	NO
TECHNICIAN:	A. Bell	hrs	YES	NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED MUD	MATERIALS USED GROUT	MATERIALS USED OTHER
NMP07AHI-1	21.5'	25.8'	✓		WD = 19.39'	MLLW	
NMP07AHI-2	20.5	24.5	✓		WD = 20.17'	MLLW	
NMP07AHI-3	21.0'	25.0'	✓		WD = 19.33'	MLLW	
NMP07AHI-4	21	25	✓		WD = 19.04'	MLLW	
NMP07AHI-5	21	25	✓		WD = 19.40'	MLLW	

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA HRS	INVOICE DATA TIME/FOOTAGE
15:15	15:30	Drill & sample NMP07AHI-4 (-40.4' to -44.4')		
15:30	16:00	Drill & sample NMP07AHI-5 (-40.4' to -44.5')		
16:00	16:15	Pick up pipe / wash deck / Load up on support		
		Boat		
16:15	16:30	Travel to Houston Mooring Company		
16:30	17:00	Travel to Hotel		

(Continued on back)

FUGRO

DAILY ACTIVITY REPORT

DATE	JOB NUMBER	PROJECT
10/4/18	04.[illegible]	H[illegible]

CREW		PAYROLL	PER DIEM	
DRILLER	D. Edwards	[illegible]	☐ YES	☐ NO
HELPER	W. Bretzel & [illegible]	[illegible]	☐ YES	☐ NO
TECHNICIAN	A. Bull	[illegible]	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	GROUT	OTHER
NMP06C-1	27	33	✓		WD = 11.64'	Muddy	
NMP06C-2	29	33'	✓		WD = 11.[illegible]'	[illegible]	
NMP06A-1	19'	19'	✓		WD = 37.43'	Muddy	
NMP06A-2	[illegible]	10	✓		WD = 31.52'	Muddy	
NMP06A-3	5	8	✓		WD = 36.46'	Muddy	
NMP05C-1	35	38	✓		WD = [illegible]	Muddy	
NMP05C-2	[illegible]	35.5	✓		WD = [illegible].05'	Muddy	
NMP05C-3	25	30	✓		WD = 14.5	Muddy	

TIME SUMMARY

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: TEM	INVOICE DATA: [illegible]
06:00	06:30	Travel to Houston Mooring Company Dock		
06:30	06:45	Load up on Boat & JHA		
06:15	06:30	Travel to jack up Boat		
06:30	06:45	Unload onto jack up		
06:45	07:15	Get coords. input onto GPS		
07:15	07:45	Travel & position on NMP06 C-1		
07:45	08:30	Drill & sample NMP06C-1		
08:30	08:45	Pick up pipe & Augers		
08:45	09:30	Shift to NMP06C-2 & Drill & Sample		
09:30	09:45	Pick up pipe, Move to NMP06A-1		
09:45	10:15	Drill & Sample NMP06A-1 (-41.5' to -44.5')		
10:15	10:30	Drill & Sample NMP06A-2 (" " ")		
10:30	10:45	Drill & Sample NMP06A-3		
10:45	11:00	Pick up pipe		
11:00	11:15	[illegible] Brown Bag [illegible]		
11:15	12:15	Move to NMP05C-1		
12:15	13:15	Drill & Sample NMP05C-1 (44.5' to -49.5' MLLW)		
13:15	13:30	Pull pipe & Reposition on NMP05C-2		
13:30	14:30	Drill & Sample NMP05C-2 (-44.5' to -49.5' MLLW)		
14:30	14:45	Pull pipe & Augers		
14:45	15:00	Relocate to NMP05C-3		
15:00	15:30	Drill & sample NMP05C-3 (-44.5 to -49.5' MLLW)		
15:30	15:45	Pick up pipe & Augers		
15:45	16:00	Wash off Deck / pack up samples / pick up		
16:00	16:30	Load up & travel to Dock (Houston Mooring)		
16:30	17:00	Travel to Hotel		

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER:	PROJECT:
10/5/14	04.15184008	HSC ECIP Pg 1/2

CREW		PAYROLL	PER DIEM	
DRILLER: D. Edwards		hrs	☐ YES	☐ NO
HELPER: W. Bretzel & L. Willis		hrs	☐ YES	☐ NO
TECHNICIAN: A. Bull		hrs	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MUD	GROUT	OTHER
NMP05A-1	8	12'	✓		WD = 37.66'	MLLW	
NMP05A-2	8	12'	✓		WD = 37.51'	MLLW	
NMP05A-3	5'	9'	✓		WD = 40.51'	MLLW	
NMP04A-1	14	19	✓		WD = 36.54'	MLLW	
NMP04A-2	7	12	✓		WD = 37.65'	MLLW	
NMP04C-1	1.5	6.5	✓		WD = 43.27'	MLLW	
NMP04C-2	1.5	6.5	✓		WD = 43.35'	MLLW	
NMP04C-3	1.5	6.5	✓		WD = 43.0'	MLLW	
NMP04C-4	1.5	6.5		✓	WD = 43.01'	MLLW (drill stem broke)	
NMP05C-5	1.0	6.0	✓		WD = 43.07'	MLLW	

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA ITEM	INVOICE DATA TIME/FOOTAGE
06:00	06:30	Travel to Houston Mooring Company Dock		
06:30	06:45	Load up & JHA		
06:45	07:00	Travel to jack up		
07:00	07:15	Unload ppl. & equip.		
07:15	07:30	Position on NMP05A-1		
07:30	08:00	Drill & sample NMP05A-1 (-45.5 to -49.5 MLLW)		
08:00	08:15	Pull pipe & augers		
08:15	08:30	Drill & Sample NMP05A-2 (-45.5 to -49.5' MLLW)		
08:30	08:45	Pick up pipe & relocate to NMP05A-3		
08:45	09:00	Drill & sample NMP05A-3		
09:00	10:00	Move to NMP04A-1		
10:00	10:15	Drill & sample NMP04A-1 -44.5' to -49.5'		
10:15	10:30	Pick up pipe/Augers move to NMP04A-2		
10:30	10:45	Drill & sample NMP04A-2		
10:45	11:00	Pull pipe & relocate to NMP04C-1		
11:00	11:15	Drill & sample NMP04C-1		
11:15	11:30	pick up pipe & relocate		
11:30	11:45	Drill & Sample NMP04C-2		
11:45	12:00	Weather Standby; Rain		
12:00	12:15	Drill & Sample NMP04C-3		
12:15	12:30	pick up & shift to NMP04C-4		
12:30	12:45	~~Standby / Mechanical~~ Drill & sample NMP04C-4		
12:45	13:15	Mechanical Standy (Drill stem Broke)		
13:15	13:45	Drill & sample NMP05C-5		
13:45	14:00	Pick up pipe		
14:00	14:30	Travel to NMP03A-1		
14:30	15:30	Drill & Sample NMP03A-1		

(Continued on back)

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT:	
10/5/18	64.18180008	HSC ECIP	pg 2 of 2

CREW

		PAYROLL	PER DIEM	
DRILLER:	D. Edwards	Im	☐ YES	☐ NO
HELPER:	W. Bretzel & L. Willis	Im	☐ YES	☐ NO
TECHNICIAN:	A. Bull	Im	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	MATERIALS USED: GROUT	MATERIALS USED: OTHER
NMP03A-1	0	18.5	✓		WD = 21.18'	MLLW	
NMP03C-1	0	27.5	✓		WD = 21.97'	MLLW	
NMP03CDUP	0	28'	✓		WD = 19.09'	MLLW (refusal	at termination depth)

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	INVOICE DATA: TIME/FOOTAGE
15:30	15:45	Relocate to NMP03C-1		
15:45	16:00	Relocate to position where barge wouldn't possibly get stuck		
16:00	17:00	Drill & Sample NMP03C~~DUP~~-1		
17:00	18:00	Drill & Sample NMP03CDUP-1		
18:00	18:15	~~Relocate to NMP03ADUP~~ pick up pipe & wash off decks		
18:15	18:45	Load up & Travel to Houston Mooring Company Dock		
18:45	19:15			

(Continued on back)

DAILY ACTIVITY REPORT

FUGRO

DATE:	JOB NUMBER:	PROJECT:
10/6/18	04.18180008	HSC ECIP

CREW

	PAYROLL	PER DIEM	
DRILLER: D. Edwards	hrs	☐ YES	☐ NO
HELPER: W. Bretzel & L. Willis	hrs	☐ YES	☐ NO
TECHNICIAN: A. Bull	hrs	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED MUD	GROUT	OTHER
NMP03C DUP	0	10	✓		WD = 20.08'	MLLW	
NMP02C-1	11	33.5	✓		WD = 16.13'	MLLW	
NMP02A-1	10	15	✓		WD = 34.73'	MLLW	
NMP02A-2	10.5	15.5	✓		WD = 34.07'	MLLW	
NMP01AH3-1	0	5.5'	✓		WD = 36.02'	MLLW	
NMP01AH3-2	0	5.5	✓		WD = 36.1'	MLLW	
NMP01AH3-3	0	5	✓		WD = ~~36.06'~~	~~MLLW~~ 36.45' MLLW	
NMP01AH3-4	0	6.5	✓		WD = 35.06'	MLLW	

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA ITEM	INVOICE DATA TIME/FOOTAGE
06:45	07:15	Travel to River Terrace Park		
07:15	07:30	Load up on support Boat / JHA		
07:30	08:00	Travel to jack up on location NMP03C Dup		
08:00	08:45	Drill & Sample NMP03C Dup		
08:45	09:15	pick up & move to NMP02C-1		
09:15	10:15	Drill & Sample NMP02C-1 (-24' to -49.5' MLLW)		
10:15	10:30	Pick up pipe & augers		
10:30	10:45	Relocate to NMP02A-1		
10:45	11:00	Drill & Sample NMP02A1 (-44.5' to -49.5' MLLW)		
11:00	11:30	Drill & Sample NMP02A-2 (" " " ")		
11:30	12:30	Travel to NMP01AH3		
12:30	13:00	Drill & Sample NMP01AH3-1 Down to -41.5'		
13:00	13:15	Drill & Sample NMP01AH3-2 Down to -41.5'		
13:15	13:45	Drill & Sample NMP01AH3-3 " " "		
13:45	14:00	Drill & Sample NMP01AH3-4 " " "		
14:00	14:30	Break Down All Equip. / Clean / Run sample Blank		
14:30	15:00	Load up and travel to River Terrace Park		
15:00	15:30	Travel to pick up Emett @ Bayland Marina		
15:30	16:00	Travel to Houston Mooring		
16:00	16:30	Travel to Hotel		

(Continued on back)

DAILY ACTIVITY REPORT

DATE:	JOB NUMBER:	PROJECT:
10/8/18	0413180008	HSC ECIP

CREW		PAYROLL	PER DIEM	
DRILLER: D. Edwards		hrs	☐ YES	☐ NO
HELPER: W. Bretzel & [illegible]		hrs	☐ YES	☐ NO
TECHNICIAN: A. Bull		hrs	☐ YES	☐ NO

BORINGS DRILLED

BORING NUMBER	FOOTAGE FROM	FOOTAGE TO	COMPLETED YES	COMPLETED NO	MATERIALS USED: MUD	GROUT	OTHER

TIME SUMMARY:

TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY	INVOICE DATA: ITEM	TIME/FOOTAGE
~~0:00~~ 07:00	~~08:00~~	Travel to Seabrook to pick up support boat Captain		
08:00	09:00	Travel to Martin Dock		
09:00	12:15	Unload Barge		
12:15	13:30	Travel to office		

(Continued on back)

APPENDIX C

WEATHER FORECAST

FUGRO
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Hithercroft Road, Wallingford
Oxfordshire, OX10 9RB, UK

Tel : +44 (0) 1491 820 515
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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 12 Sep 2018

Tropical Advisory: Tropical disturbance just N off the Yucatan Peninsula has 50% chance of cyclone formation in the next 48 hours.

Met Situation: (Next 48 hours) A frontal trough lying SW-NE over the NW GoM and N GoM coast remains in situ, filling for a time overnight but deepening again through the mornings/afternoons. An active showery trough N of the Yucatan Peninsula moves WNW across the central GoM, combining with the frontal trough from tomorrow morning. The showery trough lies over the NW GoM on Friday.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Thundery showers, heavy at times and perhaps easing for a time late evenings.

Confidence: Fairly high for trend but moderate for peak wind/wave detail a tropical disturbance moves toward the NW GoM. Low overall by late period. Stronger gusts possible in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
12/0600	E	12	16	0.3	SE	0.3	5	-	0.0	-	0.5	0.8
12/0900	ENE	12	16	0.5	SSE	0.3	5	-	0.0	-	0.6	1.0
12/1200	E	13	17	0.4	SSE	0.4	5	-	0.0	-	0.6	0.9
12/1500	E	15	20	0.7	SSE	0.3	5	-	0.0	-	0.7	1.2
12/1800	ESE	16	21	0.8	SSE	0.2	5	-	0.0	-	0.8	1.3
12/2100	ESE	17	22	0.8	SSE	0.2	5	-	0.0	-	0.9	1.4
13/0000	E	18	23	0.6	SSE	0.4	6	-	0.0	-	0.8	1.3
13/0300	E	18	23	0.6	SE	0.4	6	-	0.0	-	0.8	1.3
13/0600	ENE	19	25	0.7	SE	0.4	6	-	0.0	-	0.8	1.4
13/0900	ENE	19	25	0.7	SE	0.4	6	-	0.0	-	0.8	1.4
13/1200	ENE	18	23	0.9	SE	0.2	6	-	0.0	-	0.9	1.5
13/1500	E	18	23	0.9	-	0.0	-	-	0.0	-	0.9	1.5
13/1800	E	16	21	0.8	-	0.0	-	-	0.0	-	0.8	1.3
13/2100	E	16	21	0.8	-	0.0	-	-	0.0	-	0.8	1.3
14/0000	E	15	20	0.7	-	0.0	-	-	0.0	-	0.7	1.1
14/0300	E	15	20	0.7	-	0.0	-	-	0.0	-	0.7	1.1
14/0600	ESE	13	17	0.5	-	0.0	-	-	0.0	-	0.5	0.9
14/0900	ESE	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.8
14/1200	ESE	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.8
14/1500	SE	11	14	0.4	-	0.0	-	-	0.0	-	0.4	0.7
14/1800	SE	11	14	0.4	-	0.0	-	-	0.0	-	0.4	0.7
14/2100	SE	10	13	0.4	SE	0.2	5	-	0.0	-	0.4	0.7
15/0000	SE	10	13	0.3	SE	0.3	5	-	0.0	-	0.4	0.7
15/0300	ESE	9	12	0.2	SE	0.3	5	-	0.0	-	0.4	0.6
15/0600	ESE	8	10	0.2	SE	0.3	5	-	0.0	-	0.4	0.6
15/0900	SE	8	10	0.2	SE	0.2	5	-	0.0	-	0.3	0.5
15/1200	ESE	8	10	0.2	SE	0.2	5	-	0.0	-	0.3	0.5
15/1500	SE	8	10	0.2	SE	0.2	5	-	0.0	-	0.3	0.5
15/1800	SE	7	9	0.2	SE	0.2	5	-	0.0	-	0.3	0.4
15/2100	SSE	6	8	0.1	SE	0.2	5	-	0.0	-	0.2	0.4
16/0000	SSW	5	7	0.1	SE	0.2	5	-	0.0	-	0.2	0.4
16/0300	W	5	7	0.1	SSE	0.2	5	-	0.0	-	0.2	0.4
16/0600	WNW	5	7	0.0	SSE	0.2	5	-	0.0	-	0.2	0.3
16/0900	NW	5	7	0.0	SSE	0.2	5	-	0.0	-	0.2	0.3
16/1200	NW	5	7	0.0	SSE	0.1	5	-	0.0	-	0.1	0.2
16/1500	SW	6	8	0.1	SSE	0.1	4	-	0.0	-	0.1	0.2
16/1800	S	7	9	0.1	SSE	0.1	4	-	0.0	-	0.1	0.2
16/2100	SSW	8	10	0.1	SSE	0.1	4	-	0.0	-	0.1	0.2
17/0000	WSW	9	12	0.1	SSE	0.1	4	-	0.0	-	0.2	0.3
17/0300	W	9	12	0.0	SSE	0.1	4	-	0.0	-	0.1	0.2
17/0600	WNW	9	12	0.0	SSE	0.1	4	-	0.0	-	0.1	0.2

Forecaster: Jack Wade

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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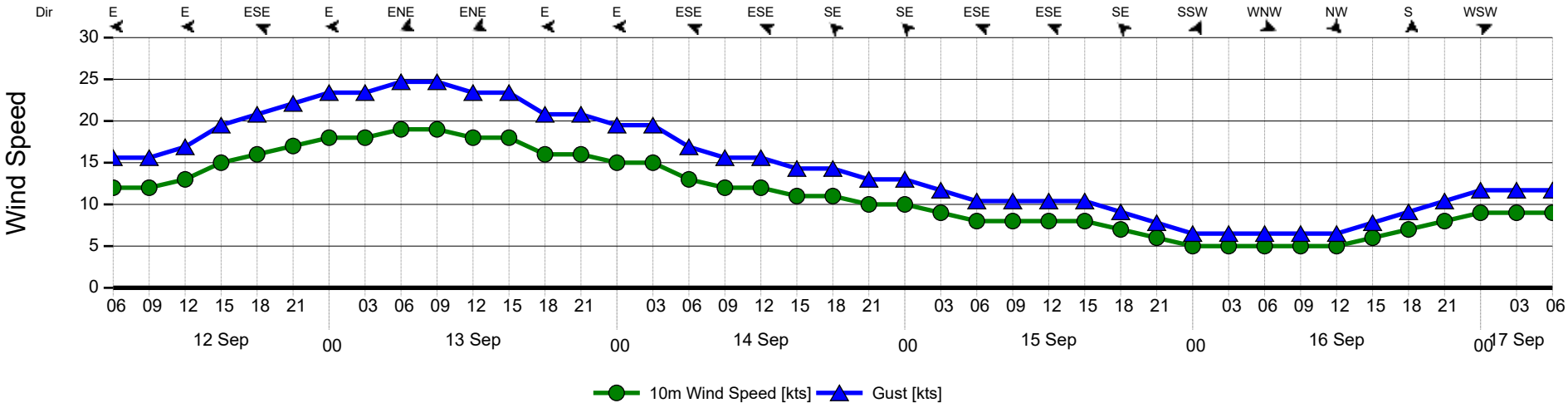
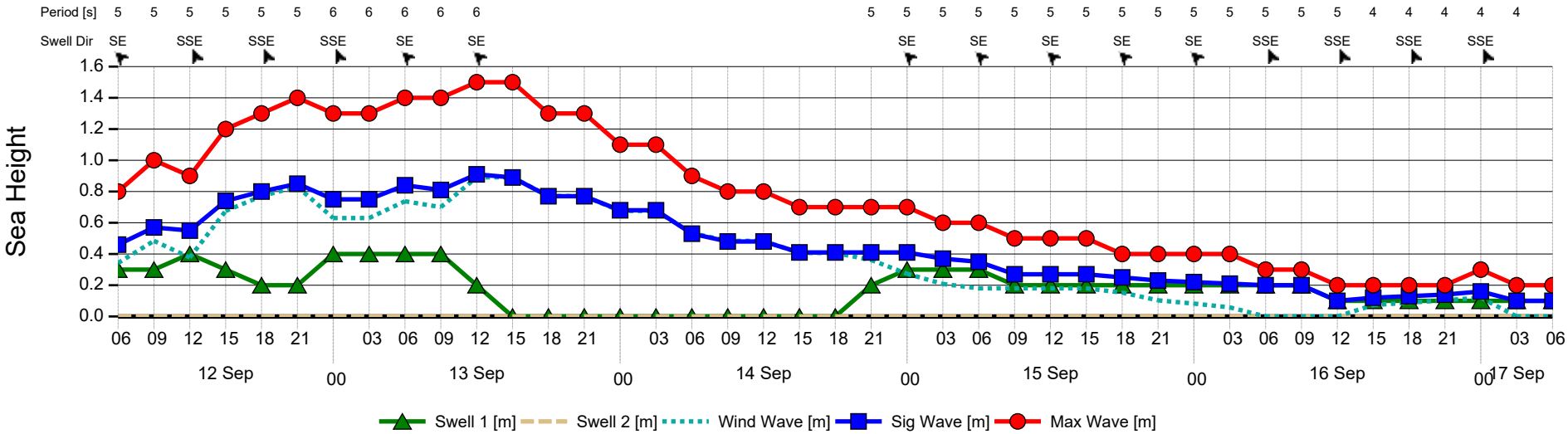
Wind Chart



Wave Chart



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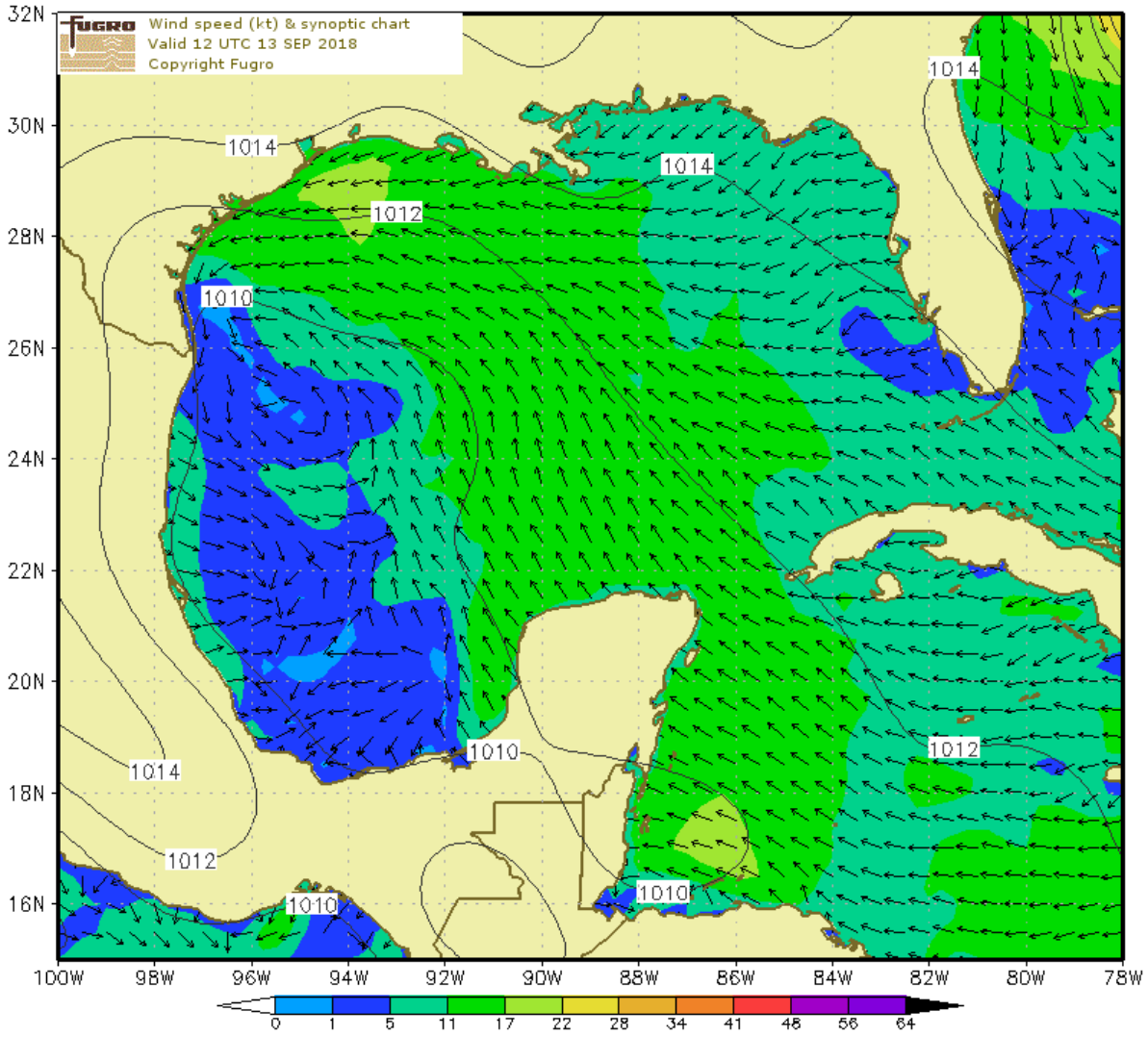

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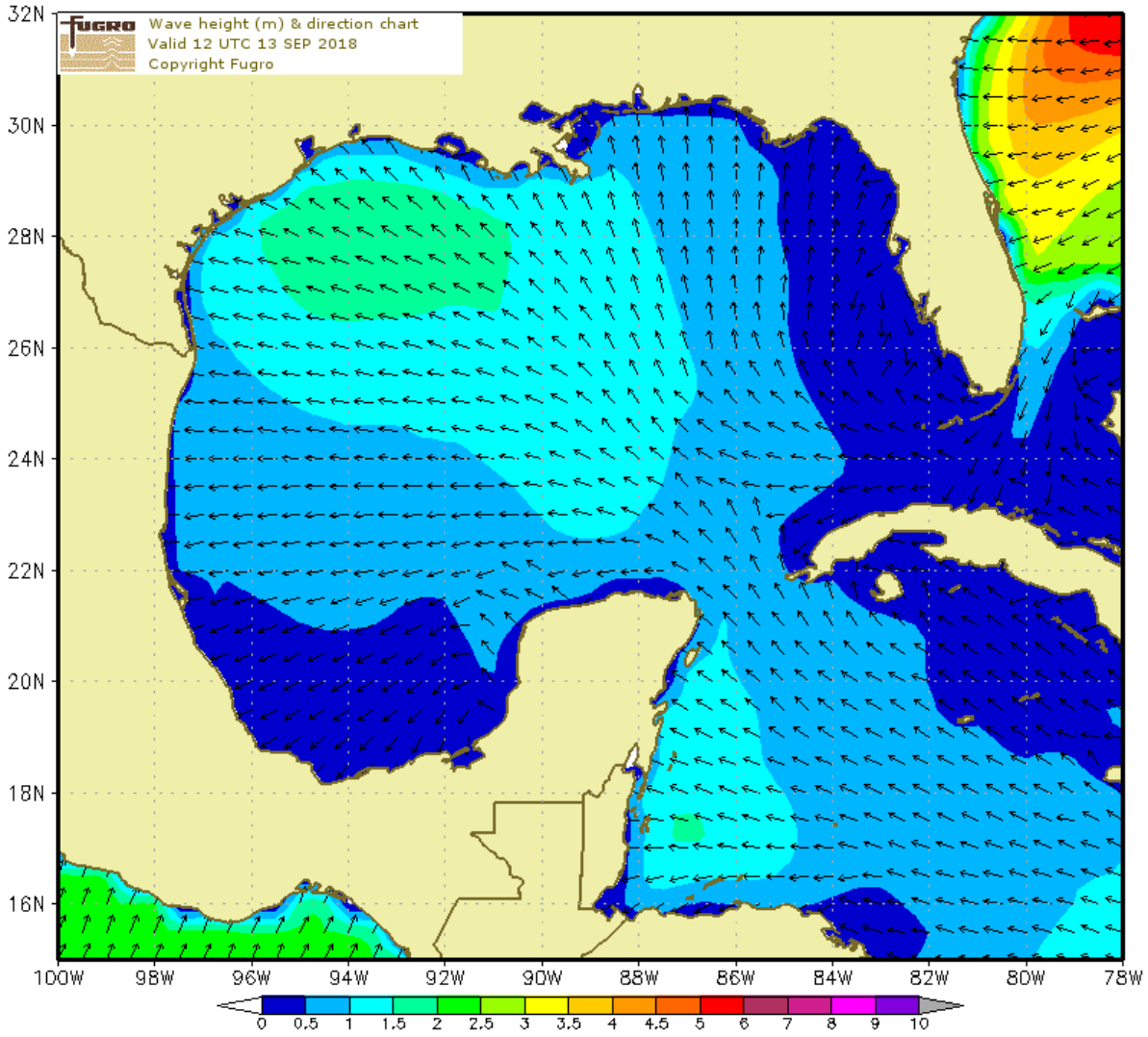

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Hithercroft Road, Wallingford
Oxfordshire, OX10 9RB, UK

Tel : +44 (0) 1491 820 515
Fax : +44 (0) 1491 820 516
Email : forecast@fugro.com

To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 13 Sep 2018

Tropical Advisory: A tropical disturbance over the central GoM has a 60% chance of cyclone formation in the next 48 hours.

Met Situation: (Next 48 hours) A fragmented showery trough lying over the N GoM is absorbed by a tropical disturbance over the central GoM during today, as the disturbance deepens and moves NW to lie over the W GoM from this evening. This then clears over Mexico/Texas tomorrow, as a ridge from the central USA extends SSE towards the N GoM. This persists into Saturday morning.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Showers, heavy at thundery at times.

Confidence: Fairly high for trend but moderate for peak wind/wave detail due to the tropical disturbance. Low overall by late period. Stronger gusts possible in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
13/0600	E	18	23	0.9	SE	0.5	6	-	0.0	-	1.0	1.7
13/0900	E	18	23	0.9	SE	0.5	6	-	0.0	-	1.0	1.7
13/1200	E	18	23	0.8	SE	0.4	6	-	0.0	-	0.9	1.5
13/1500	ESE	17	22	0.8	-	0.0	-	-	0.0	-	0.8	1.4
13/1800	ESE	16	21	0.8	-	0.0	-	-	0.0	-	0.8	1.3
13/2100	E	16	21	0.8	-	0.0	-	-	0.0	-	0.8	1.3
14/0000	E	15	20	0.7	-	0.0	-	-	0.0	-	0.7	1.1
14/0300	E	15	20	0.7	-	0.0	-	-	0.0	-	0.7	1.1
14/0600	E	13	17	0.6	-	0.0	-	-	0.0	-	0.6	1.0
14/0900	ESE	14	18	0.6	-	0.0	-	-	0.0	-	0.6	1.0
14/1200	ESE	13	17	0.5	-	0.0	-	-	0.0	-	0.5	0.9
14/1500	SE	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.8
14/1800	SE	11	14	0.4	-	0.0	-	-	0.0	-	0.4	0.7
14/2100	ESE	10	13	0.3	SE	0.3	5	-	0.0	-	0.4	0.7
15/0000	ESE	9	12	0.2	SE	0.3	5	-	0.0	-	0.4	0.6
15/0300	ESE	8	10	0.2	SE	0.3	5	-	0.0	-	0.4	0.6
15/0600	E	8	10	0.2	SE	0.4	5	-	0.0	-	0.4	0.7
15/0900	ESE	8	10	0.2	SE	0.4	5	-	0.0	-	0.4	0.7
15/1200	SE	8	10	0.2	SE	0.4	5	-	0.0	-	0.4	0.7
15/1500	SSE	7	9	0.2	SE	0.4	5	-	0.0	-	0.4	0.7
15/1800	SSE	6	8	0.1	SE	0.4	5	-	0.0	-	0.4	0.7
15/2100	SSE	5	7	0.1	SE	0.4	5	-	0.0	-	0.4	0.7
16/0000	SSW	5	7	0.1	SE	0.3	5	-	0.0	-	0.3	0.5
16/0300	WSW	6	8	0.1	SSE	0.3	5	-	0.0	-	0.3	0.5
16/0600	W	6	8	0.1	SSE	0.3	5	-	0.0	-	0.3	0.5
16/0900	WNW	6	8	0.0	SSE	0.3	5	-	0.0	-	0.3	0.5
16/1200	W	5	7	0.0	SSE	0.3	5	-	0.0	-	0.3	0.5
16/1500	SW	6	8	0.1	SSE	0.2	4	-	0.0	-	0.2	0.4
16/1800	S	8	10	0.1	SSE	0.2	4	-	0.0	-	0.2	0.4
16/2100	SSW	9	12	0.1	SSE	0.2	4	-	0.0	-	0.2	0.4
17/0000	SW	9	12	0.1	SSE	0.1	4	-	0.0	-	0.2	0.3
17/0300	WSW	9	12	0.1	SSE	0.1	4	-	0.0	-	0.2	0.3
17/0600	W	9	12	0.1	S	0.1	3	SSE	0.1	4	0.2	0.3
17/0900	W	7	9	0.0	S	0.1	3	SSE	0.1	4	0.1	0.2
17/1200	WSW	5	7	0.0	S	0.1	3	SSE	0.1	4	0.1	0.2
17/1500	SSW	7	9	0.2	SE	0.1	4	S	0.1	4	0.2	0.4
17/1800	S	8	10	0.2	SE	0.1	5	-	0.0	-	0.2	0.4
17/2100	SSW	9	12	0.2	SSE	0.1	5	-	0.0	-	0.2	0.4
18/0000	SW	9	12	0.2	SSE	0.1	5	-	0.0	-	0.2	0.4
18/0300	SW	8	10	0.2	S	0.1	3	-	0.0	-	0.2	0.4
18/0600	W	8	10	0.1	S	0.1	3	-	0.0	-	0.1	0.2

Forecaster: Megan Pearson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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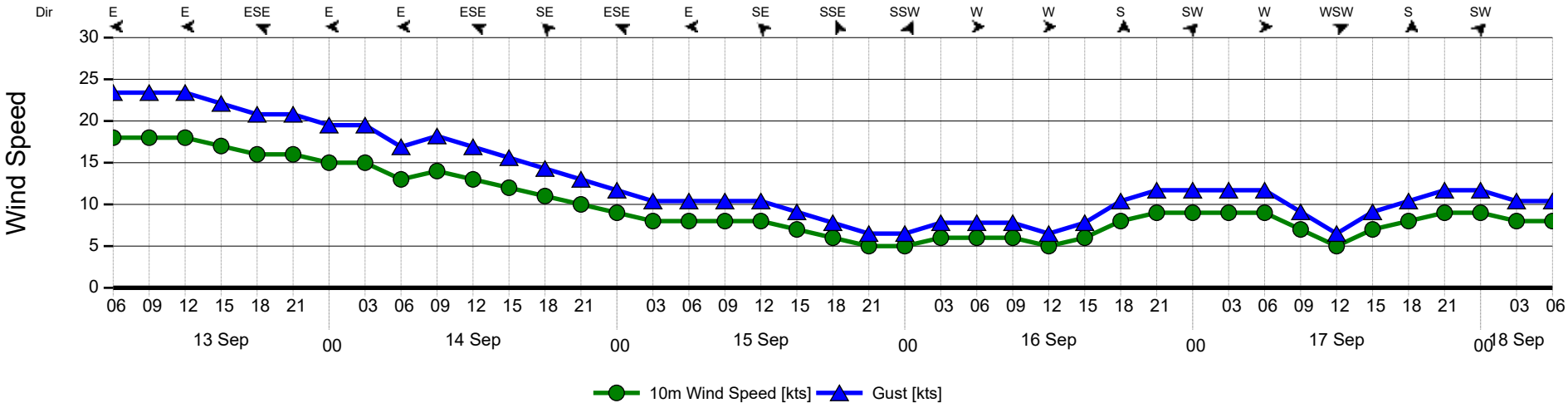
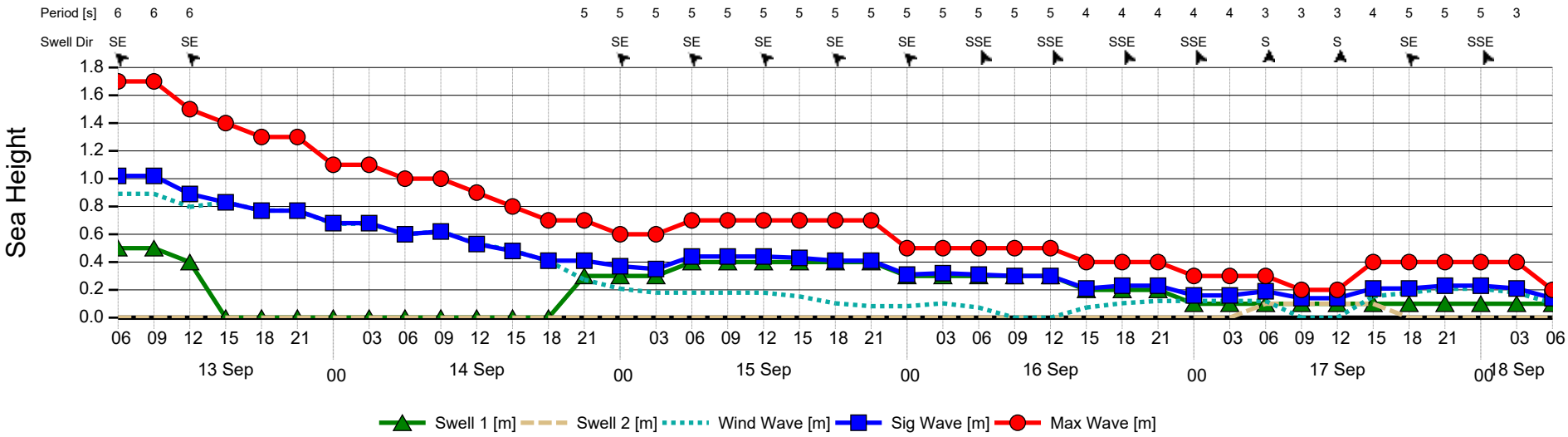
Wind Chart



Wave Chart



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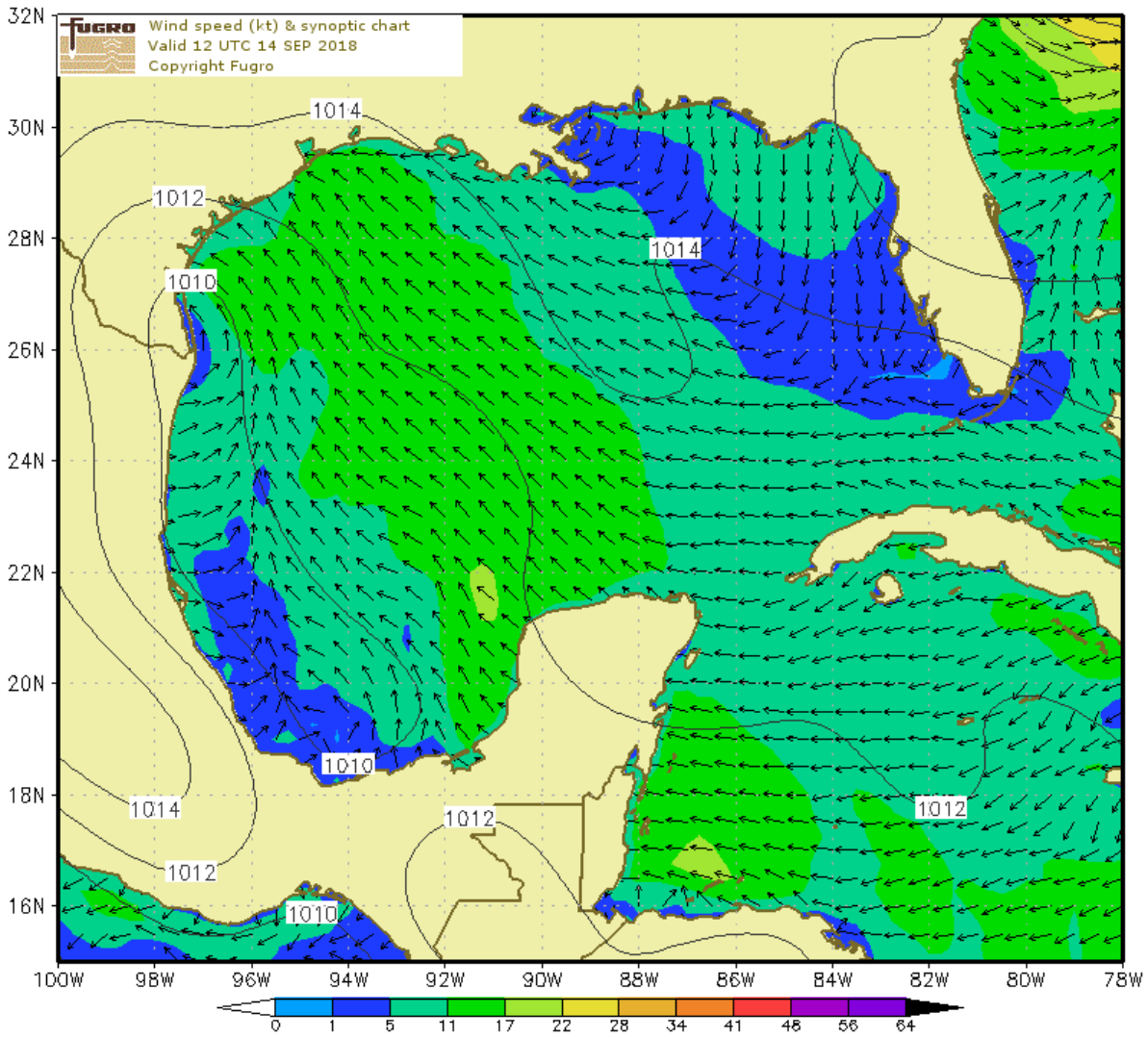

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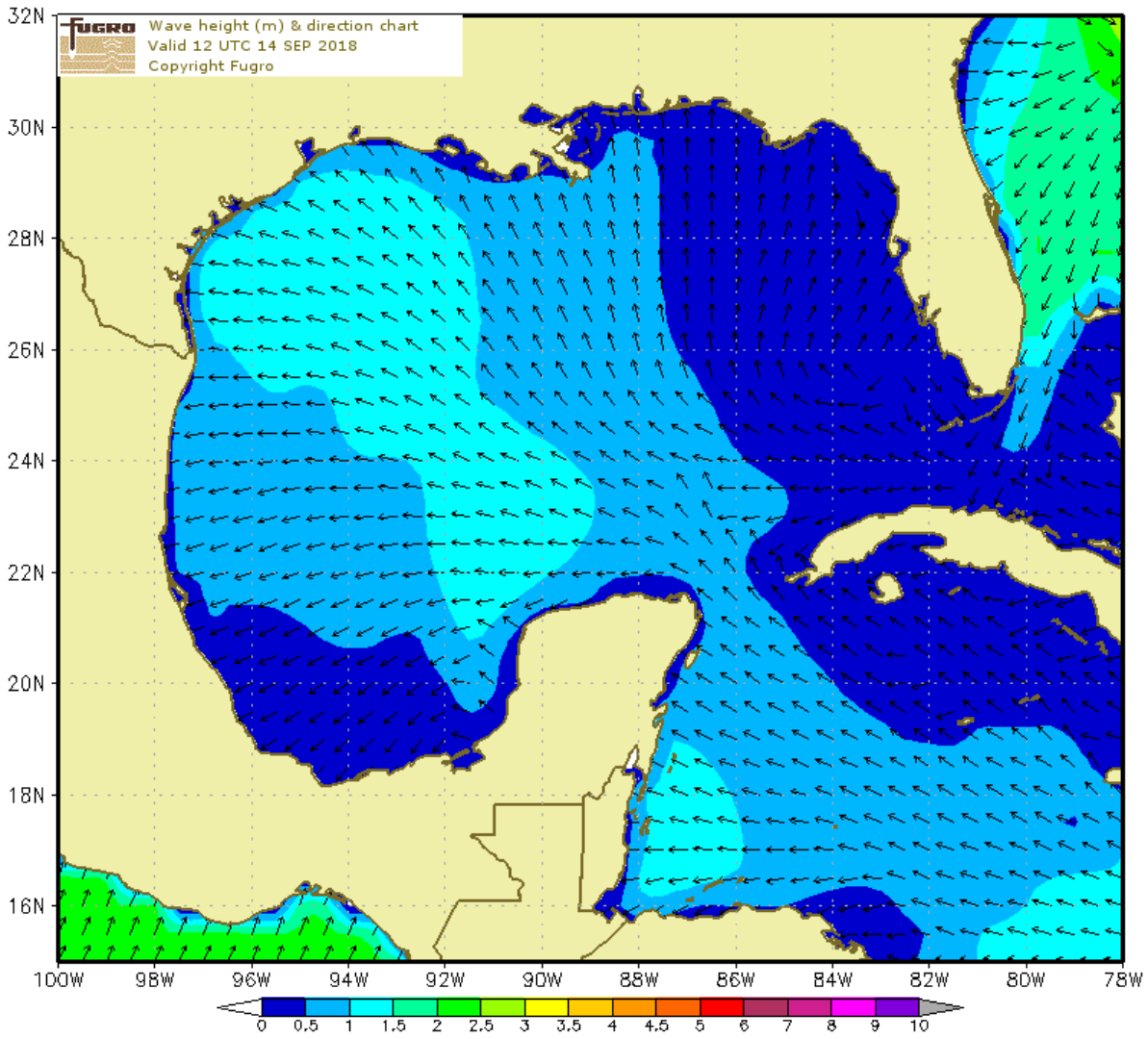

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 14 Sep 2018

Tropical Advisory: A Tropical Disturbance over the W GoM has a 30% chance of cyclone formation in the next 48 hours.

Met Situation: (Next 48 hours) A weakening tropical disturbance over the W GoM clears NW over the Mexico/Texas border this morning. Meanwhile, a ridge builds SSE towards the N GoM, becoming orientated SE from tomorrow evening. Overnight the associated high drifts W slightly into the central USA, allowing a trough to become oriented SW into the NE GoM by Sunday morning.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Risk of heavy and thundery showers through today, before these ease in intensity overnight and during tomorrow morning. Clearing then mainly fair from tomorrow afternoon.

Confidence: Fairly high for trend, but moderate for peak wind/wave detail due to uncertainty in the track of the Tropical Disturbance. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
14/0600	ESE	17	22	0.9	-	0.0	-	-	0.0	-	1.0	1.6
14/0900	ESE	17	22	0.9	-	0.0	-	-	0.0	-	1.0	1.6
14/1200	ESE	16	21	0.9	-	0.0	-	-	0.0	-	0.9	1.6
14/1500	SE	15	20	0.9	SE	0.1	6	-	0.0	-	0.9	1.5
14/1800	SE	13	17	0.8	SE	0.2	6	-	0.0	-	0.9	1.4
14/2100	ESE	11	14	0.7	SE	0.3	6	-	0.0	-	0.7	1.2
15/0000	ESE	11	14	0.6	SE	0.3	6	-	0.0	-	0.7	1.1
15/0300	E	10	13	0.5	SE	0.3	6	-	0.0	-	0.6	1.0
15/0600	E	10	13	0.5	SE	0.4	6	-	0.0	-	0.6	1.0
15/0900	E	11	14	0.4	SE	0.4	6	-	0.0	-	0.6	1.0
15/1200	ESE	11	14	0.4	SE	0.4	6	-	0.0	-	0.6	0.9
15/1500	SE	10	13	0.3	SE	0.4	6	-	0.0	-	0.5	0.8
15/1800	SSE	8	10	0.2	SSE	0.4	5	SSW	0.1	4	0.5	0.8
15/2100	SSE	6	8	0.1	SSE	0.4	5	SSW	0.2	4	0.4	0.7
16/0000	SSE	5	7	0.1	SSE	0.3	5	SSW	0.2	4	0.4	0.6
16/0300	SW	5	7	0.0	SSE	0.3	5	SSW	0.1	4	0.3	0.5
16/0600	WNW	5	7	0.0	SSE	0.3	5	SSW	0.1	4	0.3	0.5
16/0900	NW	5	7	0.0	SSE	0.3	5	SSW	0.1	4	0.3	0.5
16/1200	W	6	8	0.1	SSE	0.3	5	SSW	0.1	4	0.3	0.5
16/1500	SSW	7	9	0.1	SSE	0.2	5	SSW	0.1	4	0.2	0.4
16/1800	SSW	9	12	0.1	SSE	0.2	5	-	0.0	-	0.2	0.4
16/2100	SW	10	13	0.1	SSE	0.2	5	-	0.0	-	0.2	0.4
17/0000	WSW	10	13	0.1	SSE	0.2	5	SSW	0.1	4	0.2	0.4
17/0300	W	9	12	0.1	SSE	0.2	5	SSW	0.1	4	0.2	0.4
17/0600	W	9	12	0.0	SSE	0.2	5	SSW	0.1	4	0.2	0.3
17/0900	W	8	10	0.0	SSE	0.2	5	SSW	0.1	4	0.2	0.3
17/1200	WSW	8	10	0.1	SSE	0.2	5	SSW	0.1	4	0.2	0.4
17/1500	SSW	8	10	0.2	SSE	0.1	5	-	0.0	-	0.2	0.4
17/1800	SSW	9	12	0.2	SSE	0.1	5	-	0.0	-	0.2	0.4
17/2100	SSW	9	12	0.2	SSE	0.1	5	-	0.0	-	0.2	0.4
18/0000	SSW	9	12	0.2	SSE	0.1	5	-	0.0	-	0.2	0.4
18/0300	SW	9	12	0.2	SSE	0.1	4	-	0.0	-	0.2	0.4
18/0600	WSW	9	12	0.1	SSE	0.2	4	-	0.0	-	0.2	0.4
18/0900	WNW	8	10	0.0	SSE	0.2	3	SSW	0.1	4	0.2	0.4
18/1200	SW	7	10	0.1	SSE	0.1	3	SSW	0.1	4	0.2	0.3
18/1500	S	8	10	0.1	SSE	0.1	4	SSW	0.1	4	0.2	0.3
18/1800	S	9	12	0.1	SSE	0.1	4	-	0.0	-	0.2	0.3
18/2100	S	9	12	0.1	SSE	0.1	4	-	0.0	-	0.2	0.3
19/0000	SSW	9	12	0.1	SSE	0.1	4	-	0.0	-	0.2	0.3
19/0300	SSW	9	12	0.1	SSE	0.1	4	-	0.0	-	0.2	0.3
19/0600	SW	8	10	0.1	SSE	0.1	4	SSW	0.1	4	0.2	0.3

Forecaster: Megan Pearson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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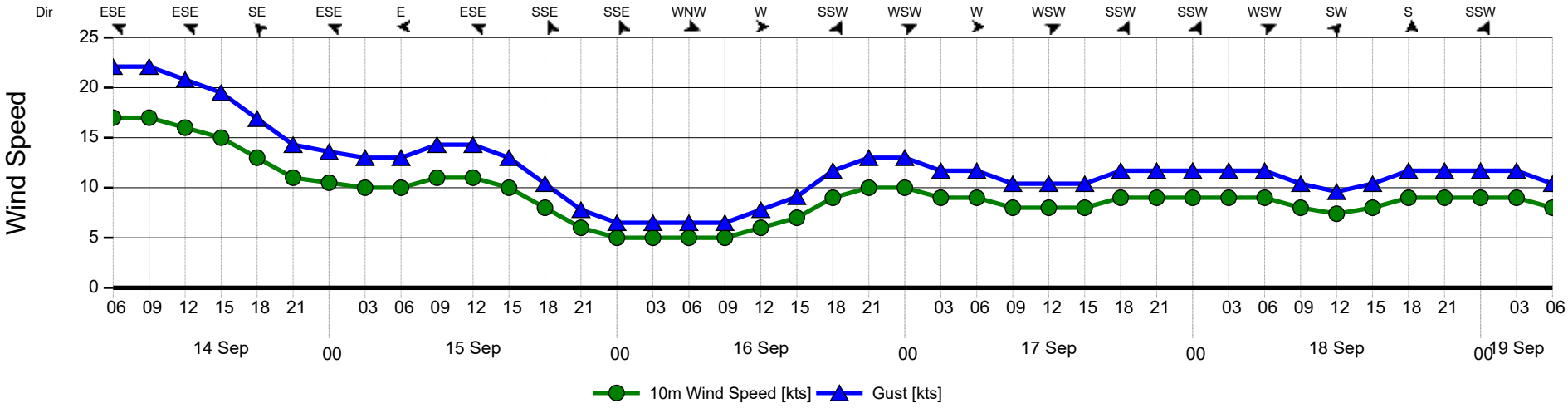
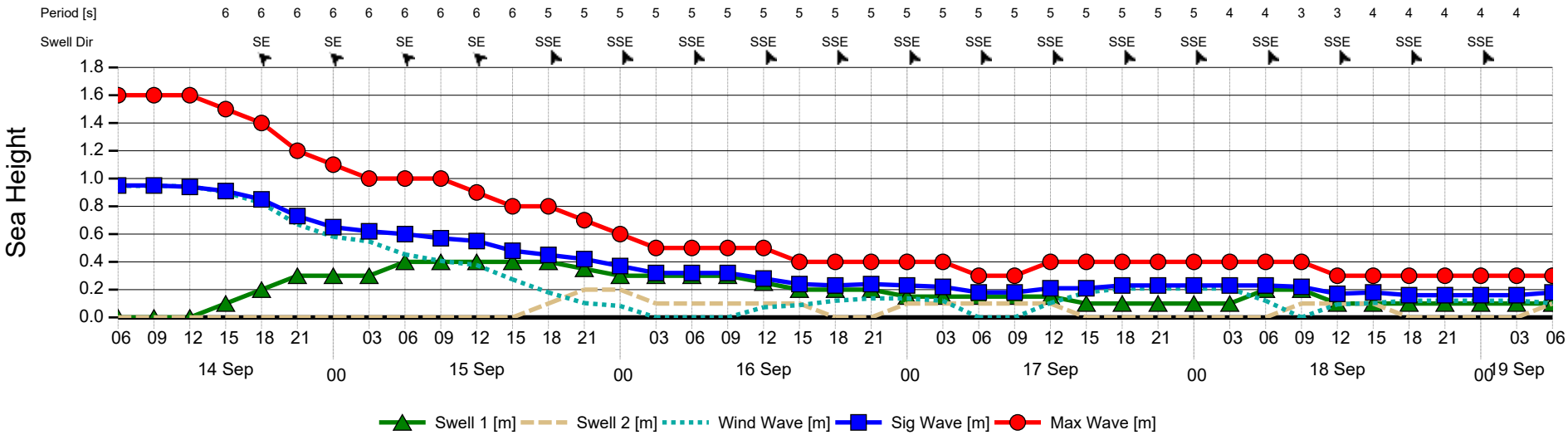
Wind Chart



Wave Chart



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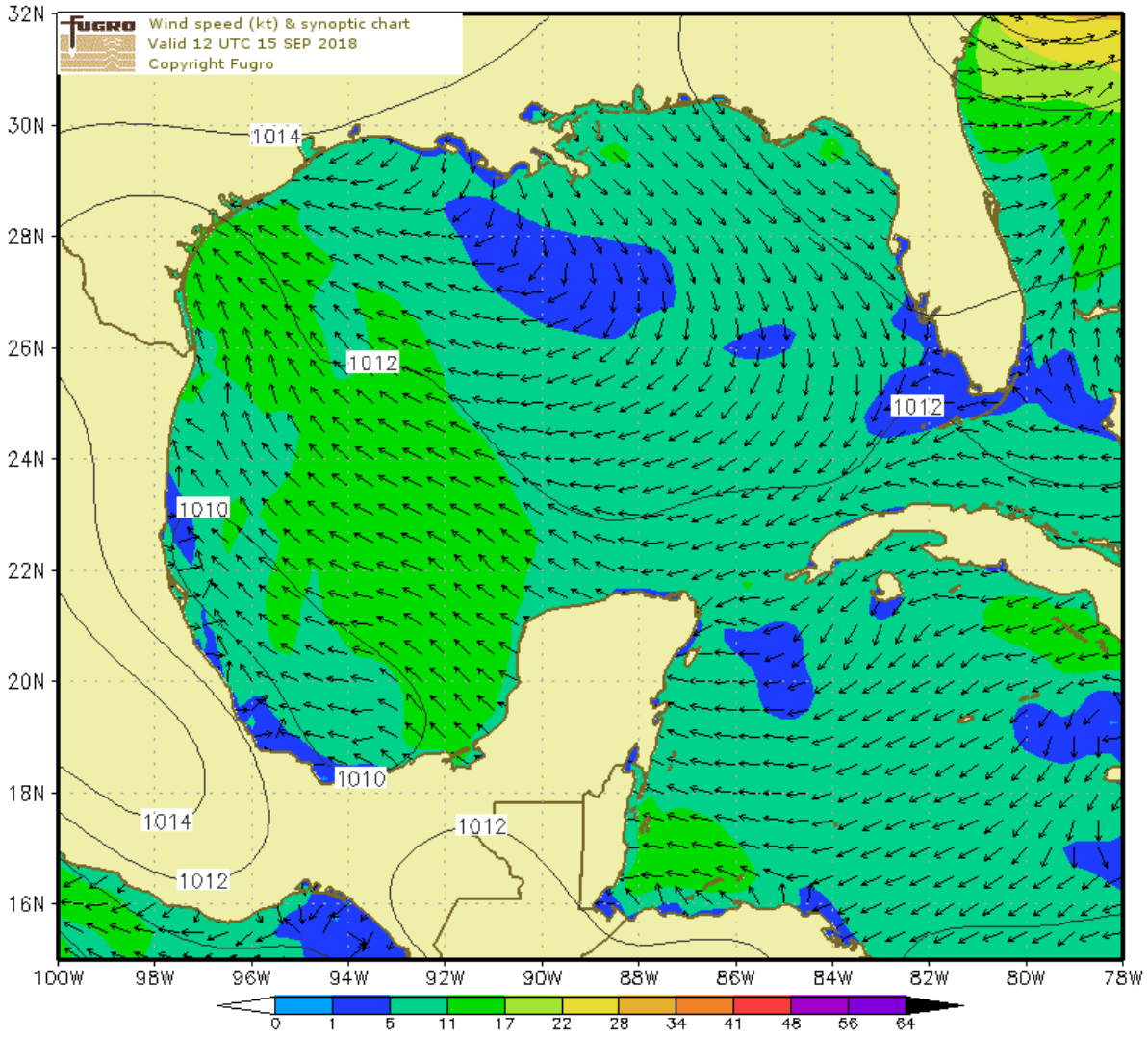

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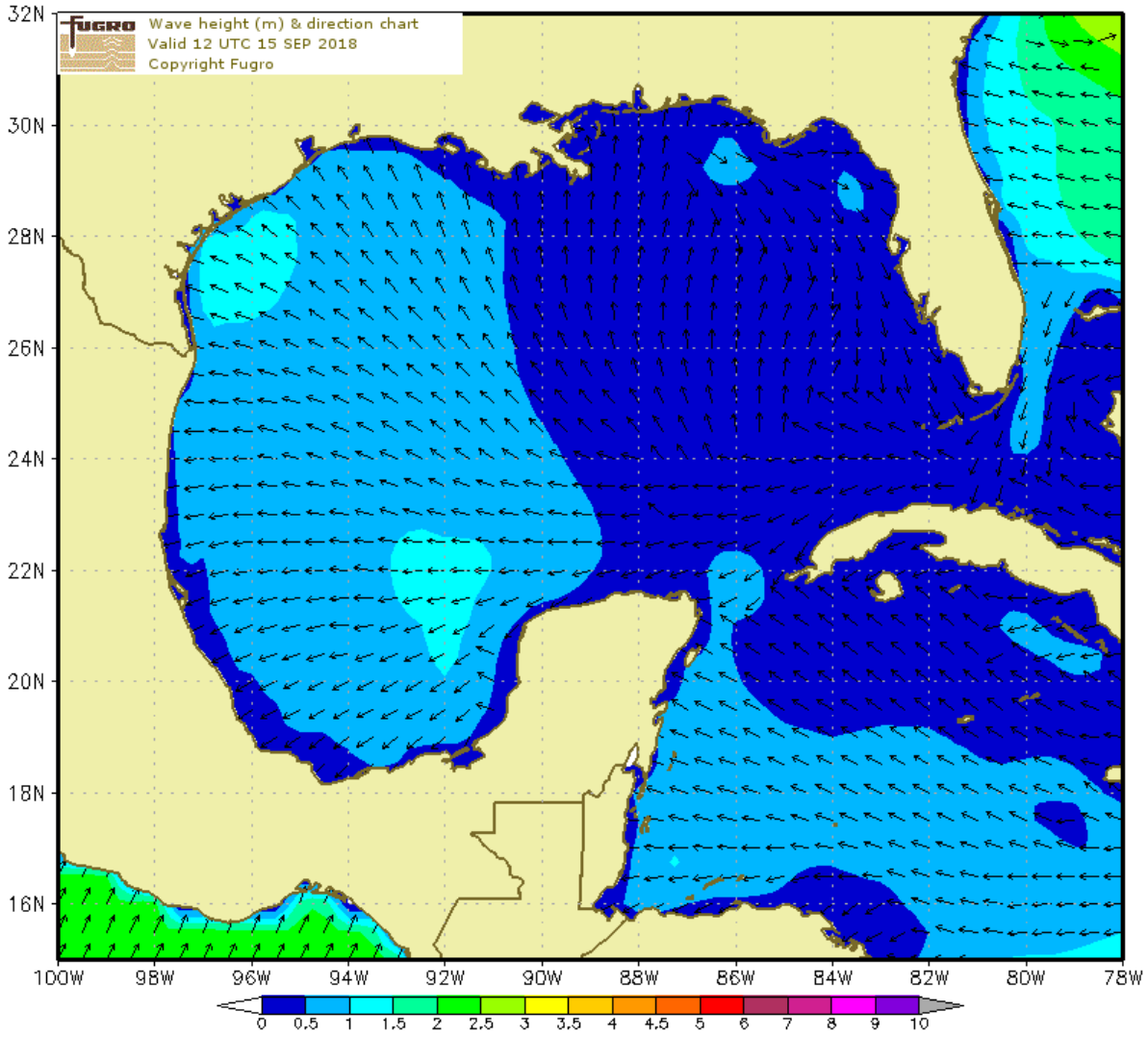

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 15 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) A ridge extends SE towards the N GoM, as the parent high drifts W slightly into the central USA during this afternoon, allowing a trough to deepen SW into the NE GoM by tomorrow morning. This remains in situ throughout Sunday before filling overnight as the pressure gradient becomes slack into Monday morning.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Risk of heavy and thundery showers through this morning. Clearing mainly fair from this afternoon.

Confidence: Fairly high for trend, falling moderate for detail by mid-period. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
15/0600	ESE	12	16	0.3	SE	0.6	6	-	0.0	-	0.7	1.2
15/0900	ESE	12	16	0.5	SE	0.5	6	-	0.0	-	0.7	1.2
15/1200	ESE	12	16	0.5	SE	0.4	6	-	0.0	-	0.6	1.1
15/1500	SE	11	14	0.4	SE	0.4	6	-	0.0	-	0.6	1.0
15/1800	SE	9	12	0.2	SSE	0.5	5	SSW	0.1	4	0.6	0.9
15/2100	SE	6	8	0.1	SSE	0.5	5	SSW	0.2	4	0.5	0.9
16/0000	SSE	4	5	0.0	SSE	0.4	5	SSW	0.2	5	0.5	0.8
16/0300	SSW	3	4	0.0	SSE	0.4	5	SSW	0.2	5	0.5	0.8
16/0600	W	3	4	0.0	SSE	0.4	5	SSW	0.2	5	0.4	0.7
16/0900	NNW	4	5	0.0	SSE	0.3	5	SSW	0.2	5	0.4	0.6
16/1200	WSW	5	7	0.1	SSE	0.3	5	SSW	0.2	5	0.3	0.6
16/1500	S	7	9	0.1	SSE	0.3	5	SSW	0.2	5	0.3	0.6
16/1800	S	8	10	0.1	SSE	0.3	5	SSW	0.1	5	0.3	0.6
16/2100	SSW	8	10	0.1	SSE	0.3	5	SSW	0.1	4	0.3	0.6
17/0000	WSW	8	10	0.1	SSE	0.3	5	SSW	0.1	4	0.3	0.5
17/0300	W	8	10	0.1	SSE	0.2	5	SSW	0.1	4	0.3	0.4
17/0600	W	8	10	0.0	SSE	0.2	5	SSW	0.1	4	0.2	0.4
17/0900	WNW	7	9	0.0	SSE	0.2	5	SSW	0.1	4	0.2	0.4
17/1200	W	7	9	0.1	SSE	0.2	4	SSW	0.1	4	0.2	0.4
17/1500	SSW	8	10	0.1	SSE	0.1	4	SSW	0.1	4	0.2	0.3
17/1800	S	9	12	0.1	SSE	0.1	4	SE	0.1	4	0.2	0.3
17/2100	SSW	9	12	0.1	SSE	0.1	4	SE	0.1	4	0.2	0.3
18/0000	SW	8	10	0.2	S	0.1	4	SE	0.1	4	0.2	0.4
18/0300	WSW	7	9	0.2	S	0.1	4	SE	0.1	4	0.2	0.4
18/0600	W	6	8	0.0	S	0.2	4	SSW	0.1	3	0.2	0.4
18/0900	WNW	6	8	0.0	S	0.2	4	SSW	0.1	3	0.2	0.4
18/1200	SW	6	8	0.1	S	0.1	4	SSW	0.1	3	0.2	0.3
18/1500	S	7	9	0.1	S	0.1	4	-	0.0	-	0.1	0.2
18/1800	SSE	7	9	0.1	S	0.1	4	-	0.0	-	0.1	0.2
18/2100	S	7	9	0.1	S	0.1	5	-	0.0	-	0.1	0.2
19/0000	SSW	7	9	0.1	S	0.1	5	-	0.0	-	0.1	0.2
19/0300	SSW	7	9	0.1	S	0.1	4	-	0.0	-	0.1	0.2
19/0600	WSW	6	8	0.1	S	0.1	4	-	0.0	-	0.1	0.2
19/0900	SW	5	7	0.0	S	0.1	5	-	0.0	-	0.1	0.2
19/1200	S	5	7	0.0	S	0.1	5	-	0.0	-	0.1	0.2
19/1500	SSE	6	8	0.1	S	0.1	5	-	0.0	-	0.1	0.2
19/1800	SE	8	10	0.1	S	0.1	5	-	0.0	-	0.1	0.2
19/2100	SE	10	13	0.1	S	0.1	5	-	0.0	-	0.2	0.3
20/0000	SE	11	14	0.2	S	0.2	5	-	0.0	-	0.3	0.4
20/0300	SSE	11	14	0.2	S	0.3	5	-	0.0	-	0.3	0.5
20/0600	SSE	10	13	0.1	S	0.3	5	-	0.0	-	0.3	0.6

Forecaster: Hannah Mallinson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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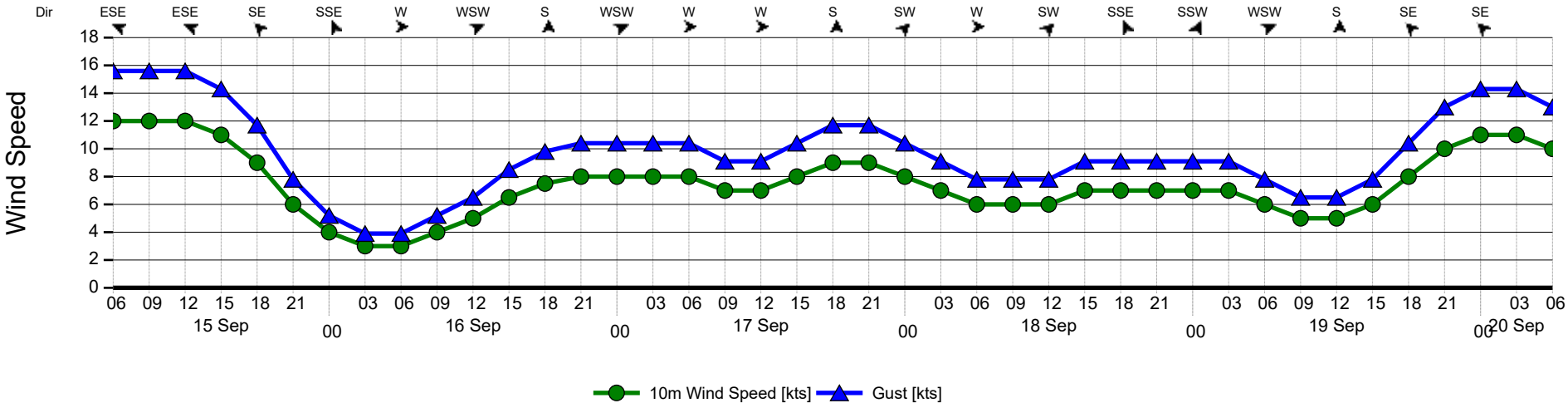
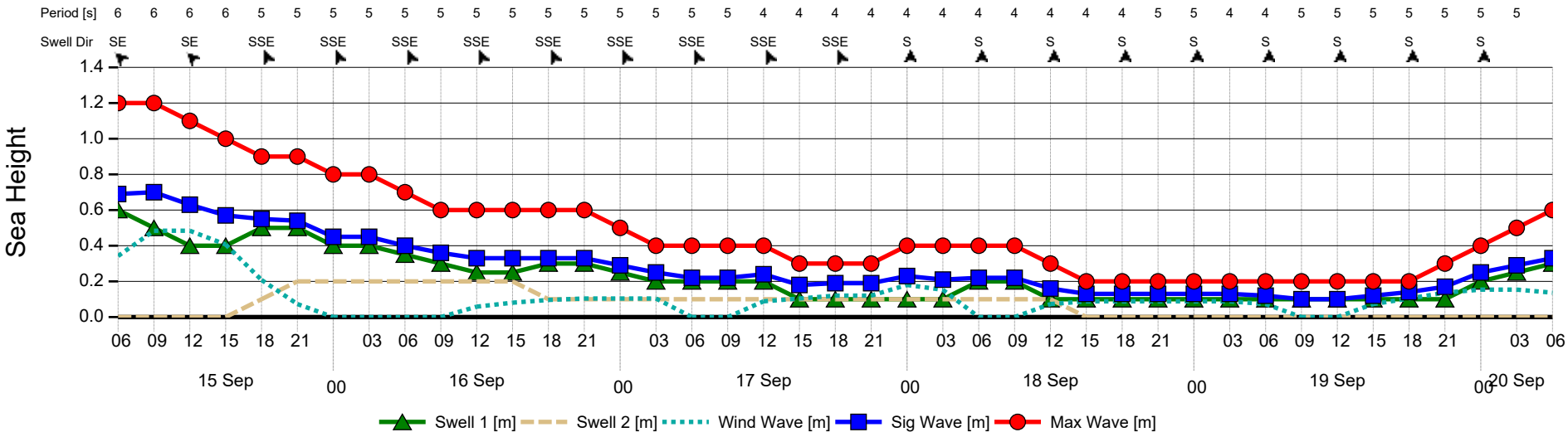
Wind Chart



Wave Chart



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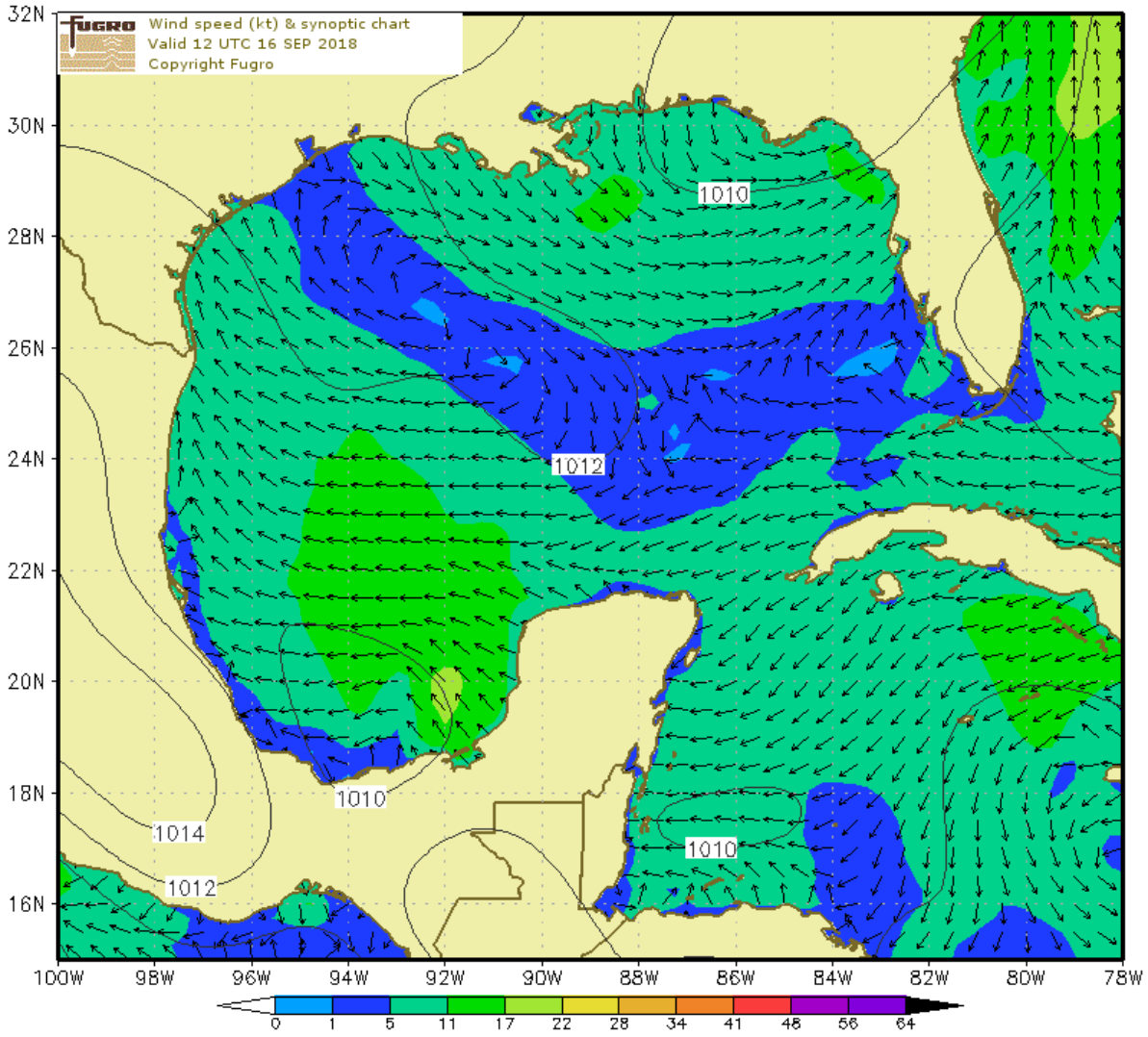

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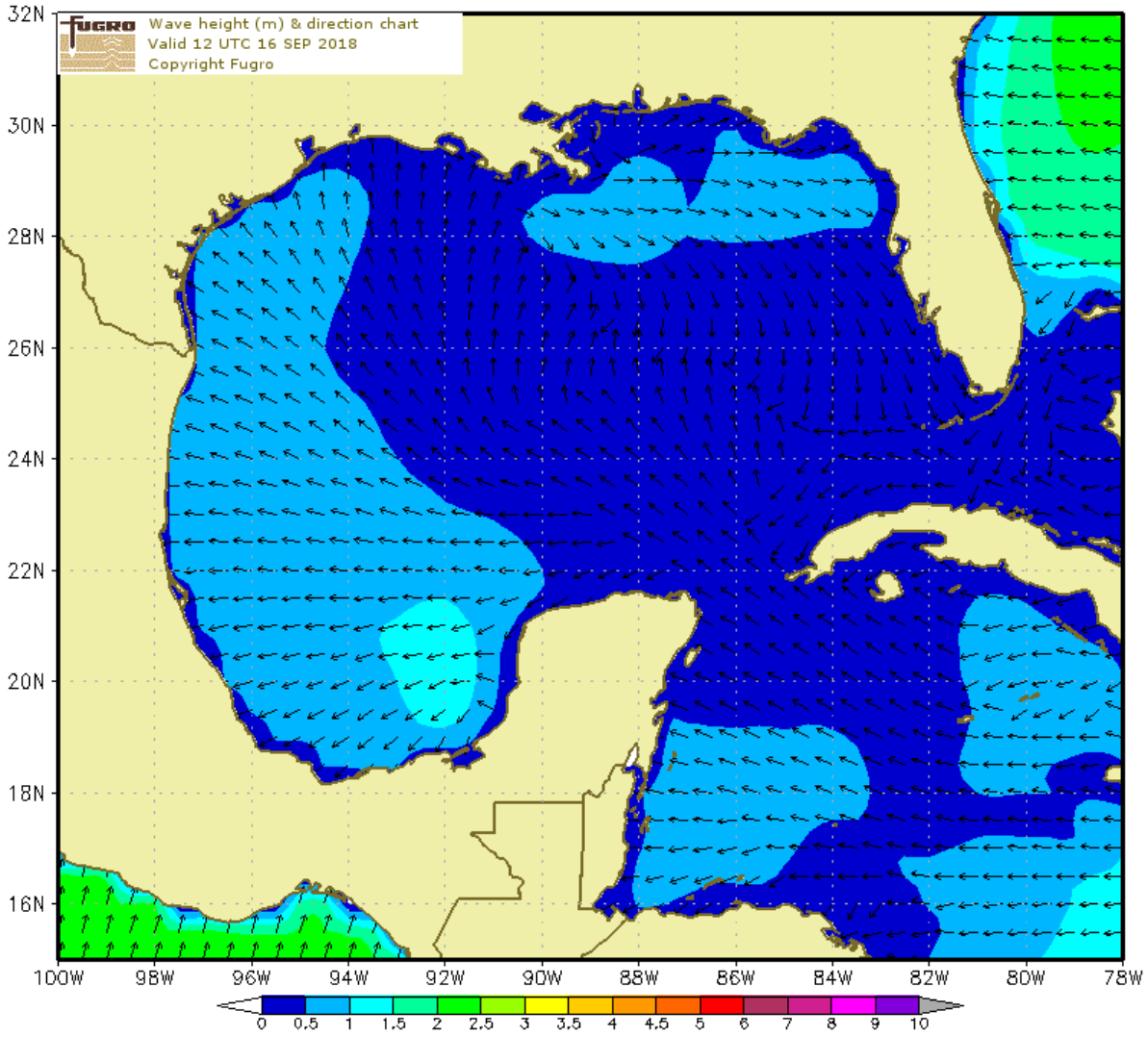

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 16 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) During this morning a trough deepens SW into the NE GoM, and this remains in situ throughout today before filling overnight. From tomorrow morning a weak ridge associated with a high over the central Atlantic extends W-SW into the N GoM, and this persists into Tuesday morning.

WARNINGS: (Next 24 hours) THUNDERSTORMS.

Weather: (Next 48 hours) Generally fair today. Risk of a few showers/thunderstorms tomorrow morning/afternoon before clearing fair again through the evening. Risk of further showers/thunderstorms on Tuesday morning.

Confidence: Fairly high for trend, falling moderate for peak wind/wave detail by mid-period. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
16/0600	NNE	3	4	0.0	SSE	0.4	5	SSW	0.2	5	0.4	0.7
16/0900	N	3	4	0.0	SSE	0.3	5	SSW	0.2	5	0.4	0.6
16/1200	WSW	4	5	0.1	SSE	0.3	5	SSW	0.2	5	0.3	0.6
16/1500	SSW	6	7	0.1	SSE	0.3	5	SSW	0.2	5	0.3	0.6
16/1800	SSW	7	9	0.1	SSE	0.2	5	SSW	0.2	5	0.3	0.5
16/2100	SW	8	10	0.1	SSE	0.2	5	SSW	0.2	5	0.3	0.5
17/0000	WSW	8	10	0.1	SSE	0.2	5	SSW	0.1	4	0.3	0.4
17/0300	W	9	12	0.1	SSE	0.2	5	SSW	0.1	4	0.3	0.4
17/0600	W	9	12	0.0	SSE	0.2	5	SSW	0.1	4	0.2	0.4
17/0900	WNW	9	12	0.0	SSE	0.2	4	SSW	0.1	5	0.2	0.4
17/1200	WNW	8	10	0.0	SSE	0.2	4	SSW	0.1	5	0.2	0.4
17/1500	SW	8	10	0.1	SSE	0.1	4	SSW	0.1	4	0.2	0.3
17/1800	S	8	10	0.1	SSE	0.1	4	SSW	0.1	4	0.2	0.3
17/2100	SSW	8	10	0.1	SSE	0.1	4	SSW	0.1	4	0.2	0.3
18/0000	SW	8	10	0.1	SSE	0.1	4	SSW	0.1	4	0.2	0.3
18/0300	WSW	8	10	0.1	SSE	0.1	4	S	0.1	4	0.2	0.3
18/0600	W	8	10	0.1	SSW	0.1	3	S	0.1	4	0.2	0.3
18/0900	WNW	8	10	0.0	SSW	0.1	3	S	0.1	4	0.1	0.2
18/1200	W	7	9	0.1	SSW	0.1	3	-	0.0	-	0.1	0.2
18/1500	SSW	7	9	0.1	SSW	0.1	3	-	0.0	-	0.1	0.2
18/1800	S	7	9	0.1	S	0.1	4	-	0.0	-	0.1	0.2
18/2100	S	7	9	0.1	S	0.1	4	-	0.0	-	0.1	0.2
19/0000	SSW	8	10	0.1	S	0.1	4	-	0.0	-	0.1	0.2
19/0300	SW	8	10	0.1	S	0.1	4	-	0.0	-	0.1	0.2
19/0600	SW	7	9	0.1	S	0.1	4	-	0.0	-	0.1	0.2
19/0900	WSW	6	8	0.1	S	0.1	3	-	0.0	-	0.1	0.2
19/1200	SSW	6	8	0.1	S	0.1	3	-	0.0	-	0.1	0.2
19/1500	S	7	9	0.1	S	0.1	4	-	0.0	-	0.1	0.2
19/1800	SSE	8	10	0.1	S	0.1	5	-	0.0	-	0.1	0.2
19/2100	SSE	9	12	0.1	S	0.1	5	-	0.0	-	0.2	0.3
20/0000	SSE	10	13	0.2	SSE	0.1	4	-	0.0	-	0.2	0.4
20/0300	SSE	10	13	0.2	SSE	0.1	4	-	0.0	-	0.2	0.4
20/0600	SSE	9	12	0.2	SSE	0.1	4	-	0.0	-	0.2	0.4
20/0900	SSE	8	10	0.2	SSE	0.1	4	-	0.0	-	0.2	0.4
20/1200	SSE	8	10	0.2	SSE	0.1	4	-	0.0	-	0.2	0.4
20/1500	SSE	9	12	0.3	SSE	0.1	5	-	0.0	-	0.3	0.5
20/1800	SSE	11	14	0.4	SSE	0.1	5	-	0.0	-	0.4	0.7
20/2100	SE	12	16	0.4	SSE	0.2	5	-	0.0	-	0.5	0.8
21/0000	SE	13	17	0.5	SSE	0.3	5	-	0.0	-	0.6	0.9
21/0300	SSE	12	16	0.4	SSE	0.4	5	-	0.0	-	0.6	1.0
21/0600	ESE	10	13	0.3	SSE	0.5	5	-	0.0	-	0.6	1.0

Forecaster: Hannah Mallinson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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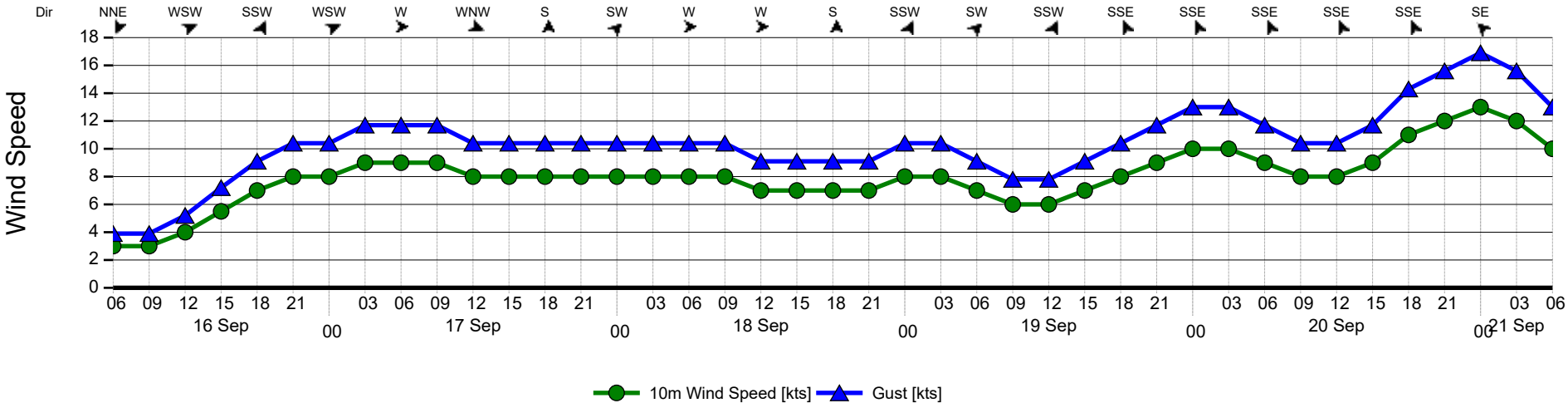
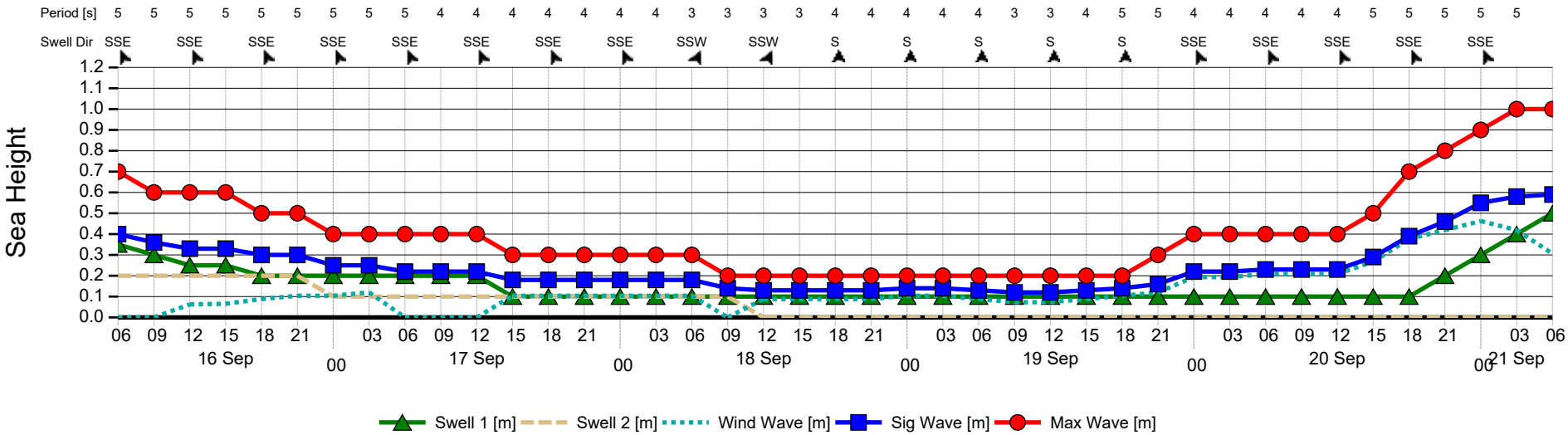
Wind Chart



Wave Chart



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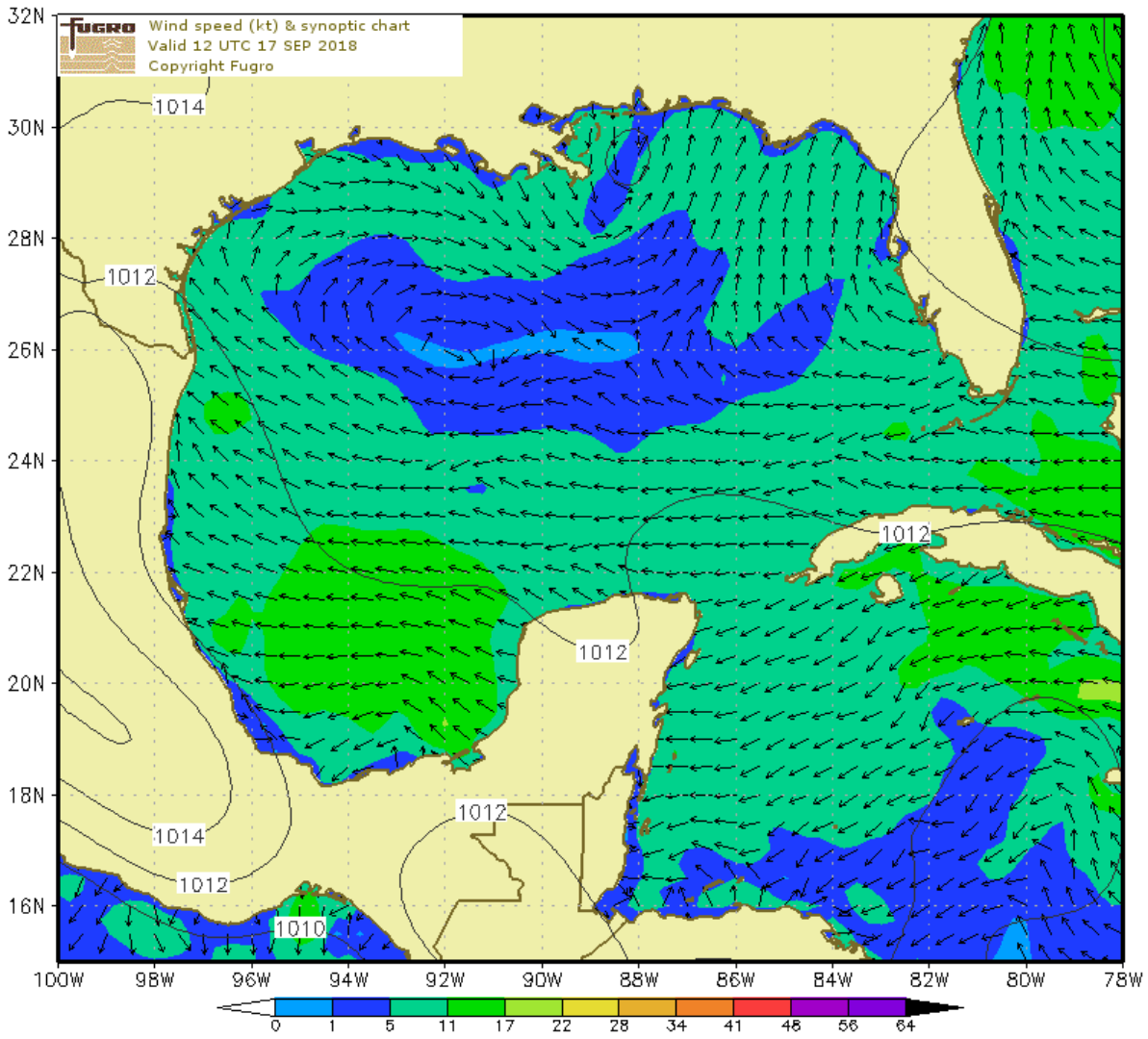

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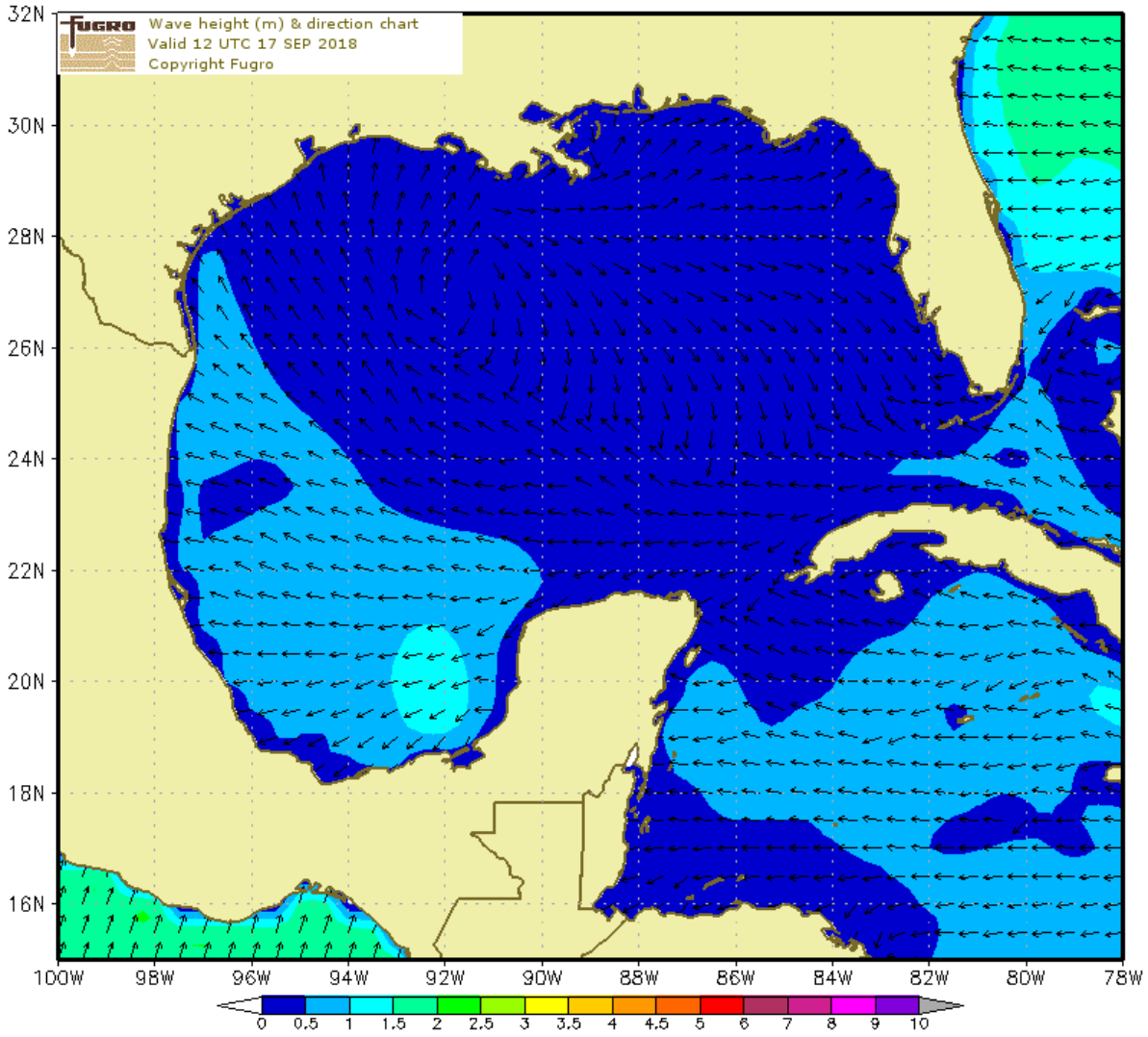

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 17 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) A weak trough lies SW over N Florida and gradually fills to leave a slack pressure gradient across the basin today. From early on Tuesday and into Wednesday, a weak ridge extends S-SSW across the basin. At the same time, weak showery troughs drift WNW over the central GoM.

WARNINGS: (Next 24 hours) THUNDERSTORMS.

Weather: (Next 48 hours) A low risk of thundery showers during the late mornings/early afternoons. Otherwise fair.

Confidence: Fairly high for trend, falling moderate for detail by mid-period. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
17/0600	WNW	7	9	0.0	SSE	0.2	5	SSW	0.1	4	0.2	0.4
17/0900	NW	6	8	0.0	SSE	0.2	4	SSW	0.1	4	0.2	0.4
17/1200	NNW	6	8	0.0	SSE	0.2	4	SSW	0.1	4	0.2	0.4
17/1500	N	6	8	0.0	SSE	0.1	4	SSW	0.1	4	0.1	0.2
17/1800	S	7	9	0.1	SSE	0.1	4	SSW	0.1	4	0.2	0.3
17/2100	SSW	7	9	0.1	SSE	0.1	4	-	0.0	-	0.1	0.2
18/0000	WSW	7	9	0.1	SSE	0.1	4	-	0.0	-	0.1	0.2
18/0300	W	7	9	0.1	SSE	0.1	4	-	0.0	-	0.1	0.2
18/0600	WNW	7	9	0.0	SSW	0.1	3	-	0.0	-	0.1	0.2
18/0900	NW	7	9	0.0	SSW	0.1	3	-	0.0	-	0.1	0.2
18/1200	NW	7	9	0.0	-	0.0	-	-	0.0	-	0.0	0.0
18/1500	ESE	7	9	0.2	-	0.0	-	-	0.0	-	0.2	0.3
18/1800	SSE	7	9	0.2	-	0.0	-	-	0.0	-	0.2	0.3
18/2100	S	7	9	0.2	-	0.0	-	-	0.0	-	0.2	0.3
19/0000	SSW	6	8	0.1	-	0.0	-	-	0.0	-	0.1	0.2
19/0300	SW	6	8	0.1	-	0.0	-	-	0.0	-	0.1	0.2
19/0600	WSW	5	7	0.1	-	0.0	-	-	0.0	-	0.1	0.1
19/0900	NW	6	8	0.0	-	0.0	-	-	0.0	-	0.0	0.0
19/1200	N	6	8	0.0	-	0.0	-	-	0.0	-	0.0	0.0
19/1500	SE	7	9	0.1	-	0.0	-	-	0.0	-	0.1	0.2
19/1800	SSE	8	10	0.1	-	0.0	-	-	0.0	-	0.1	0.2
19/2100	SSE	9	12	0.2	-	0.0	-	-	0.0	-	0.2	0.4
20/0000	SSE	10	13	0.3	-	0.0	-	-	0.0	-	0.3	0.5
20/0300	SSE	10	13	0.4	-	0.0	-	-	0.0	-	0.4	0.6
20/0600	SSE	9	12	0.3	-	0.0	-	-	0.0	-	0.3	0.5
20/0900	SE	10	13	0.4	-	0.0	-	-	0.0	-	0.4	0.6
20/1200	SE	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.8
20/1500	SE	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.8
20/1800	SE	13	17	0.5	-	0.0	-	-	0.0	-	0.5	0.9
20/2100	SE	14	18	0.6	-	0.0	-	-	0.0	-	0.6	1.0
21/0000	SE	14	18	0.6	-	0.0	-	-	0.0	-	0.6	1.0
21/0300	SE	13	17	0.7	-	0.0	-	-	0.0	-	0.7	1.1
21/0600	SSE	12	16	0.7	-	0.0	-	-	0.0	-	0.7	1.2
21/0900	SE	11	14	0.6	-	0.0	-	-	0.0	-	0.6	1.1
21/1200	SE	13	17	0.7	-	0.0	-	-	0.0	-	0.7	1.1
21/1500	SE	13	17	0.8	-	0.0	-	-	0.0	-	0.8	1.4
21/1800	SE	12	16	0.8	-	0.0	-	-	0.0	-	0.8	1.4
21/2100	SE	14	18	1.1	-	0.0	-	-	0.0	-	1.1	1.8
22/0000	SE	14	18	1.1	-	0.0	-	-	0.0	-	1.1	1.8
22/0300	SE	13	17	0.9	SE	0.2	5	-	0.0	-	1.0	1.6
22/0600	SE	12	16	0.8	SE	0.3	5	-	0.0	-	0.9	1.5

Forecaster: Jack Wade

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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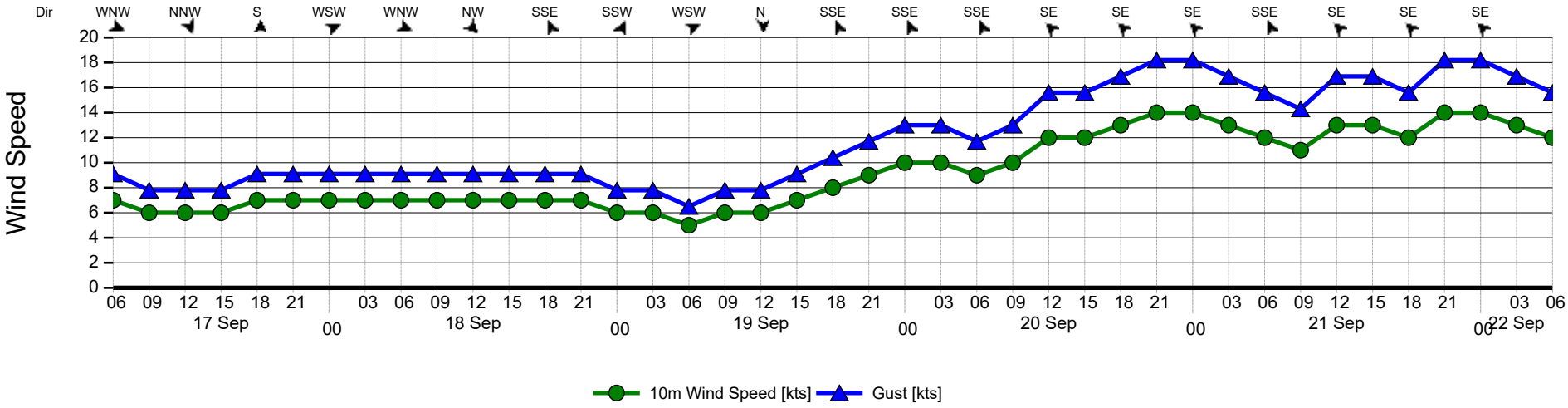
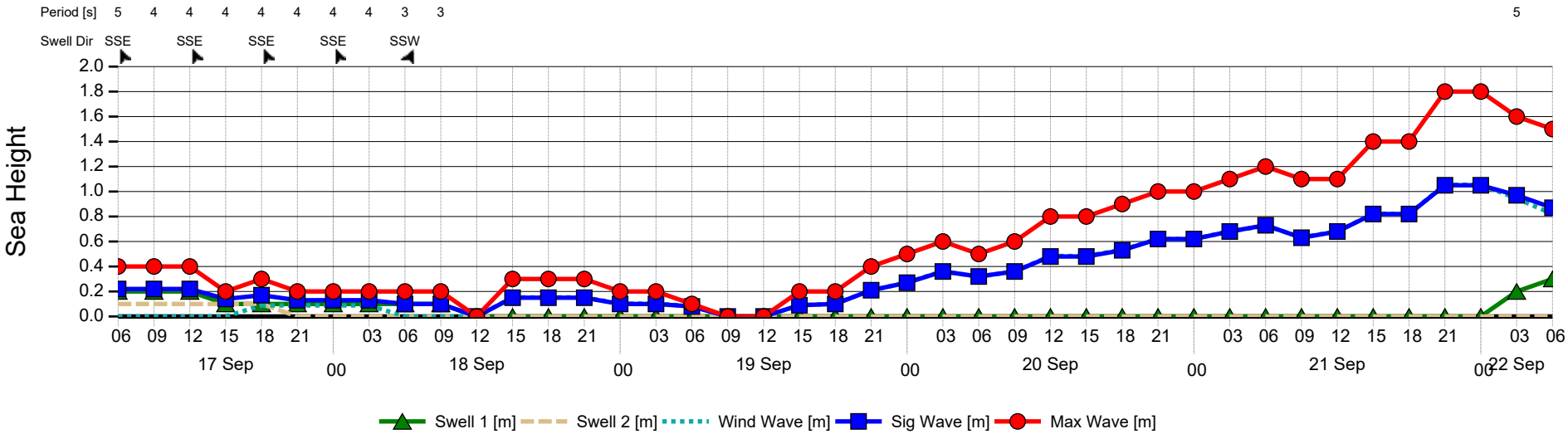
Wind Chart



Wave Chart



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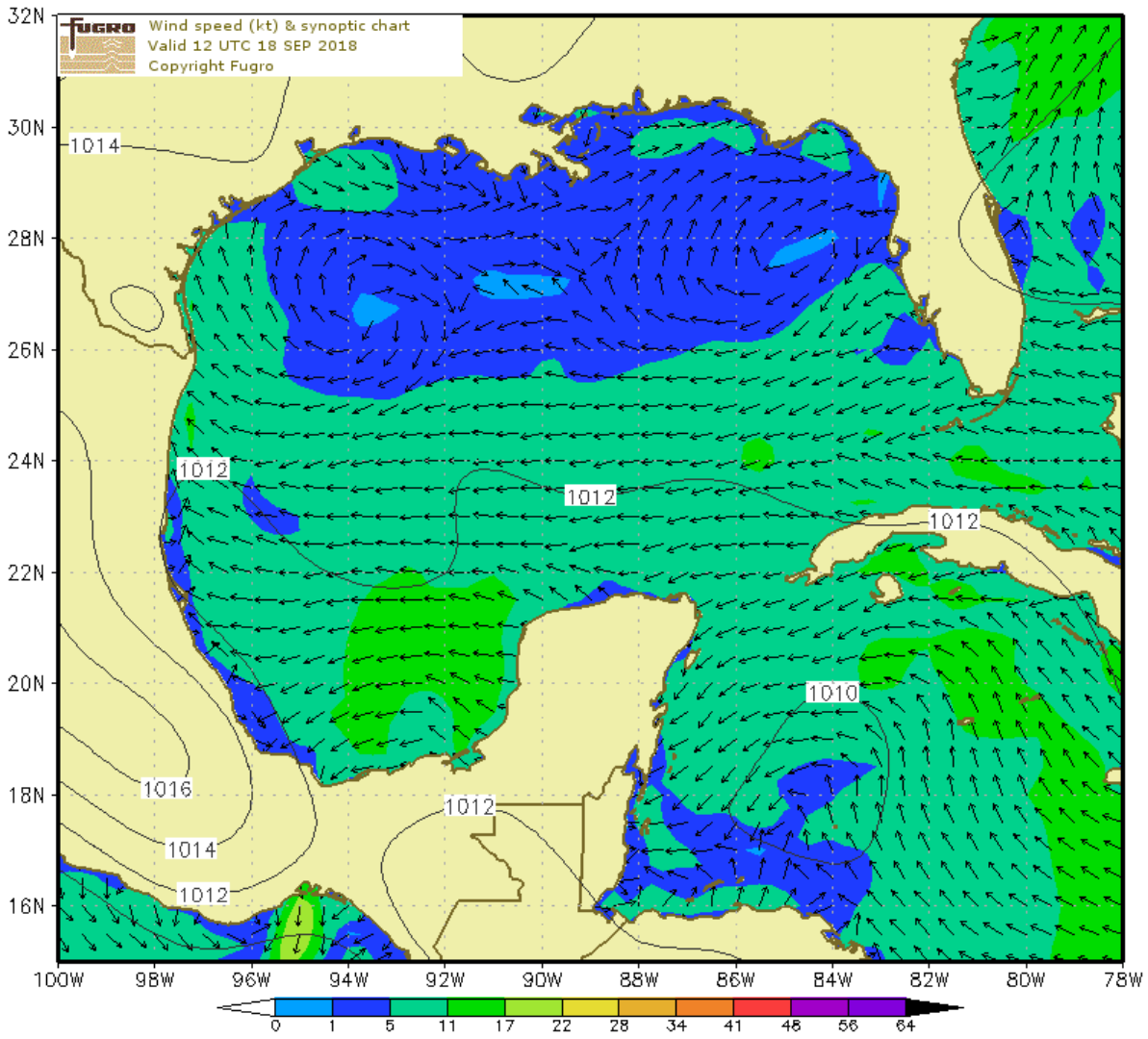

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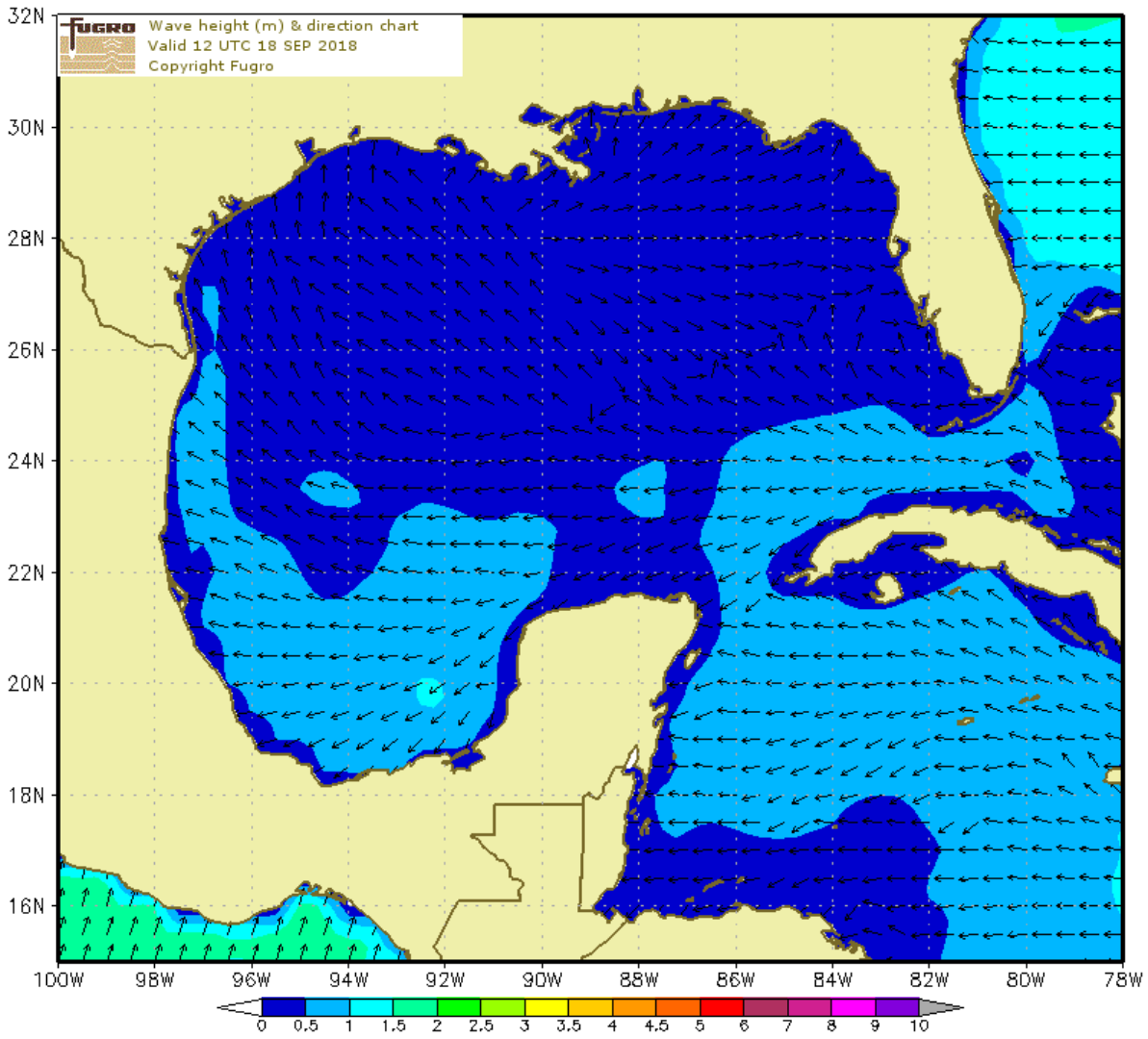

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 18 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) A weak ridge gradually builds SSW over the N GoM over the next few days and becomes orientated WSW on Thursday as the parent high moves E. At the same time, weak showery troughs drift WNW over the central GoM.

WARNINGS: (Next 24 hours) THUNDERSTORMS.

Weather: (Next 48 hours) A low risk of thundery showers during the late mornings/early afternoons. Otherwise fair.

Confidence: Fairly high for trend, falling moderate for detail by mid-period. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
18/0600	WNW	7	9	0.0	SSW	0.1	3	-	0.0	-	0.1	0.2
18/0900	NW	7	9	0.0	SSW	0.1	4	-	0.0	-	0.1	0.2
18/1200	NW	6	8	0.0	SSW	0.1	4	-	0.0	-	0.1	0.2
18/1500	SE	6	8	0.1	-	0.0	-	-	0.0	-	0.1	0.2
18/1800	S	6	8	0.1	-	0.0	-	-	0.0	-	0.1	0.2
18/2100	S	6	8	0.1	-	0.0	-	-	0.0	-	0.1	0.2
19/0000	SSW	6	8	0.1	-	0.0	-	-	0.0	-	0.1	0.2
19/0300	SW	7	9	0.2	-	0.0	-	-	0.0	-	0.2	0.3
19/0600	W	7	9	0.0	-	0.0	-	-	0.0	-	0.0	0.0
19/0900	WNW	6	8	0.0	-	0.0	-	-	0.0	-	0.0	0.0
19/1200	E	6	8	0.1	-	0.0	-	-	0.0	-	0.1	0.2
19/1500	SE	7	9	0.2	-	0.0	-	-	0.0	-	0.2	0.3
19/1800	SE	8	10	0.2	-	0.0	-	-	0.0	-	0.2	0.3
19/2100	SE	9	12	0.2	-	0.0	-	-	0.0	-	0.2	0.4
20/0000	SSE	10	13	0.3	-	0.0	-	-	0.0	-	0.3	0.5
20/0300	SSE	10	13	0.3	-	0.0	-	-	0.0	-	0.3	0.5
20/0600	SSE	9	12	0.3	-	0.0	-	-	0.0	-	0.3	0.5
20/0900	SE	10	13	0.4	-	0.0	-	-	0.0	-	0.4	0.6
20/1200	SE	12	16	0.3	-	0.0	-	-	0.0	-	0.3	0.6
20/1500	SE	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.8
20/1800	SE	13	17	0.5	-	0.0	-	-	0.0	-	0.5	0.9
20/2100	SE	13	17	0.5	-	0.0	-	-	0.0	-	0.5	0.9
21/0000	SSE	14	18	0.6	-	0.0	-	-	0.0	-	0.6	1.0
21/0300	SSE	14	18	0.7	-	0.0	-	-	0.0	-	0.7	1.2
21/0600	SE	14	18	0.8	-	0.0	-	-	0.0	-	0.8	1.3
21/0900	SE	13	17	0.8	-	0.0	-	-	0.0	-	0.8	1.4
21/1200	SE	11	14	0.7	SE	0.3	5	-	0.0	-	0.8	1.3
21/1500	ESE	11	14	0.6	SE	0.3	5	-	0.0	-	0.7	1.2
21/1800	ESE	11	14	0.6	SE	0.2	5	-	0.0	-	0.7	1.1
21/2100	ESE	11	14	0.6	SE	0.2	5	-	0.0	-	0.7	1.1
22/0000	SE	10	13	0.5	SE	0.2	5	-	0.0	-	0.6	1.0
22/0300	SE	10	13	0.5	SE	0.2	5	-	0.0	-	0.6	1.0
22/0600	ESE	10	13	0.5	SE	0.3	5	-	0.0	-	0.5	0.9
22/0900	SE	9	12	0.4	SE	0.3	5	-	0.0	-	0.5	0.9
22/1200	SE	8	10	0.3	SE	0.4	5	-	0.0	-	0.5	0.9
22/1500	SE	7	9	0.3	SE	0.4	5	-	0.0	-	0.5	0.8
22/1800	SE	7	9	0.3	SE	0.4	5	-	0.0	-	0.5	0.8
22/2100	SE	6	8	0.3	SE	0.4	5	-	0.0	-	0.5	0.8
23/0000	SE	6	8	0.3	SE	0.4	5	-	0.0	-	0.5	0.8
23/0300	SE	5	7	0.2	SE	0.4	5	-	0.0	-	0.4	0.7
23/0600	SE	5	7	0.2	SE	0.4	6	-	0.0	-	0.4	0.7

Forecaster: Jack Wade

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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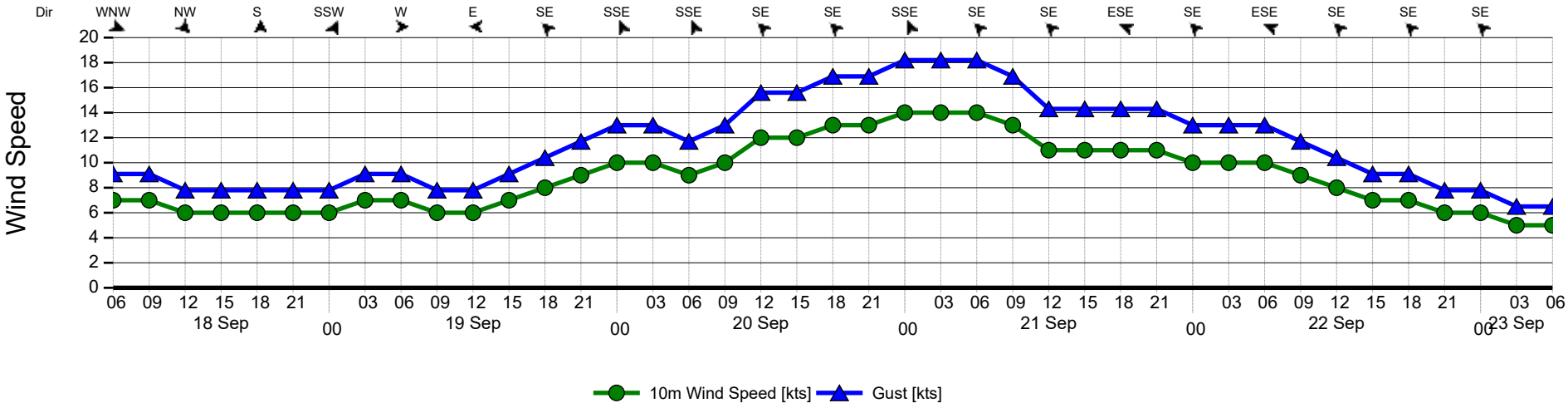
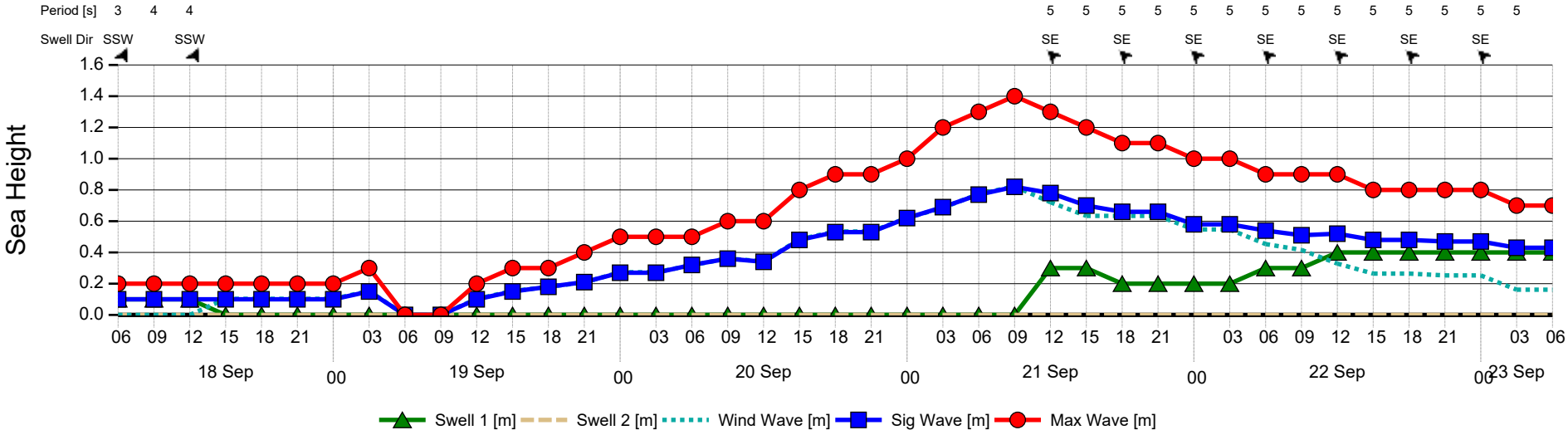
Wind Chart



Wave Chart



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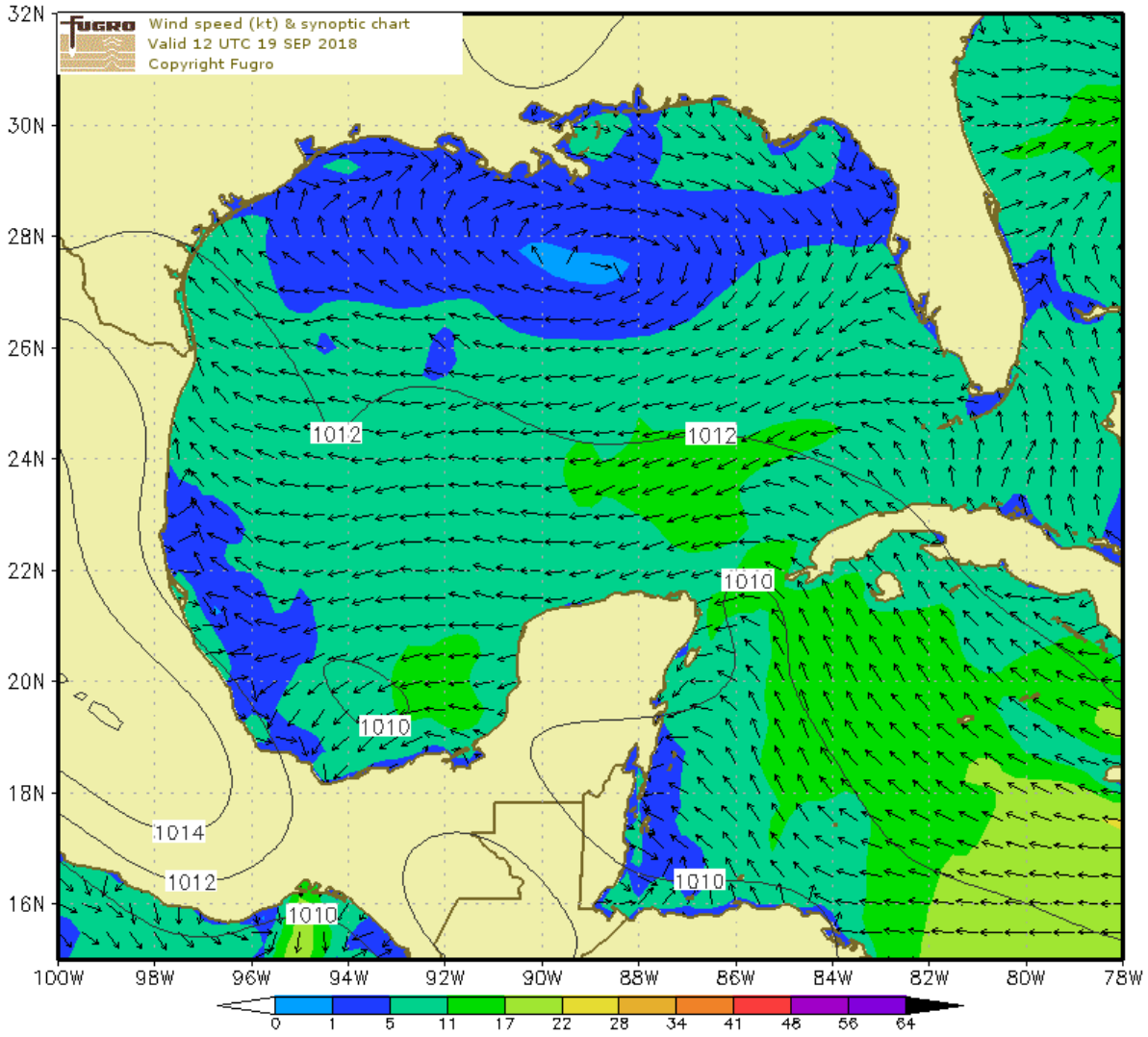

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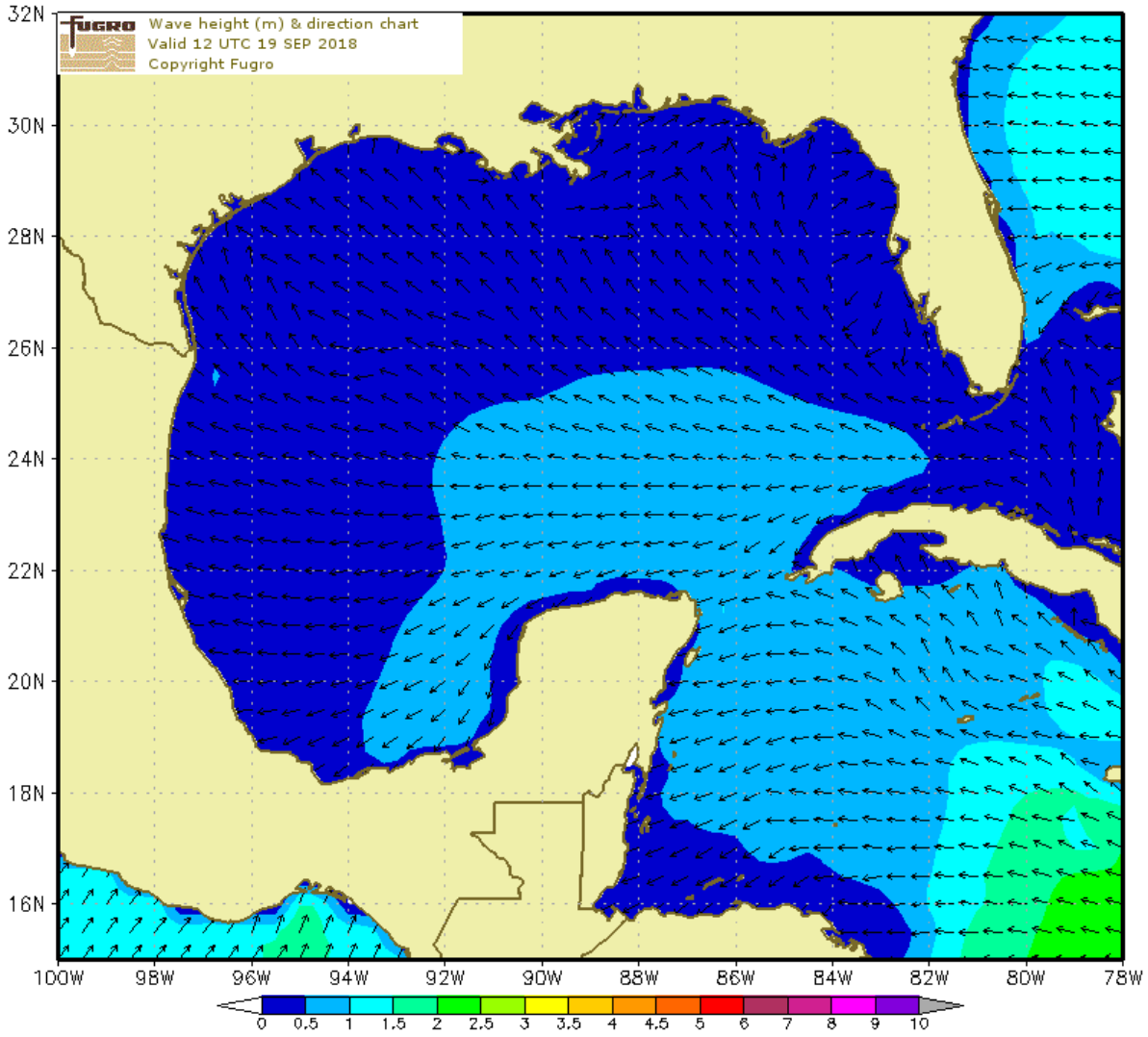

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 19 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) A weak ridge gradually builds SW over the N GoM over the next few days, becoming orientated WSW from tomorrow as the parent high moves E. At the same time weak showery troughs drift WNW over the central GoM. By Friday morning the ridge decays ENE a little, allowing a few showery troughs to track NNW into the N GoM.

WARNINGS: (Next 24 hours) THUNDERSTORMS.

Weather: (Next 48 hours) Generally fair today. Low risk of a few showers/thunderstorms at times tomorrow, before this risk increases by Friday morning.

Confidence: Fairly high for trend, falling moderate for detail by tomorrow night as the ridge decays and showery troughs move near to your site. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
19/0600	W	7	9	0.1	SSE	0.1	5	-	0.0	-	0.1	0.2
19/0900	W	5	7	0.1	SSE	0.1	5	-	0.0	-	0.1	0.2
19/1200	S	4	5	0.1	SSE	0.1	5	-	0.0	-	0.1	0.2
19/1500	SE	6	8	0.1	-	0.0	-	-	0.0	-	0.1	0.2
19/1800	SSE	8	10	0.1	-	0.0	-	-	0.0	-	0.1	0.2
19/2100	SSE	9	12	0.1	-	0.0	-	-	0.0	-	0.1	0.2
20/0000	SSE	10	13	0.2	-	0.0	-	-	0.0	-	0.2	0.3
20/0300	SSE	11	14	0.2	-	0.0	-	-	0.0	-	0.2	0.4
20/0600	SSE	11	14	0.3	-	0.0	-	-	0.0	-	0.3	0.5
20/0900	SE	11	14	0.4	-	0.0	-	-	0.0	-	0.4	0.6
20/1200	SE	11	14	0.4	-	0.0	-	-	0.0	-	0.4	0.6
20/1500	SE	12	16	0.4	-	0.0	-	-	0.0	-	0.4	0.7
20/1800	SE	13	17	0.5	-	0.0	-	-	0.0	-	0.5	0.8
20/2100	SE	14	18	0.5	-	0.0	-	-	0.0	-	0.6	0.9
21/0000	SE	15	20	0.6	-	0.0	-	-	0.0	-	0.6	1.1
21/0300	SSE	14	18	0.7	-	0.0	-	-	0.0	-	0.7	1.2
21/0600	SSE	13	17	0.7	-	0.0	-	-	0.0	-	0.7	1.1
21/0900	SE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0
21/1200	SE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0
21/1500	SE	13	17	0.6	-	0.0	-	-	0.0	-	0.6	1.1
21/1800	SE	13	17	0.6	-	0.0	-	-	0.0	-	0.6	1.1
21/2100	SE	14	18	0.7	-	0.0	-	-	0.0	-	0.7	1.1
22/0000	SE	14	18	0.7	-	0.0	-	-	0.0	-	0.7	1.1
22/0300	SE	13	17	0.6	SSE	0.1	5	-	0.0	-	0.6	1.1
22/0600	SE	12	15	0.6	SSE	0.3	5	-	0.0	-	0.6	1.0
22/0900	SSE	10	13	0.5	SSE	0.4	5	-	0.0	-	0.6	1.0
22/1200	SSE	10	13	0.4	SSE	0.5	5	-	0.0	-	0.6	1.0
22/1500	SSE	11	14	0.3	SSE	0.5	5	-	0.0	-	0.6	1.0
22/1800	SE	11	14	0.3	SSE	0.5	5	-	0.0	-	0.6	1.0
22/2100	SE	10	13	0.3	SSE	0.5	5	-	0.0	-	0.5	0.9
23/0000	ESE	8	10	0.3	SSE	0.4	5	-	0.0	-	0.5	0.8
23/0300	ESE	6	8	0.2	SSE	0.4	6	-	0.0	-	0.5	0.8
23/0600	E	6	8	0.2	SSE	0.4	6	-	0.0	-	0.4	0.7
23/0900	E	6	7	0.1	SSE	0.4	6	-	0.0	-	0.4	0.7
23/1200	E	7	9	0.2	SSE	0.4	5	-	0.0	-	0.4	0.7
23/1500	ESE	8	10	0.2	SSE	0.4	5	SE	0.1	6	0.4	0.7
23/1800	ESE	9	12	0.2	SSE	0.3	5	SE	0.2	6	0.4	0.7
23/2100	ESE	9	12	0.2	SSE	0.3	5	SE	0.2	6	0.4	0.7
24/0000	ESE	9	12	0.2	SE	0.4	5	SSE	0.1	6	0.5	0.8
24/0300	SE	8	10	0.2	SE	0.4	5	SSE	0.1	6	0.5	0.8
24/0600	SE	6	8	0.1	SE	0.5	5	-	0.0	-	0.5	0.8

Forecaster: Megan Pearson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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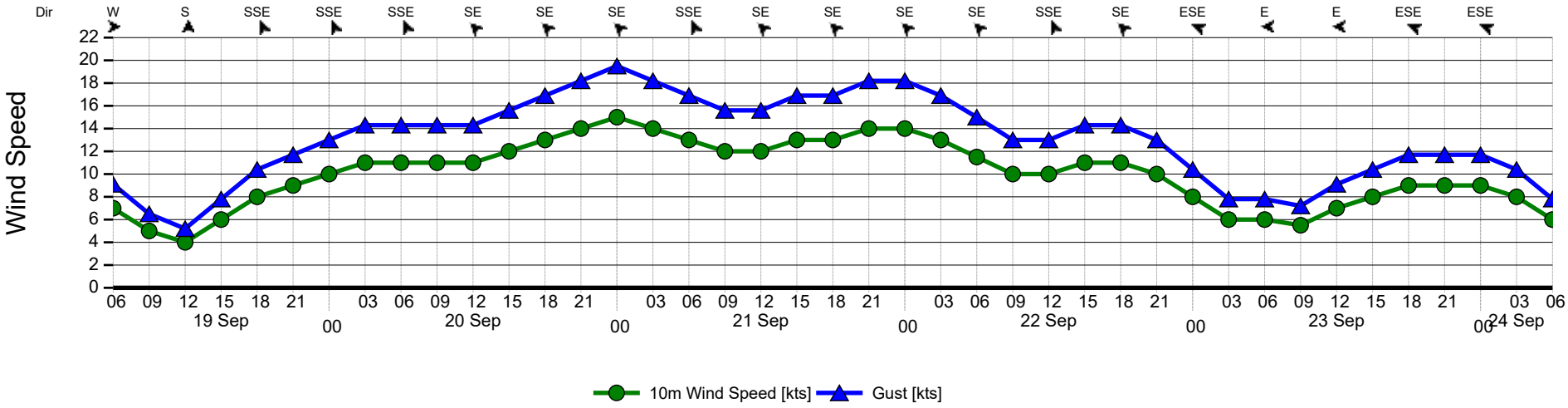
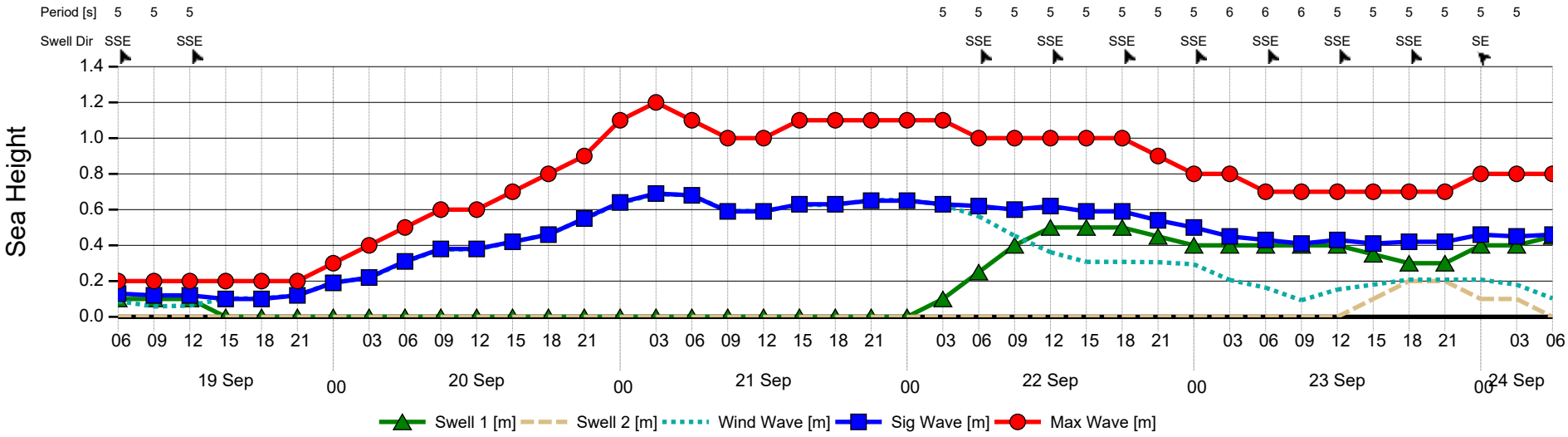
Wind Chart



Wave Chart



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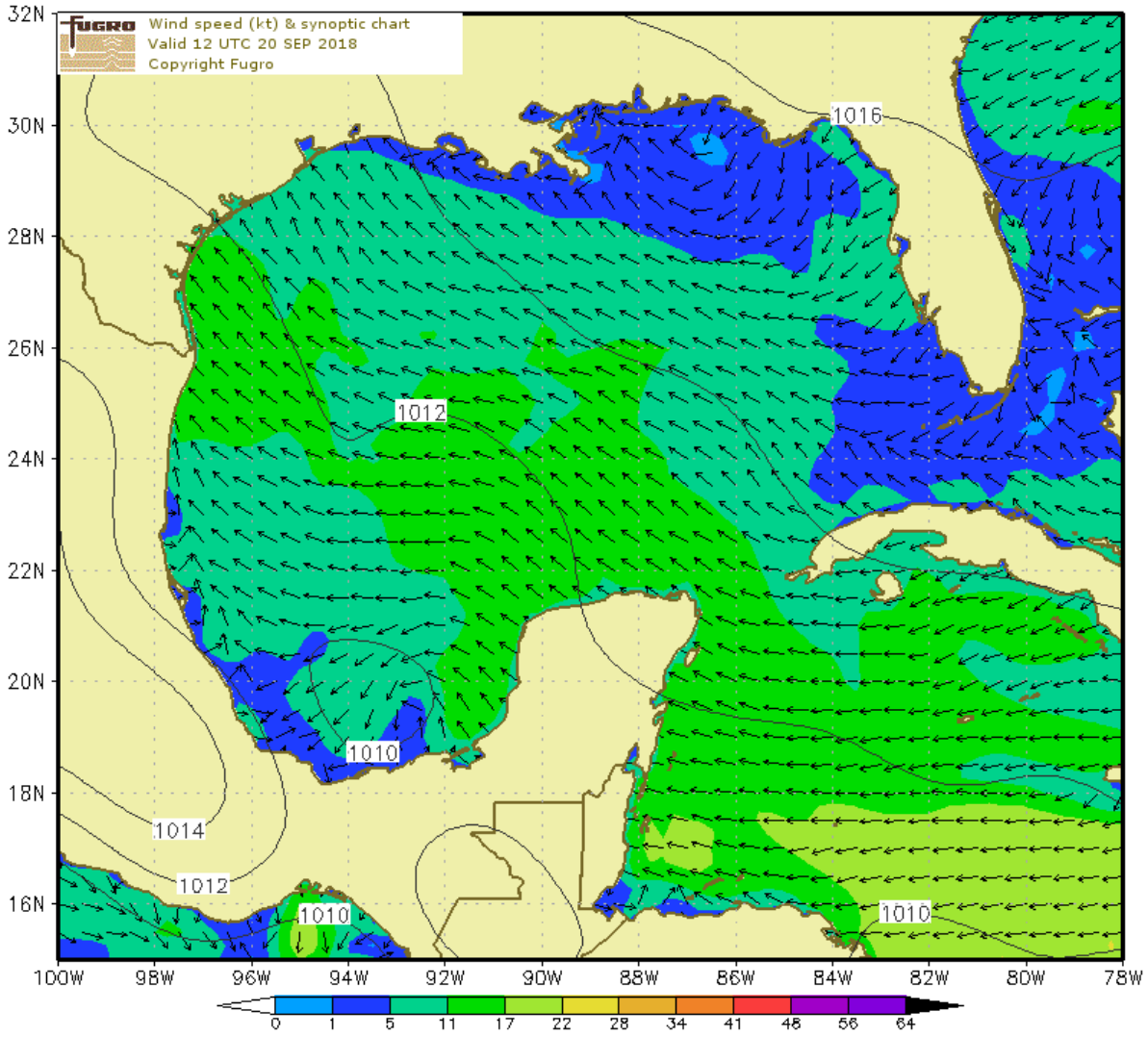

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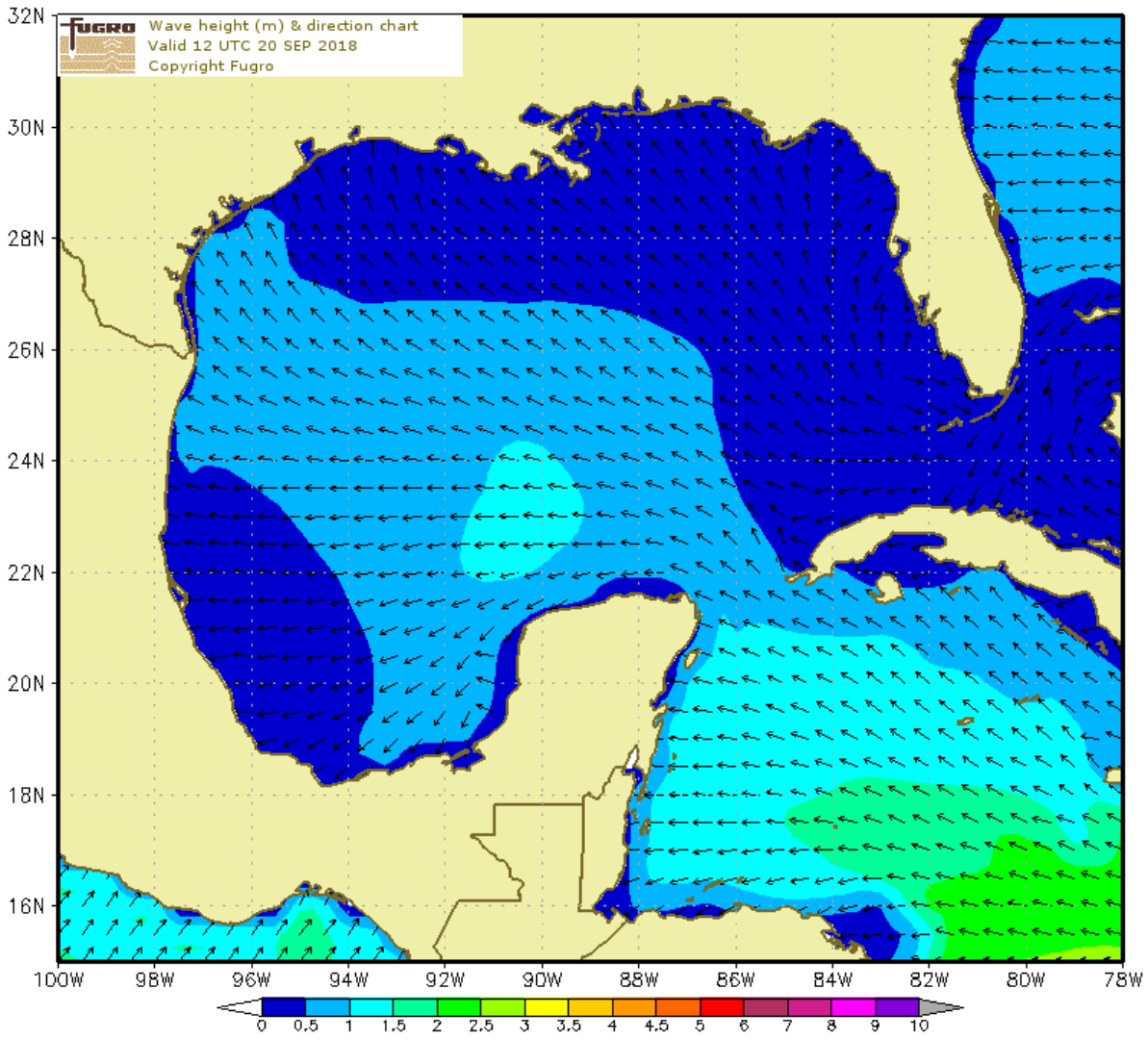

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 20 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) A weak ridge lies SW over the N GoM during today, becoming orientated WSW from tomorrow morning as the parent high moves E. At the same time weak showery troughs drift WNW over the central GoM. By tomorrow afternoon/evening the ridge decays slightly ENE, allowing showery troughs to track NNW into the N GoM.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Largely fair today. Risk of showers/thunderstorms from this evening. These ease for a time overnight, before risk of further showers/thunderstorms from tomorrow morinng.

Confidence: Fairly high for trend, falling moderate for detail by tonight as the ridge decays and showery troughs move near to your site. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
20/0600	SSE	8	10	0.3	-	0.0	-	-	0.0	-	0.3	0.4
20/0900	SE	10	13	0.3	-	0.0	-	-	0.0	-	0.3	0.5
20/1200	SE	12	16	0.3	-	0.0	-	-	0.0	-	0.3	0.6
20/1500	SE	13	17	0.5	-	0.0	-	-	0.0	-	0.5	0.8
20/1800	SSE	14	18	0.5	-	0.0	-	-	0.0	-	0.6	0.9
20/2100	SSE	15	20	0.6	-	0.0	-	-	0.0	-	0.6	1.0
21/0000	SSE	15	20	0.7	-	0.0	-	-	0.0	-	0.7	1.1
21/0300	SSE	14	18	0.7	-	0.0	-	-	0.0	-	0.7	1.2
21/0600	SSE	13	17	0.7	-	0.0	-	-	0.0	-	0.7	1.1
21/0900	SSE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0
21/1200	SSE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0
21/1500	SSE	12	16	0.7	-	0.0	-	-	0.0	-	0.7	1.1
21/1800	SSE	12	16	0.7	-	0.0	-	-	0.0	-	0.7	1.1
21/2100	SE	13	17	0.6	SSE	0.1	5	-	0.0	-	0.6	1.1
22/0000	SE	14	18	0.7	SSE	0.2	5	-	0.0	-	0.7	1.2
22/0300	SSE	13	17	0.6	SSE	0.3	5	-	0.0	-	0.7	1.2
22/0600	S	12	16	0.5	SSE	0.4	5	-	0.0	-	0.6	1.1
22/0900	SSW	11	14	0.4	SSE	0.5	5	-	0.0	-	0.6	1.1
22/1200	SE	10	13	0.3	SSE	0.5	5	-	0.0	-	0.6	1.0
22/1500	ESE	8	10	0.2	SSE	0.5	5	-	0.0	-	0.5	0.9
22/1800	ESE	7	9	0.2	SSE	0.5	5	-	0.0	-	0.5	0.9
22/2100	ESE	6	8	0.1	SSE	0.5	5	-	0.0	-	0.5	0.8
23/0000	ESE	6	8	0.2	SSE	0.4	5	-	0.0	-	0.4	0.7
23/0300	SE	5	7	0.1	SSE	0.4	5	-	0.0	-	0.4	0.6
23/0600	SSE	5	7	0.1	SSE	0.4	5	-	0.0	-	0.4	0.6
23/0900	SSE	4	5	0.1	SSE	0.3	5	-	0.0	-	0.3	0.5
23/1200	NNW	4	5	0.0	SSE	0.3	5	-	0.0	-	0.3	0.5
23/1500	SE	6	8	0.1	SSE	0.3	5	-	0.0	-	0.3	0.5
23/1800	SE	8	10	0.1	SSE	0.3	5	S	0.1	6	0.3	0.5
23/2100	SSE	9	12	0.2	SSE	0.2	5	S	0.1	6	0.3	0.5
24/0000	SSE	10	13	0.2	SSE	0.2	5	S	0.1	5	0.3	0.5
24/0300	S	10	13	0.2	SSE	0.2	5	S	0.1	5	0.3	0.5
24/0600	S	9	12	0.1	SSE	0.2	4	S	0.2	5	0.3	0.5
24/0900	S	7	9	0.1	SSE	0.2	4	S	0.2	5	0.3	0.5
24/1200	SSE	8	10	0.2	SSE	0.2	5	S	0.1	5	0.3	0.5
24/1500	SSE	10	13	0.3	SSE	0.1	5	-	0.0	-	0.3	0.5
24/1800	SSE	11	14	0.3	SSE	0.1	5	-	0.0	-	0.3	0.5
24/2100	SSE	12	15	0.3	SE	0.1	5	-	0.0	-	0.3	0.6
25/0000	SSE	11	14	0.4	SE	0.1	5	-	0.0	-	0.4	0.7
25/0300	S	10	13	0.4	SE	0.2	5	-	0.0	-	0.4	0.7
25/0600	S	9	12	0.3	SE	0.3	5	-	0.0	-	0.4	0.7

Forecaster: Hannah Mallinson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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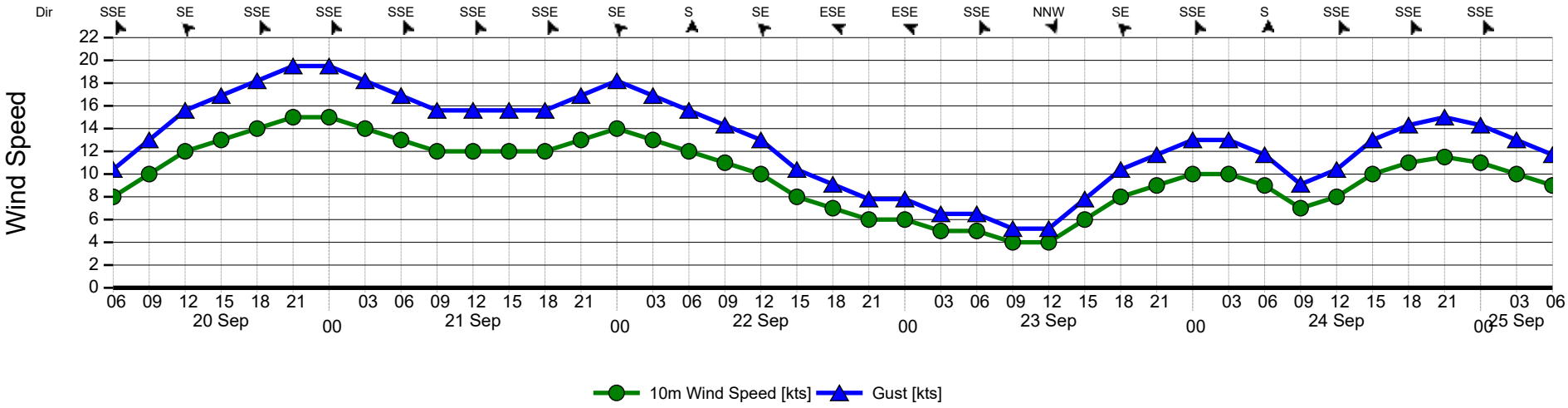
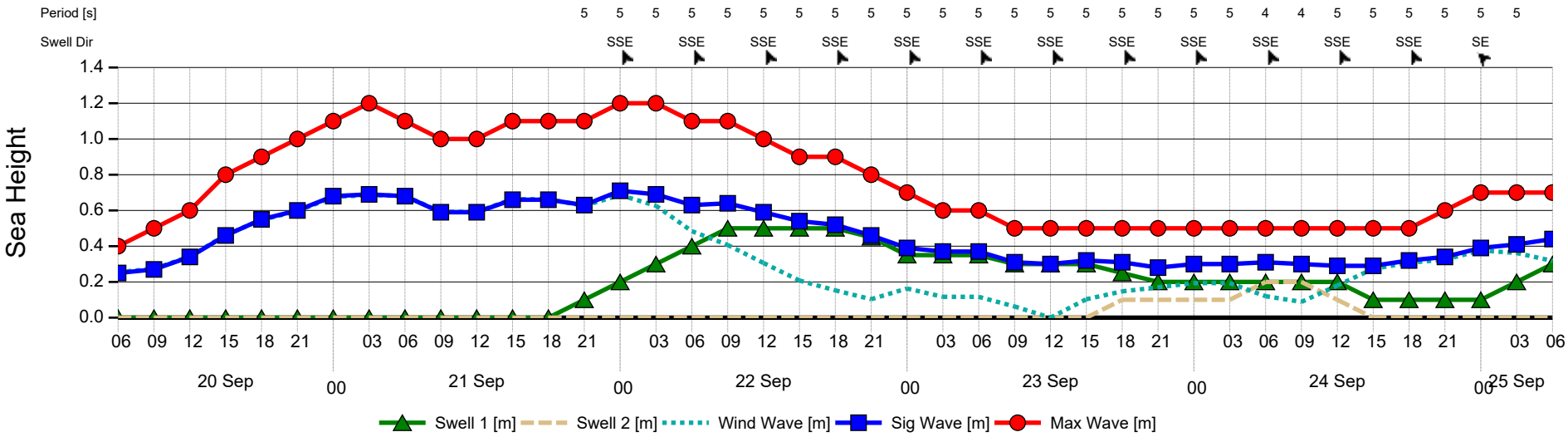
Wind Chart



Wave Chart



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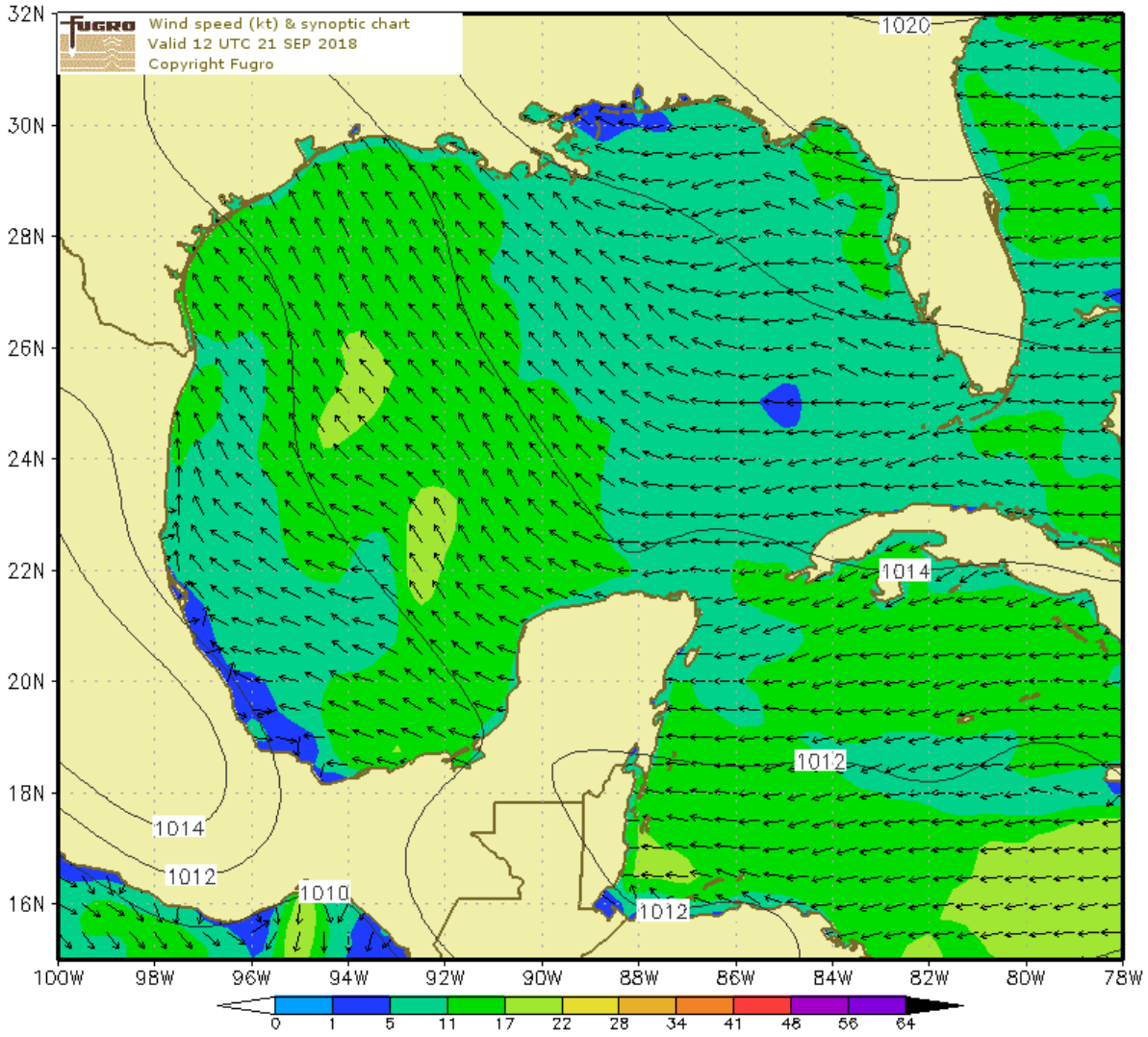

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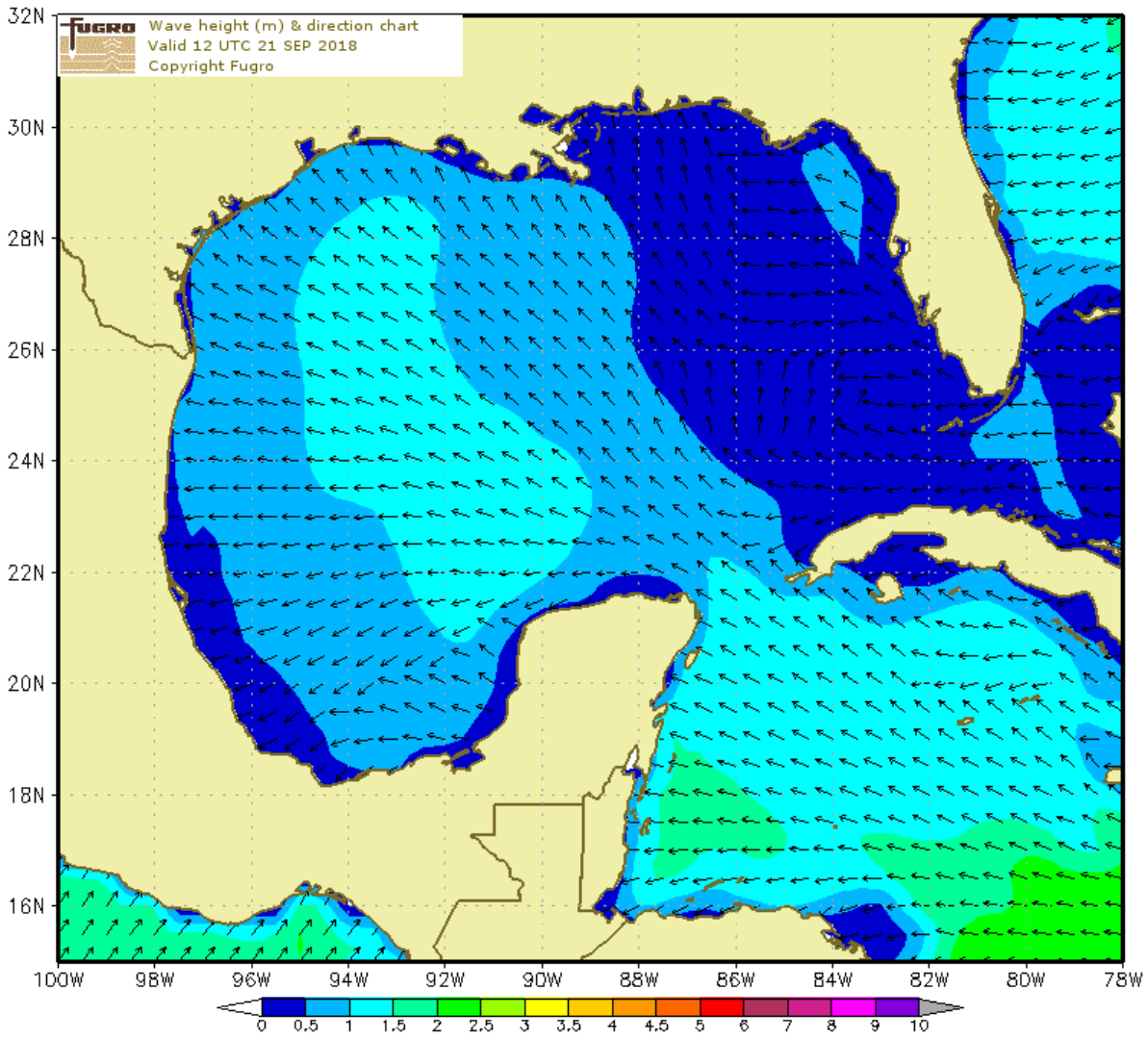

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 21 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) A weak ridge extending WSW-W along the N GoM coast drifts N whilst a series of showery troughs move WNW across the central GoM this morning. From the afternoon the ridge decays ENE slightly, allowing showery troughs to track N towards the N GoM.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Risk of showers throughout, and these may be heavy and thundery at times.

Confidence: Fairly high for trend, but only moderate for detail as showery troughs move across the N GoM. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
21/0600	S	10	13	0.3	SE	0.4	5	S	0.4	4	0.6	1.1
21/0900	SSE	11	14	0.4	SE	0.3	5	S	0.3	4	0.6	1.0
21/1200	SE	11	14	0.5	SE	0.3	5	S	0.2	4	0.6	1.0
21/1500	SE	10	13	0.5	SE	0.4	5	S	0.1	4	0.6	1.0
21/1800	SE	10	13	0.5	SE	0.4	5	-	0.0	-	0.6	1.0
21/2100	SE	11	14	0.5	SE	0.3	5	-	0.0	-	0.6	1.0
22/0000	SSE	11	14	0.4	SE	0.3	5	-	0.0	-	0.5	0.9
22/0300	SSE	10	14	0.4	SSE	0.4	5	-	0.0	-	0.5	0.9
22/0600	S	9	12	0.3	SSE	0.4	5	-	0.0	-	0.5	0.9
22/0900	SSW	8	10	0.3	SSE	0.4	5	-	0.0	-	0.5	0.8
22/1200	SSW	8	10	0.2	SSE	0.4	5	-	0.0	-	0.5	0.8
22/1500	SSW	9	12	0.3	SSE	0.4	5	-	0.0	-	0.5	0.8
22/1800	SSW	9	12	0.2	SSE	0.4	5	-	0.0	-	0.5	0.8
22/2100	SSW	9	12	0.2	SSE	0.4	5	-	0.0	-	0.5	0.8
23/0000	SW	10	13	0.3	SSE	0.4	5	-	0.0	-	0.4	0.7
23/0300	WSW	9	12	0.1	SSE	0.4	5	S	0.1	4	0.4	0.6
23/0600	W	7	9	0.1	SE	0.3	5	S	0.2	4	0.4	0.6
23/0900	WSW	5	7	0.1	SE	0.3	5	S	0.2	4	0.4	0.6
23/1200	SW	7	9	0.2	SE	0.3	5	S	0.1	5	0.4	0.6
23/1500	SW	9	12	0.2	SE	0.3	5	S	0.1	6	0.4	0.6
23/1800	SW	9	12	0.2	SE	0.3	5	S	0.1	6	0.3	0.5
23/2100	SW	9	12	0.2	SSE	0.2	6	S	0.1	6	0.3	0.5
24/0000	SW	10	13	0.3	SSE	0.2	6	SE	0.1	5	0.4	0.6
24/0300	WSW	11	14	0.3	SSE	0.2	6	SE	0.1	5	0.4	0.6
24/0600	WSW	9	12	0.1	SSE	0.3	6	SE	0.2	5	0.4	0.6
24/0900	W	7	9	0.0	SSE	0.3	6	SE	0.2	5	0.4	0.6
24/1200	SW	7	9	0.2	SSE	0.3	6	SE	0.2	6	0.4	0.6
24/1500	S	10	13	0.3	SSE	0.2	6	SE	0.1	6	0.4	0.6
24/1800	S	12	16	0.3	SSE	0.2	6	-	0.0	-	0.4	0.7
24/2100	S	13	17	0.5	SE	0.2	5	-	0.0	-	0.5	0.8
25/0000	S	14	18	0.5	SE	0.2	5	-	0.0	-	0.6	1.0
25/0300	S	14	18	0.6	SE	0.2	5	-	0.0	-	0.7	1.1
25/0600	SSW	12	16	0.5	SE	0.3	4	-	0.0	-	0.6	1.0
25/0900	S	9	12	0.4	SE	0.3	4	-	0.0	-	0.5	0.8
25/1200	S	10	13	0.4	SE	0.2	4	-	0.0	-	0.4	0.7
25/1500	S	11	14	0.4	SE	0.2	5	-	0.0	-	0.4	0.7
25/1800	S	11	14	0.4	SE	0.2	5	S	0.1	7	0.4	0.7
25/2100	S	11	14	0.4	SE	0.2	6	S	0.1	7	0.4	0.7
26/0000	S	11	14	0.4	SE	0.2	6	-	0.0	-	0.4	0.7
26/0300	SSW	10	13	0.4	SE	0.2	6	-	0.0	-	0.4	0.7
26/0600	SW	8	10	0.3	SE	0.3	6	S	0.1	7	0.4	0.7

Forecaster: Hannah Mallinson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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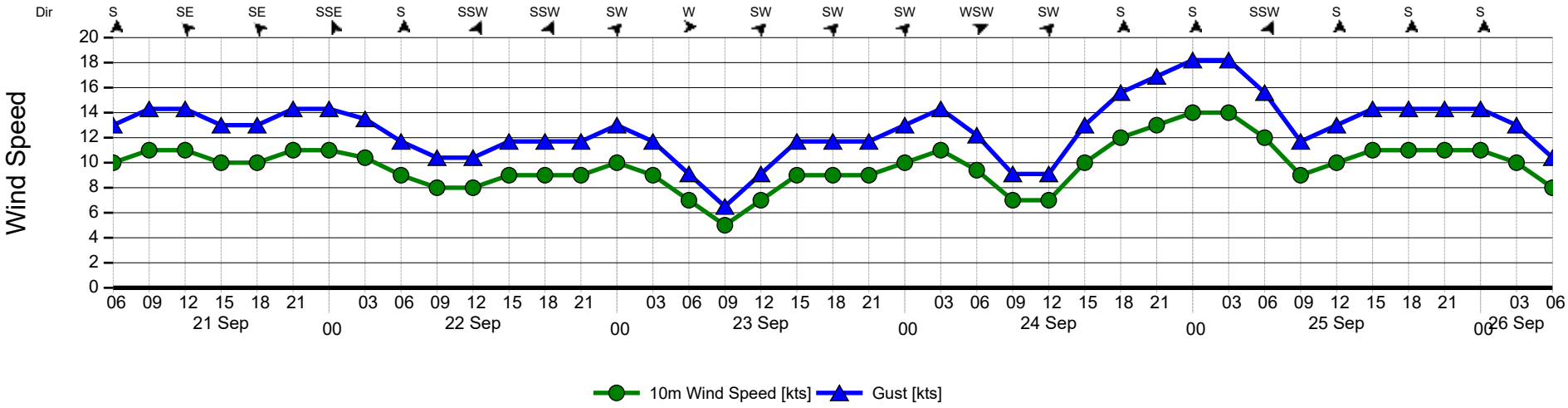
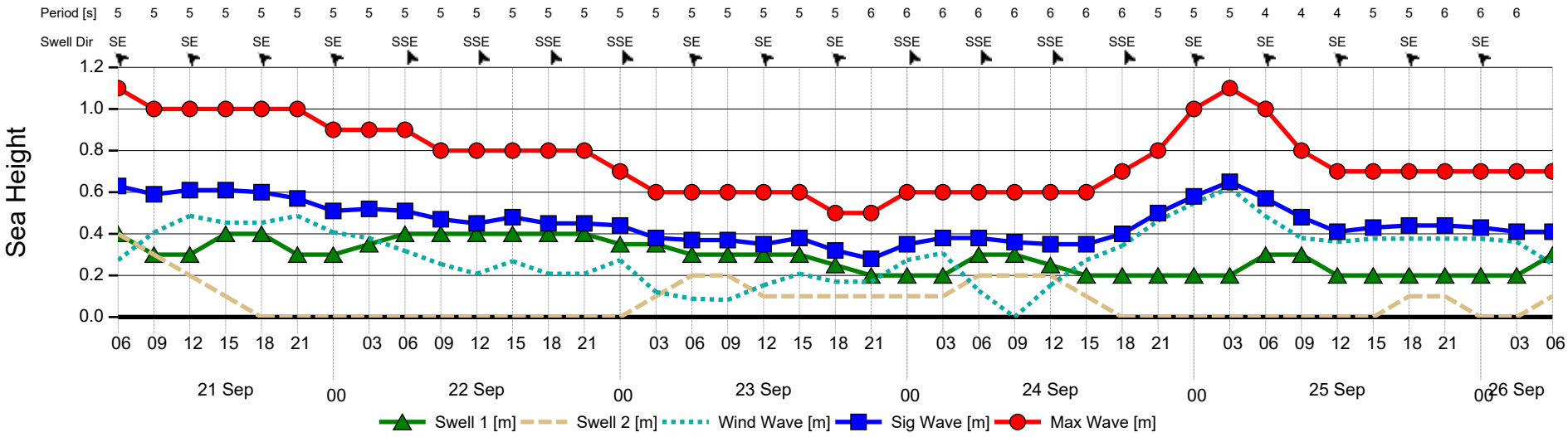
Wind Chart



Wave Chart



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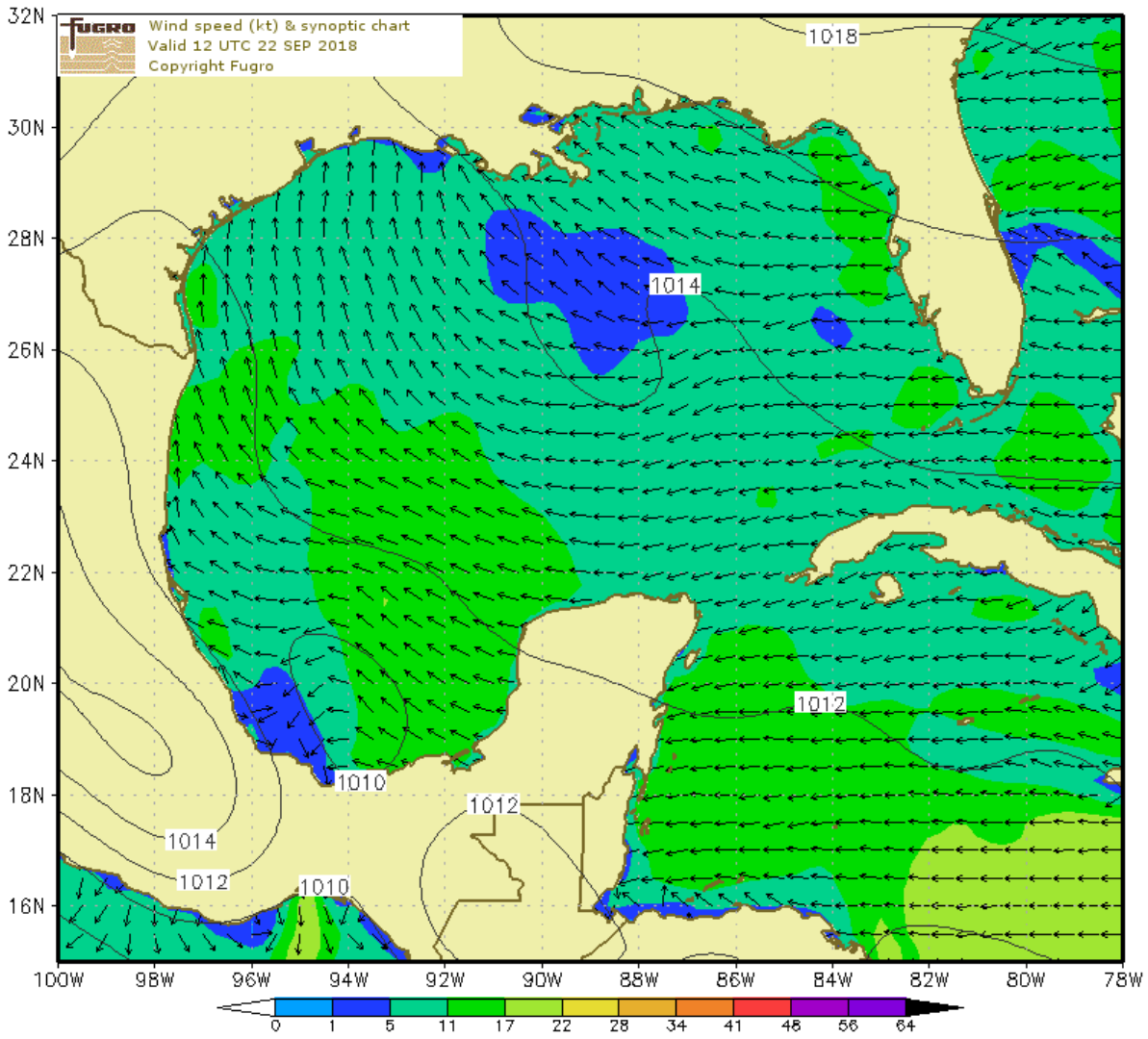

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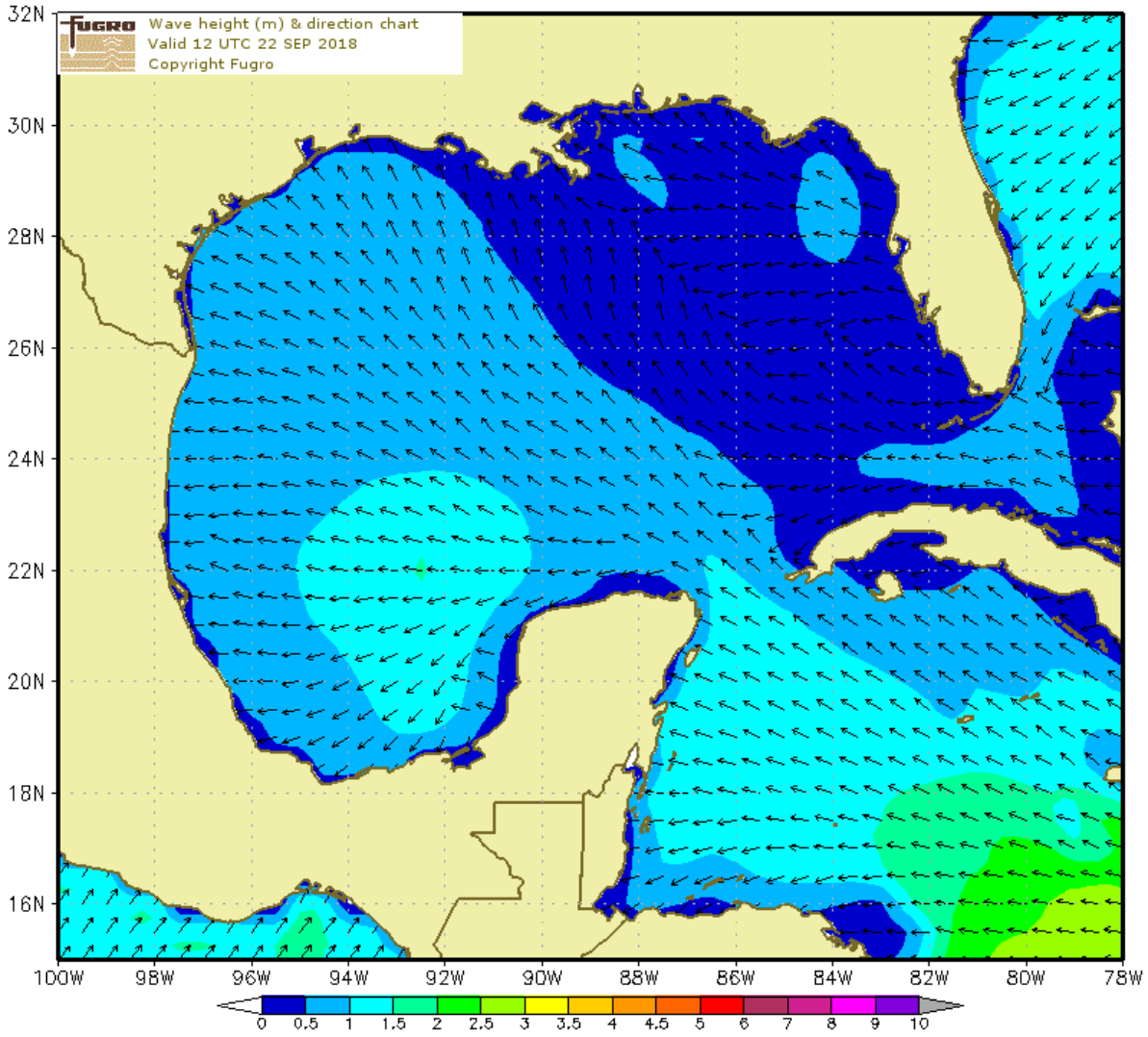

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 22 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) A ridge extending SSW-SW across the SE USA gradually decays today whilst a series of fragmented showery troughs move across the GoM throughout. More organised showery trough over Texas moves E over the S States from this morning to lie over Mississippi by tomorrow afternoon. From Monday, the ridge rebuilds SW into the NE GoM.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Risk of showers throughout, and these may be heavy and thundery at times.

Confidence: Fairly high for trend, but moderate for peak wind/wave detail as showery troughs move across your area. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
22/0600	SW	11	14	0.4	SSE	0.4	5	-	0.0	-	0.6	1.0
22/0900	SW	10	13	0.3	SSE	0.6	5	-	0.0	-	0.6	1.0
22/1200	SSW	9	12	0.3	SSE	0.5	5	-	0.0	-	0.6	1.0
22/1500	S	9	12	0.3	SSE	0.4	5	-	0.0	-	0.5	0.8
22/1800	SSW	10	13	0.2	SSE	0.4	5	-	0.0	-	0.4	0.7
22/2100	SSW	9	12	0.2	SSE	0.4	5	-	0.0	-	0.4	0.7
23/0000	SSW	8	10	0.2	SSE	0.4	5	-	0.0	-	0.4	0.7
23/0300	SW	9	12	0.2	SSE	0.4	5	S	0.1	4	0.4	0.7
23/0600	SW	10	13	0.3	SE	0.3	5	S	0.1	4	0.4	0.7
23/0900	WSW	9	12	0.1	SE	0.3	5	S	0.2	4	0.4	0.6
23/1200	WSW	8	10	0.2	SE	0.3	5	S	0.1	5	0.4	0.6
23/1500	SSW	9	12	0.2	SE	0.3	5	S	0.1	6	0.4	0.6
23/1800	SSW	9	12	0.2	SE	0.3	5	S	0.1	6	0.3	0.5
23/2100	SSW	9	12	0.2	SSE	0.2	6	S	0.1	6	0.3	0.5
24/0000	SSW	10	13	0.3	SSE	0.2	6	SE	0.1	5	0.4	0.6
24/0300	SW	10	13	0.4	SSE	0.2	6	SE	0.1	5	0.4	0.7
24/0600	WSW	9	12	0.2	SSE	0.3	6	SE	0.2	5	0.4	0.6
24/0900	WSW	8	10	0.2	SSE	0.3	6	SE	0.2	5	0.3	0.6
24/1200	SW	8	10	0.2	SSE	0.3	6	SE	0.2	6	0.3	0.6
24/1500	SSW	9	12	0.2	SSE	0.2	6	SE	0.1	6	0.3	0.5
24/1800	S	10	13	0.3	SSE	0.2	6	-	0.0	-	0.3	0.6
24/2100	S	11	14	0.3	SE	0.2	5	-	0.0	-	0.4	0.6
25/0000	SSW	12	16	0.4	SE	0.1	5	-	0.0	-	0.4	0.7
25/0300	SSW	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.8
25/0600	SSW	10	13	0.5	-	0.0	-	-	0.0	-	0.5	0.8
25/0900	SSW	9	12	0.4	-	0.0	-	-	0.0	-	0.4	0.6
25/1200	SSW	9	12	0.4	SE	0.1	4	-	0.0	-	0.4	0.7
25/1500	S	10	13	0.4	SE	0.1	5	-	0.0	-	0.4	0.6
25/1800	S	11	14	0.4	SE	0.1	5	-	0.0	-	0.4	0.7
25/2100	S	11	14	0.4	SE	0.1	5	-	0.0	-	0.4	0.7
26/0000	S	10	13	0.4	SE	0.1	5	-	0.0	-	0.4	0.6
26/0300	SSW	10	13	0.4	SE	0.2	5	-	0.0	-	0.4	0.7
26/0600	SSW	9	12	0.3	SE	0.3	5	-	0.0	-	0.4	0.7
26/0900	SSW	9	12	0.3	SE	0.3	5	-	0.0	-	0.4	0.7
26/1200	SSW	10	13	0.3	SE	0.2	5	-	0.0	-	0.3	0.6
26/1500	S	11	14	0.4	-	0.0	-	-	0.0	-	0.4	0.6
26/1800	S	10	13	0.4	-	0.0	-	-	0.0	-	0.4	0.7
26/2100	SSW	8	10	0.3	SE	0.1	5	-	0.0	-	0.3	0.6
27/0000	SSW	8	10	0.3	SE	0.1	5	-	0.0	-	0.3	0.5
27/0300	SSW	8	10	0.3	SE	0.2	5	-	0.0	-	0.3	0.5
27/0600	SSW	7	9	0.2	SE	0.3	5	-	0.0	-	0.3	0.6

Forecaster: Megan Pearson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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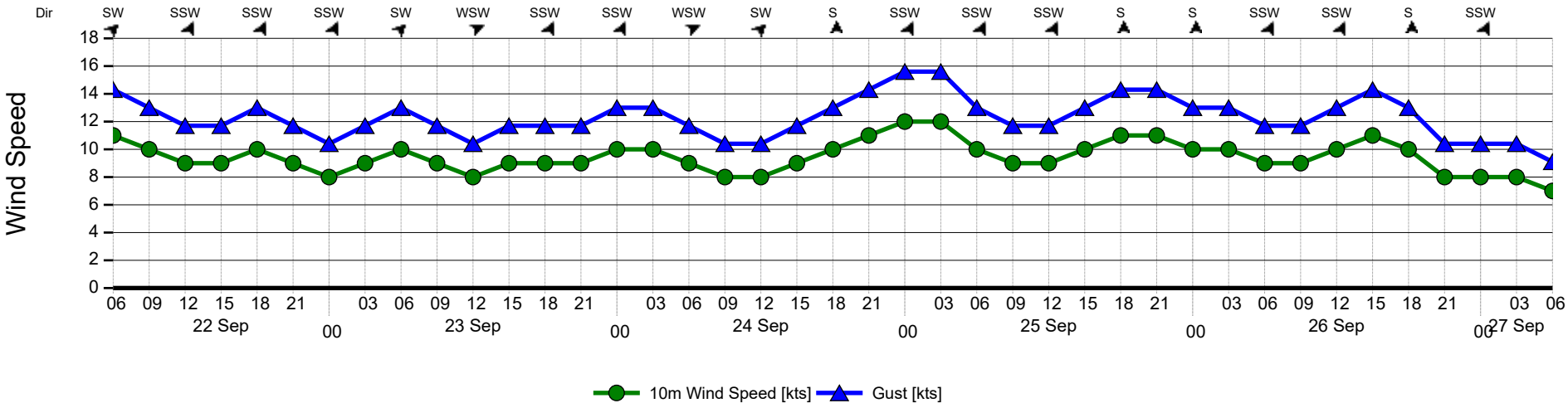
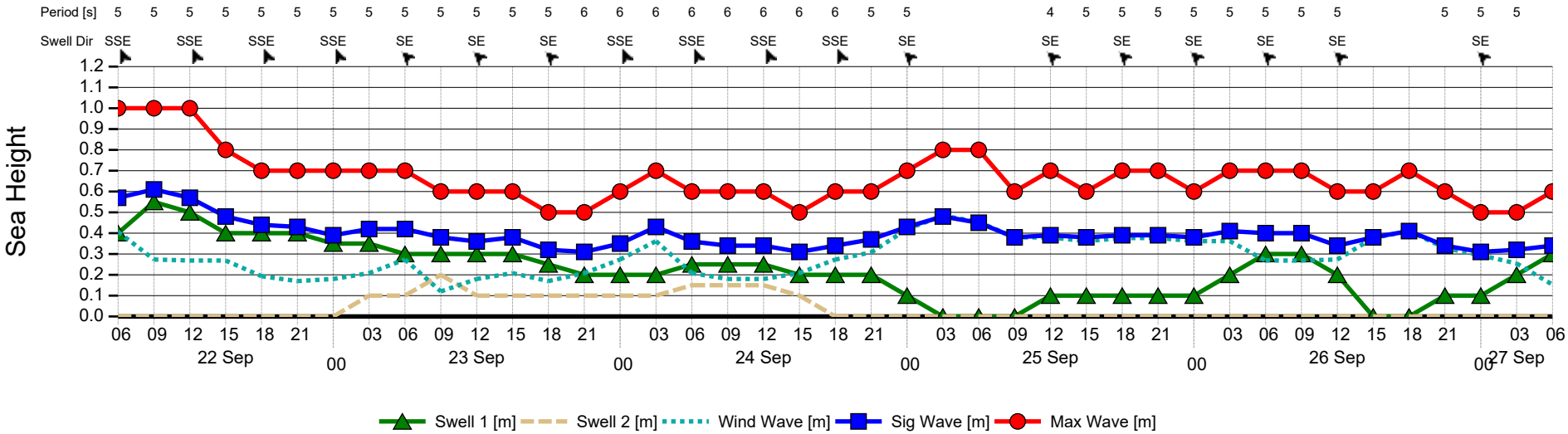
Wind Chart



Wave Chart



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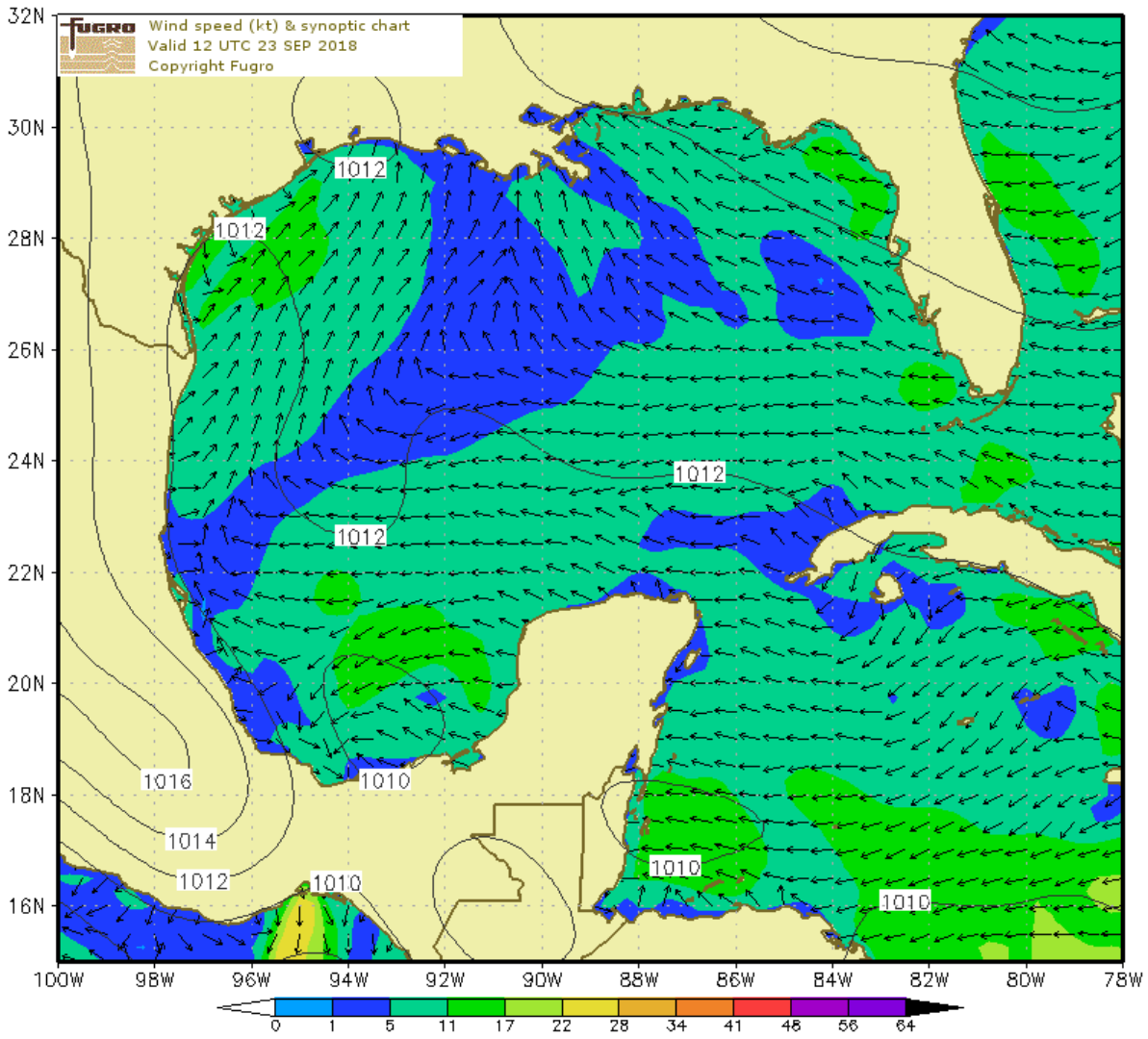

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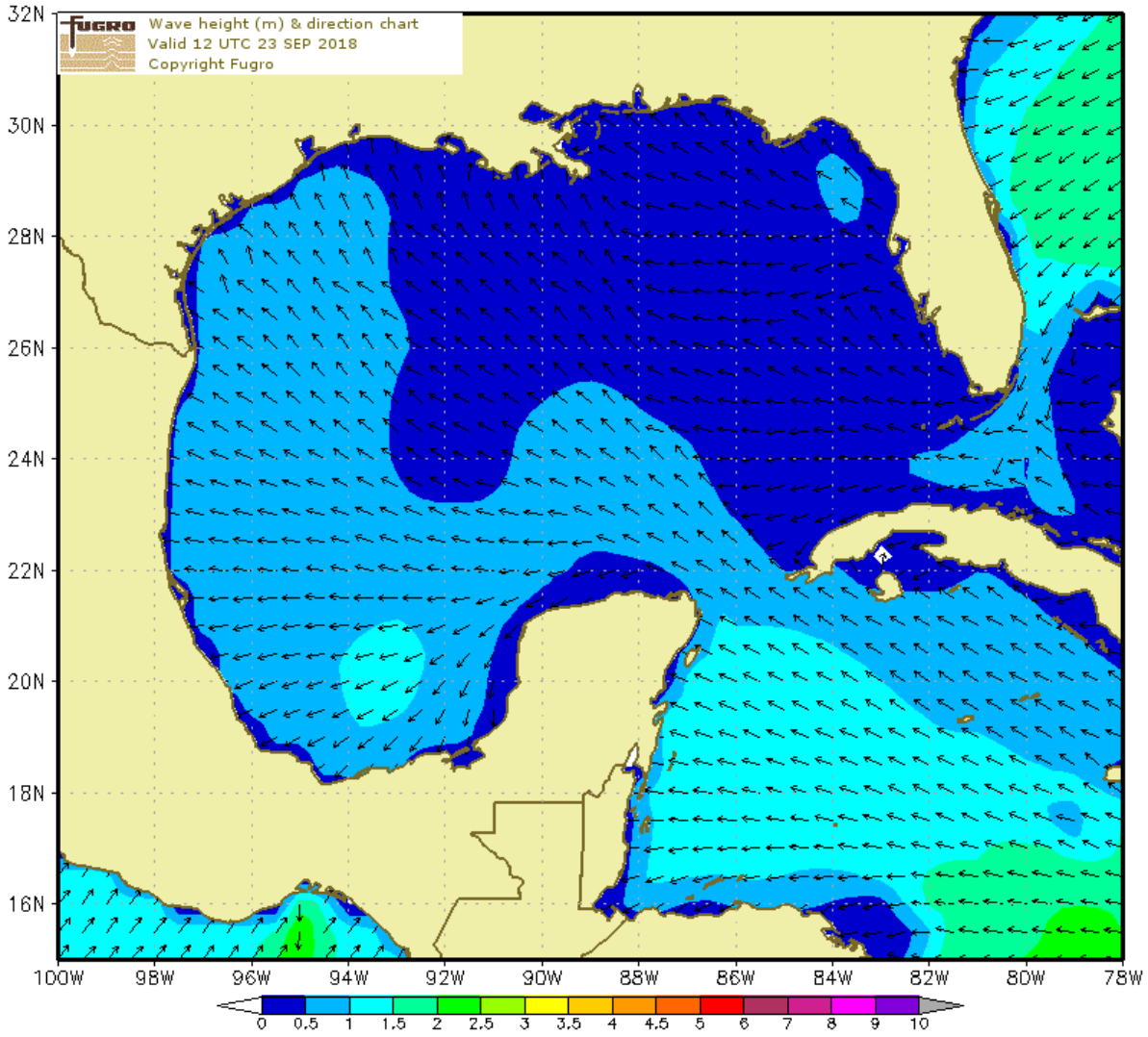

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 23 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) An organised showery trough over Texas moves E over the S States to lie over Mississippi by the afternoon, then fills as a weak ridge extends SW into the NE GoM tomorrow. Meanwhile a series of fragmented showery troughs move across the GoM throughout.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Showers, heavy and thundery at times. Clearing mainly fair by Monday afternoon.

Confidence: Fairly high for trend, but moderate for peak wind/wave detail as showery troughs move across your area. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
23/0600	SW	13	17	0.7	SE	0.3	5	-	0.0	-	0.7	1.2
23/0900	SW	10	13	0.5	SE	0.4	5	S	0.1	4	0.6	1.0
23/1200	WSW	9	12	0.1	SE	0.4	5	S	0.3	5	0.5	0.9
23/1500	SW	7	9	0.2	SE	0.3	5	S	0.2	6	0.4	0.7
23/1800	SSW	8	10	0.3	SE	0.2	5	S	0.1	6	0.4	0.7
23/2100	SSW	8	10	0.3	SSE	0.2	5	SE	0.1	6	0.3	0.6
24/0000	SSW	9	12	0.2	SSE	0.2	5	SE	0.1	5	0.3	0.5
24/0300	SW	9	12	0.2	SSE	0.2	6	SE	0.1	5	0.3	0.5
24/0600	SW	8	10	0.2	SSE	0.2	6	SE	0.1	5	0.3	0.5
24/0900	W	8	10	0.1	SSE	0.2	6	SE	0.1	5	0.3	0.5
24/1200	WSW	6	8	0.2	SSE	0.2	6	SE	0.1	6	0.3	0.5
24/1500	SSW	7	9	0.2	SSE	0.2	6	-	0.0	-	0.3	0.4
24/1800	S	9	12	0.2	SSE	0.2	6	-	0.0	-	0.3	0.5
24/2100	S	10	13	0.2	SE	0.2	5	-	0.0	-	0.3	0.5
25/0000	S	11	14	0.3	SE	0.1	5	-	0.0	-	0.3	0.5
25/0300	SSW	11	14	0.4	SE	0.1	5	-	0.0	-	0.4	0.7
25/0600	SW	10	13	0.4	SE	0.1	5	-	0.0	-	0.4	0.6
25/0900	SW	7	9	0.3	SE	0.2	5	SSW	0.1	4	0.4	0.6
25/1200	SSW	7	9	0.2	SE	0.2	5	SSW	0.1	4	0.3	0.5
25/1500	S	9	12	0.3	SE	0.1	5	SSW	0.1	4	0.3	0.5
25/1800	SSE	9	12	0.3	SE	0.1	5	SSW	0.1	4	0.3	0.5
25/2100	SSE	9	12	0.3	SE	0.1	5	SSW	0.1	4	0.3	0.5
26/0000	SSE	9	12	0.3	SE	0.1	5	SSW	0.1	4	0.3	0.5
26/0300	S	8	10	0.2	SE	0.2	5	SSW	0.1	4	0.3	0.5
26/0600	SW	7	9	0.2	SE	0.2	5	SSW	0.2	4	0.3	0.5
26/0900	SW	6	8	0.1	SE	0.2	5	SSW	0.2	4	0.3	0.5
26/1200	E	5	7	0.1	SE	0.2	5	SSW	0.2	4	0.3	0.5
26/1500	SE	4	5	0.1	SE	0.2	5	SSW	0.2	4	0.3	0.5
26/1800	SSE	5	7	0.1	SE	0.2	5	SSW	0.2	4	0.3	0.5
26/2100	S	5	7	0.1	SE	0.2	5	SSW	0.2	4	0.3	0.5
27/0000	S	5	7	0.1	SE	0.2	5	SSW	0.2	4	0.3	0.5
27/0300	SSW	4	5	0.1	SE	0.2	5	SSW	0.2	4	0.3	0.5
27/0600	W	4	5	0.0	SSE	0.2	4	SSW	0.2	4	0.3	0.5
27/0900	WNW	4	5	0.0	SSE	0.2	4	SSW	0.1	4	0.2	0.4
27/1200	SE	5	7	0.1	SSE	0.2	5	SSW	0.1	4	0.2	0.3
27/1500	SSE	7	9	0.2	SSE	0.2	5	-	0.0	-	0.2	0.4
27/1800	SSE	8	10	0.2	SSE	0.2	5	SSW	0.1	4	0.3	0.4
27/2100	SSE	8	10	0.2	SSE	0.2	5	SSW	0.1	4	0.3	0.5
28/0000	SSE	7	9	0.2	SSE	0.2	5	-	0.0	-	0.3	0.5
28/0300	SSE	6	8	0.2	SSE	0.2	5	S	0.1	4	0.3	0.5
28/0600	ESE	5	7	0.1	SSE	0.3	5	SSW	0.1	4	0.3	0.5

Forecaster: Megan Pearson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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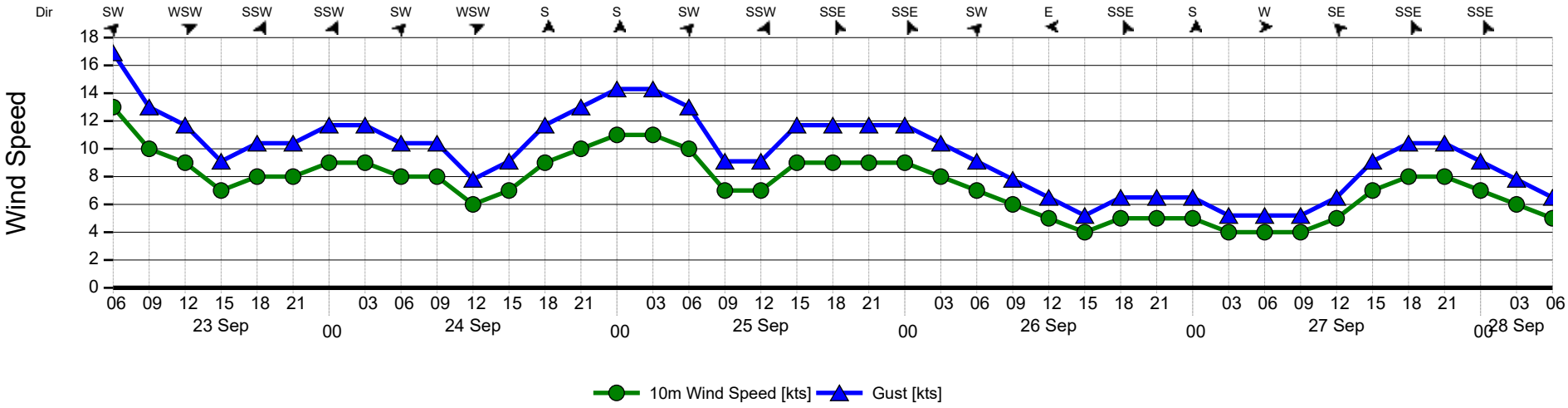
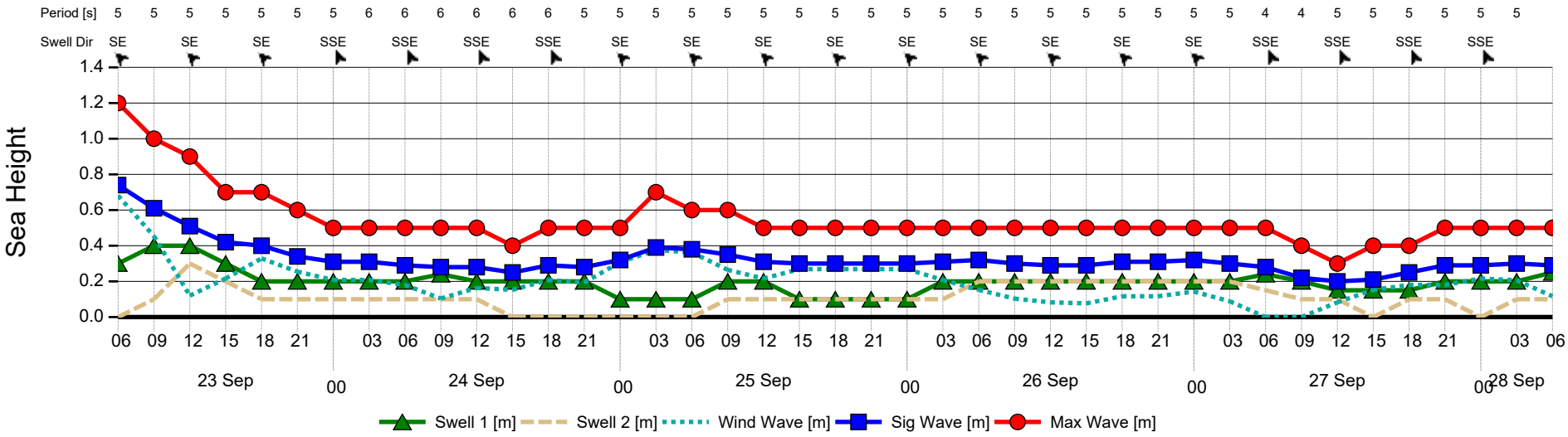
Wind Chart



Wave Chart



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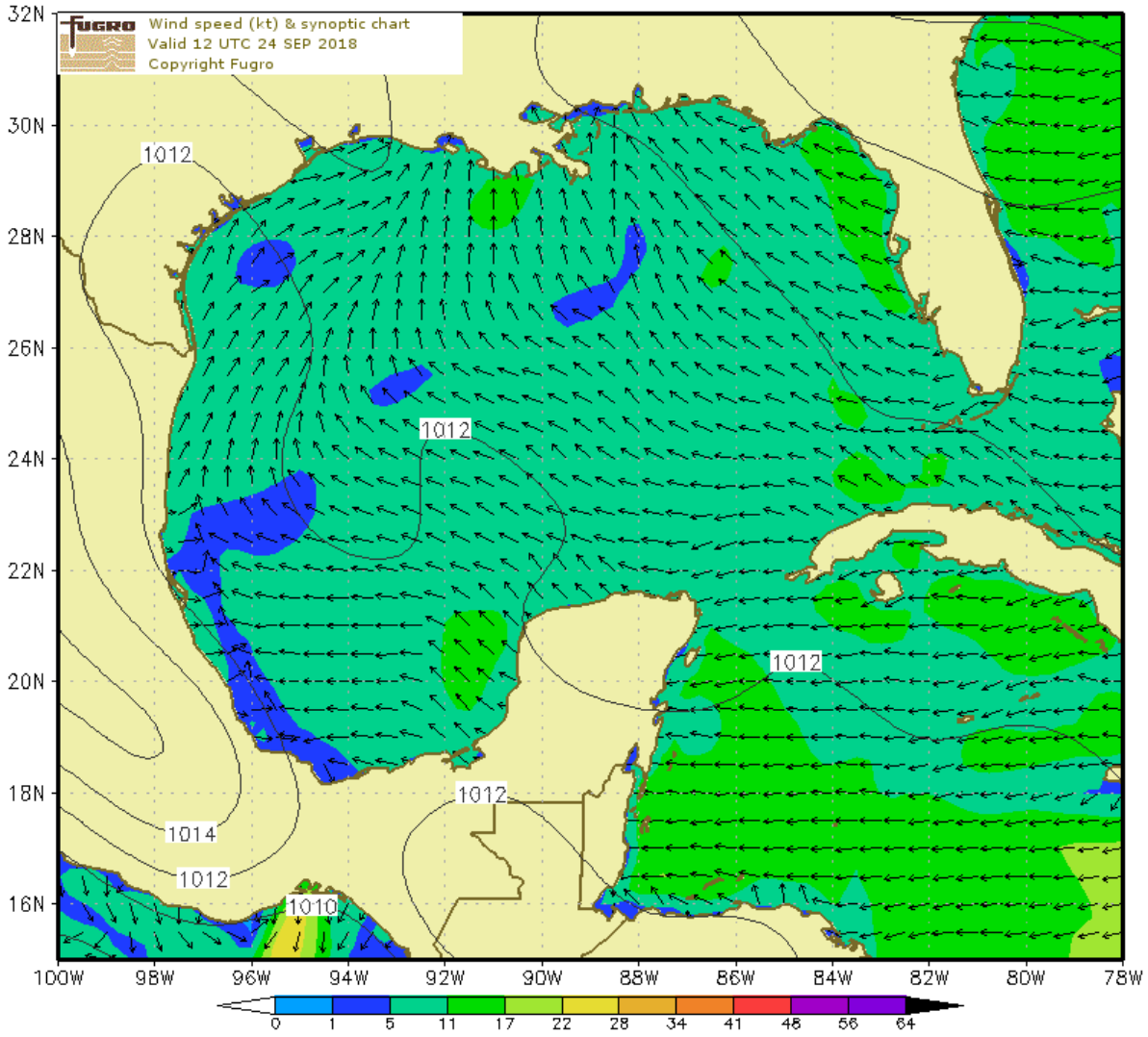

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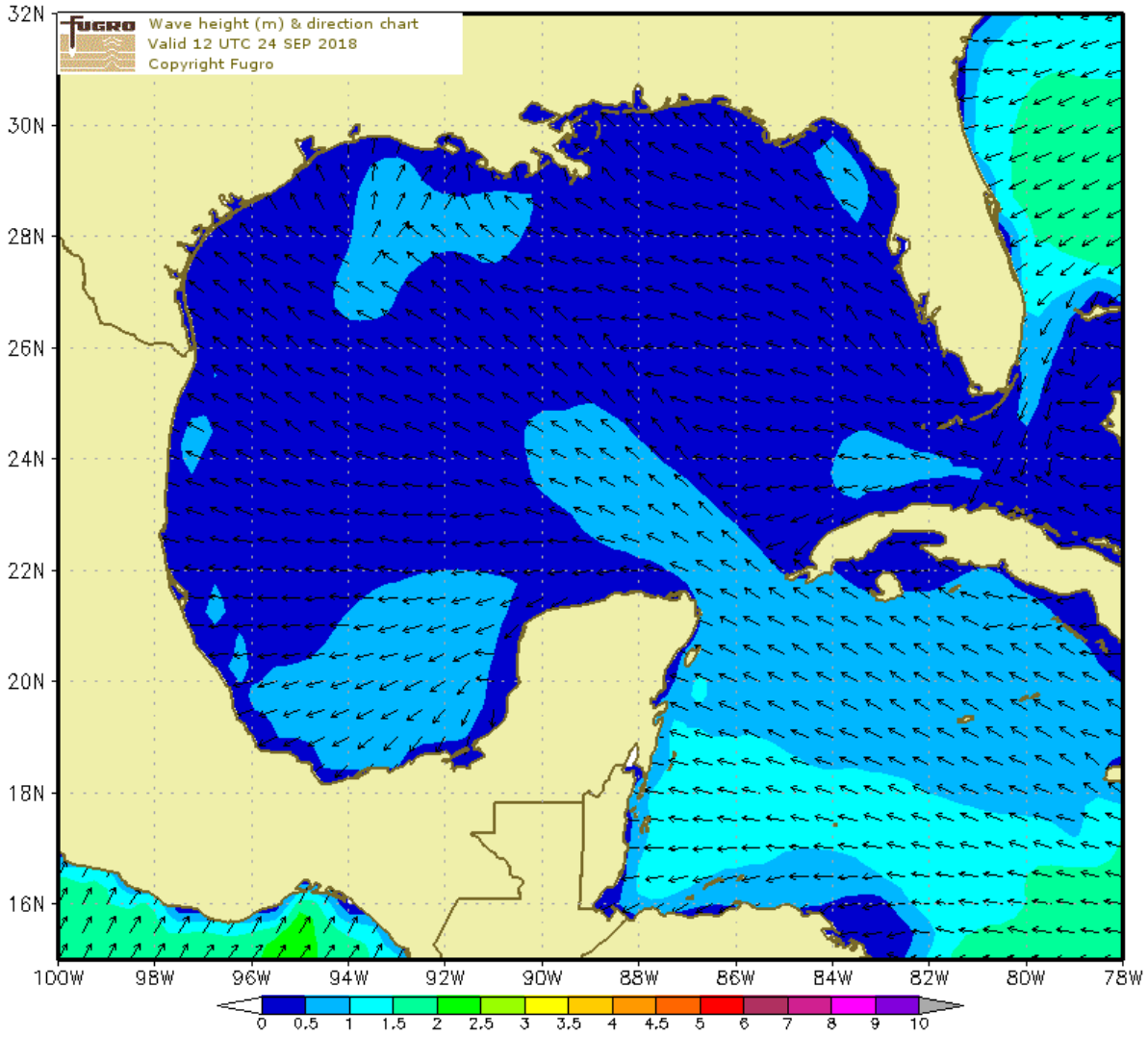

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 24 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) A showery trough over the S States gradually fills as a weak ridge extends SW into the NE GoM from today. Meanwhile a series of fragmented showery troughs move across the GoM throughout.

WARNINGS: NIL.
(Next 24 hours)

Weather: (Next 48 hours) Occasional showers, becoming more frequent and perhaps thundery for a time Tuesday morning.

Confidence: Fairly high for trend, but moderate for peak wind/wave detail as showery troughs at times develop and move across the area. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
24/0600	W	8	10	0.1	SSE	0.3	5	SE	0.1	5	0.3	0.5
24/0900	W	7	9	0.1	SSE	0.2	5	SE	0.2	5	0.3	0.5
24/1200	W	7	9	0.1	SSE	0.2	5	SE	0.2	5	0.3	0.5
24/1500	SW	8	10	0.2	SSE	0.2	5	SE	0.1	5	0.3	0.4
24/1800	S	9	12	0.2	SSE	0.2	5	-	0.0	-	0.2	0.4
24/2100	S	10	13	0.3	SE	0.1	5	-	0.0	-	0.3	0.5
25/0000	S	11	14	0.3	SE	0.1	5	-	0.0	-	0.3	0.5
25/0300	S	11	14	0.3	SE	0.1	5	-	0.0	-	0.3	0.5
25/0600	SSW	11	14	0.4	SE	0.1	5	-	0.0	-	0.4	0.7
25/0900	SSW	10	13	0.4	SE	0.1	5	SSW	0.1	4	0.4	0.7
25/1200	SSW	10	13	0.4	SE	0.1	5	SSW	0.1	4	0.4	0.7
25/1500	S	11	14	0.4	SE	0.1	5	SSW	0.1	4	0.4	0.7
25/1800	S	10	13	0.4	SE	0.1	5	SSW	0.1	4	0.4	0.7
25/2100	SSE	9	12	0.4	SE	0.1	5	SSW	0.1	4	0.4	0.7
26/0000	S	9	12	0.4	SE	0.1	5	SSW	0.1	4	0.4	0.7
26/0300	S	7	9	0.2	SE	0.2	5	SSW	0.1	4	0.3	0.5
26/0600	SSW	6	8	0.1	SE	0.3	5	SSW	0.1	4	0.3	0.5
26/0900	WNW	5	7	0.0	SE	0.3	5	SSW	0.1	4	0.3	0.5
26/1200	SW	5	7	0.1	SE	0.3	5	SSW	0.1	4	0.3	0.5
26/1500	S	5	7	0.1	SE	0.3	5	SSW	0.1	4	0.3	0.5
26/1800	S	7	9	0.2	SE	0.2	5	SSW	0.1	4	0.3	0.5
26/2100	S	7	9	0.2	SE	0.2	5	SSW	0.1	4	0.3	0.5
27/0000	SSW	6	8	0.2	SE	0.2	5	SSW	0.1	4	0.3	0.5
27/0300	W	5	7	0.1	SE	0.2	5	SSW	0.1	4	0.2	0.4
27/0600	NW	5	7	0.0	SSE	0.2	4	SSW	0.1	4	0.2	0.4
27/0900	NNW	5	7	0.0	SSE	0.2	4	SSW	0.1	4	0.2	0.4
27/1200	NE	5	7	0.0	SSE	0.2	5	SSW	0.1	4	0.2	0.4
27/1500	E	5	7	0.1	SSE	0.2	5	SSW	0.1	4	0.2	0.4
27/1800	ESE	5	7	0.1	SSE	0.2	5	SSW	0.1	4	0.2	0.4
27/2100	E	6	8	0.1	SSE	0.2	5	SSW	0.1	4	0.3	0.4
28/0000	E	8	10	0.2	SSE	0.2	5	SSW	0.1	4	0.3	0.5
28/0300	E	9	12	0.2	SSE	0.2	5	-	0.0	-	0.3	0.5
28/0600	E	9	12	0.2	SSE	0.2	5	-	0.0	-	0.3	0.5
28/0900	E	10	13	0.2	SSE	0.2	5	-	0.0	-	0.3	0.5
28/1200	E	10	13	0.2	SSE	0.2	5	-	0.0	-	0.3	0.5
28/1500	E	11	14	0.3	SSE	0.2	5	-	0.0	-	0.4	0.6
28/1800	E	12	16	0.3	SSE	0.2	5	-	0.0	-	0.4	0.7
28/2100	ESE	12	16	0.3	SSE	0.2	5	-	0.0	-	0.4	0.7
29/0000	ESE	13	17	0.5	SSE	0.2	5	-	0.0	-	0.5	0.8
29/0300	ESE	12	16	0.5	SSE	0.2	5	-	0.0	-	0.6	1.0
29/0600	ESE	10	13	0.5	SSE	0.2	5	-	0.0	-	0.5	0.9

Forecaster: Megan Pearson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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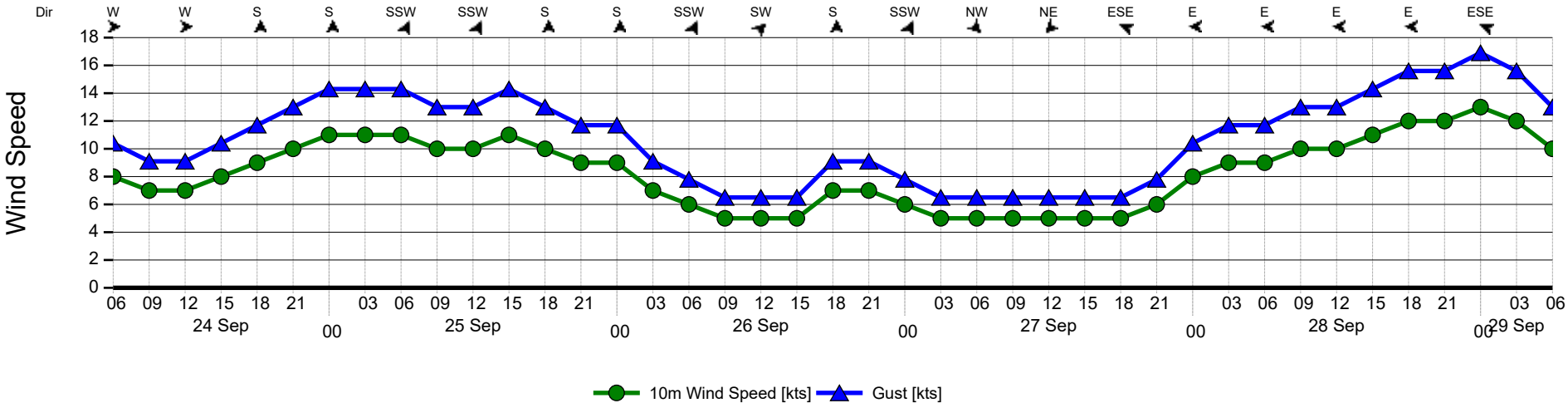
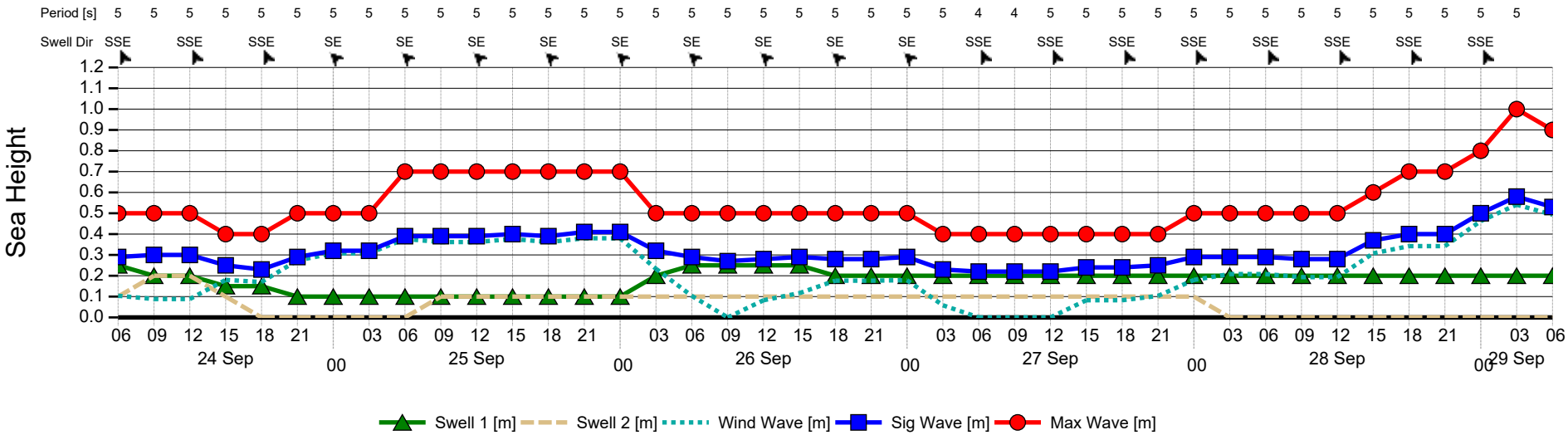
Wind Chart



Wave Chart



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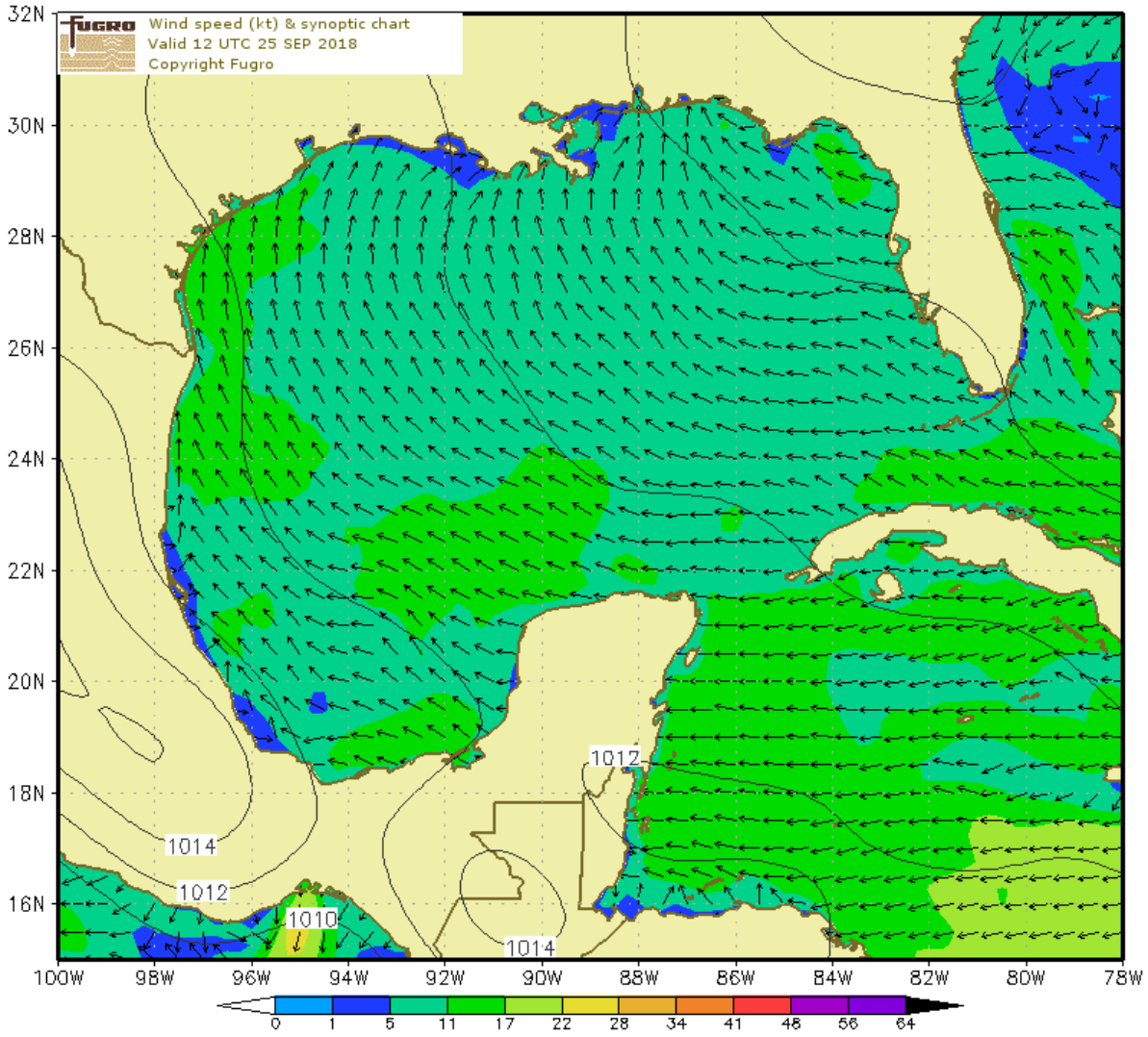

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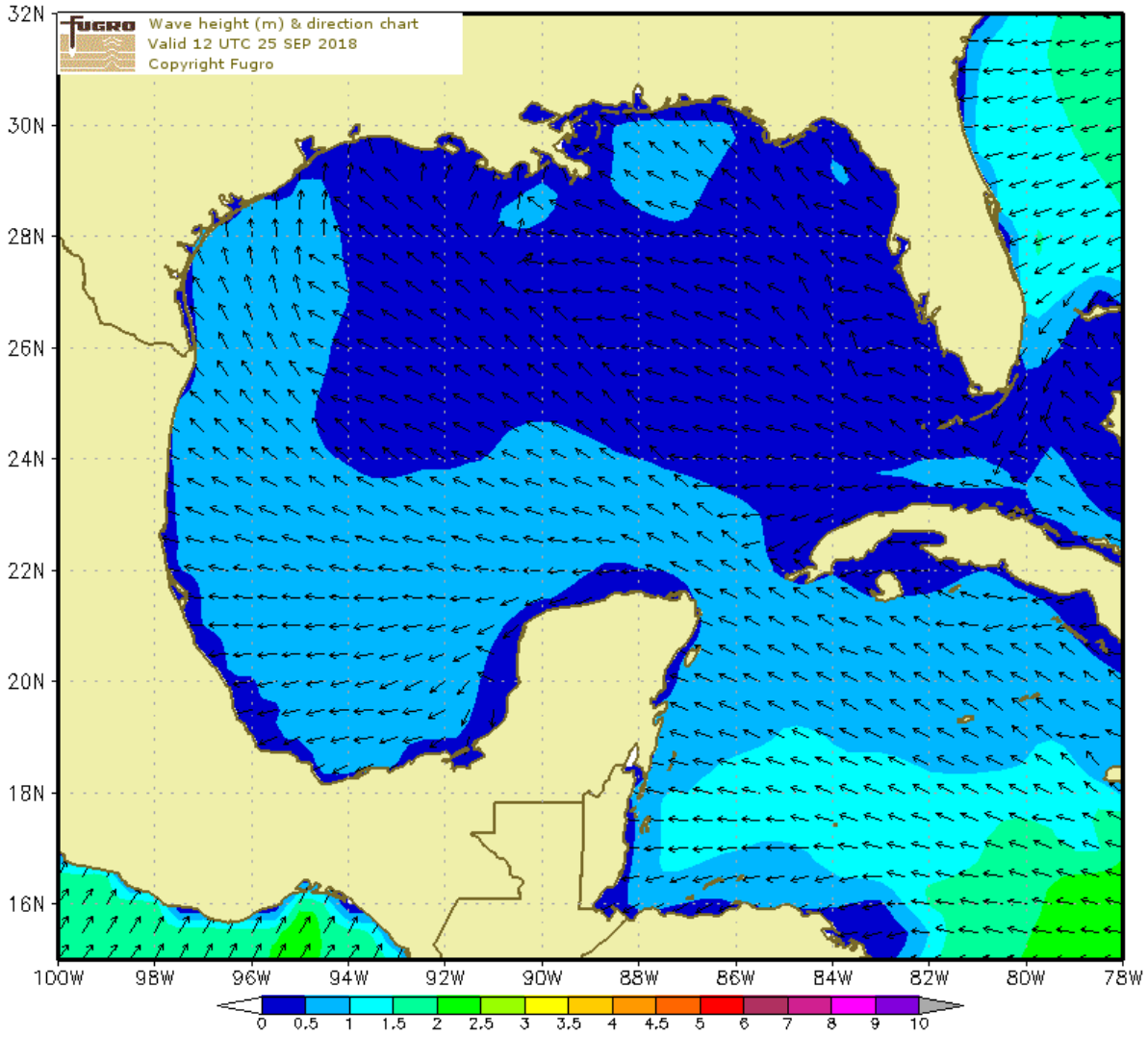

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 25 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) A weak ridge extends SW into the NE GoM whilea series of fragmented showery troughs move across the GoM throughout. Tomorrow, with a more organised frontal trough moves E over the S States, gradually filling over Mississippi on Thursday.

WARNINGS: (Next 24 hours) THUNDERSTORMS.

Weather: (Next 48 hours) Occasional showers, becoming more frequent and thundery for a time in the mornings.

Confidence: Fairly high for trend, but moderate for peak wind/wave detail as showery troughs at times develop and move across the area. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
25/0600	SSW	14	18	0.5	SE	0.2	5	-	0.0	-	0.6	1.0
25/0900	SSW	12	16	0.5	SE	0.3	5	SSW	0.1	4	0.6	1.0
25/1200	SSW	10	13	0.4	SE	0.3	5	SSW	0.1	4	0.5	0.8
25/1500	S	10	13	0.5	SE	0.2	5	SSW	0.1	4	0.5	0.8
25/1800	S	10	13	0.4	SE	0.1	5	SSW	0.1	4	0.4	0.7
25/2100	S	9	12	0.4	SE	0.1	5	SSW	0.1	4	0.4	0.7
26/0000	S	9	12	0.4	SE	0.1	5	SSW	0.1	4	0.4	0.7
26/0300	S	8	10	0.3	SE	0.2	5	SSW	0.1	4	0.3	0.6
26/0600	SW	7	9	0.2	SE	0.3	5	SSW	0.1	4	0.3	0.5
26/0900	WNW	6	8	0.0	SE	0.3	5	SSW	0.1	4	0.3	0.5
26/1200	WNW	5	7	0.0	SE	0.3	5	SSW	0.2	4	0.3	0.5
26/1500	SSW	6	8	0.1	SE	0.2	5	SSW	0.2	4	0.3	0.5
26/1800	SSW	7	9	0.2	SE	0.2	5	SSW	0.2	4	0.3	0.5
26/2100	WSW	6	8	0.1	SE	0.2	5	SSW	0.2	4	0.3	0.5
27/0000	WNW	5	7	0.0	SE	0.2	5	SSW	0.2	4	0.3	0.5
27/0300	NNW	5	7	0.0	SE	0.2	5	SSW	0.1	4	0.3	0.4
27/0600	NNE	8	10	0.0	SSE	0.2	4	SSW	0.1	4	0.3	0.4
27/0900	NNE	10	13	0.0	SSE	0.2	4	SSW	0.1	4	0.3	0.4
27/1200	NNE	11	14	0.0	SSE	0.2	5	SSW	0.1	4	0.3	0.4
27/1500	NNE	10	13	0.0	SSE	0.2	5	SSW	0.1	4	0.3	0.4
27/1800	NNE	9	12	0.0	SSE	0.2	5	SSW	0.1	4	0.2	0.4
27/2100	NE	8	10	0.0	SSE	0.2	5	SSW	0.1	4	0.2	0.4
28/0000	ENE	8	10	0.0	SSE	0.2	5	SSW	0.1	4	0.2	0.4
28/0300	ENE	8	10	0.0	SSE	0.2	5	SSW	0.1	4	0.2	0.4
28/0600	NE	9	12	0.0	SSE	0.2	5	-	0.0	-	0.2	0.4
28/0900	NE	11	14	0.0	SSE	0.3	5	-	0.0	-	0.3	0.5
28/1200	NE	11	14	0.0	SSE	0.3	5	-	0.0	-	0.3	0.5
28/1500	ENE	10	13	0.0	SSE	0.3	5	-	0.0	-	0.3	0.5
28/1800	ENE	11	14	0.2	SSE	0.2	5	-	0.0	-	0.3	0.5
28/2100	E	11	14	0.2	SSE	0.2	5	-	0.0	-	0.3	0.5
29/0000	E	11	14	0.3	SSE	0.2	4	-	0.0	-	0.4	0.6
29/0300	ESE	10	13	0.4	SSE	0.2	4	-	0.0	-	0.4	0.7
29/0600	ESE	9	12	0.4	SSE	0.2	4	-	0.0	-	0.4	0.7
29/0900	E	9	12	0.4	SSE	0.1	4	-	0.0	-	0.4	0.7
29/1200	E	10	13	0.4	SSE	0.1	4	-	0.0	-	0.4	0.7
29/1500	E	11	14	0.4	-	0.0	-	-	0.0	-	0.4	0.7
29/1800	E	11	14	0.4	-	0.0	-	-	0.0	-	0.4	0.7
29/2100	ESE	11	14	0.5	-	0.0	-	-	0.0	-	0.5	0.8
30/0000	ESE	11	14	0.5	-	0.0	-	-	0.0	-	0.5	0.9
30/0300	ESE	11	14	0.5	-	0.0	-	-	0.0	-	0.5	0.9
30/0600	ESE	11	14	0.5	-	0.0	-	-	0.0	-	0.5	0.9

Forecaster: Megan Pearson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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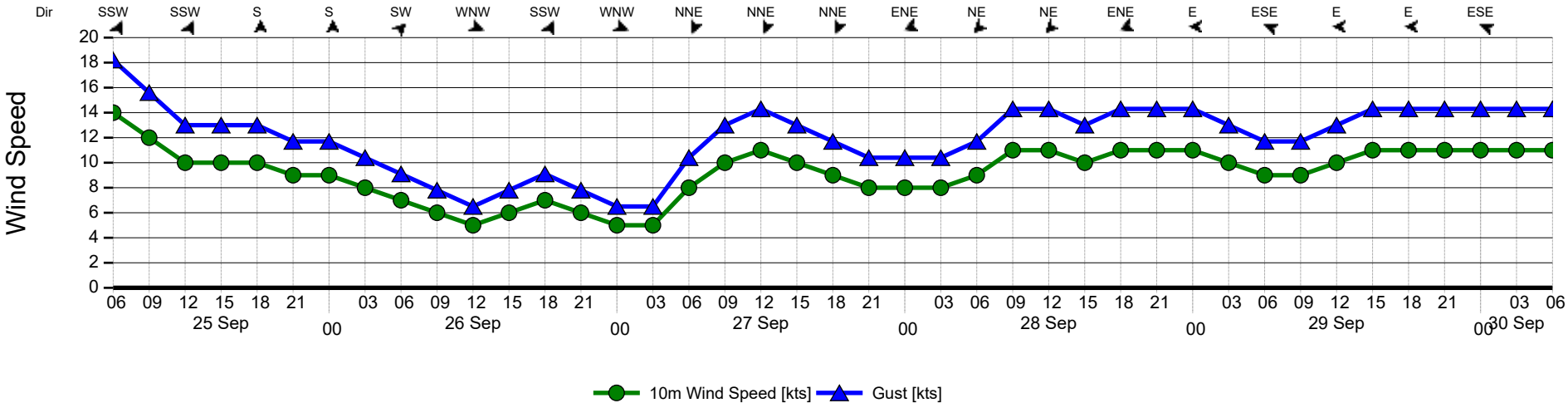
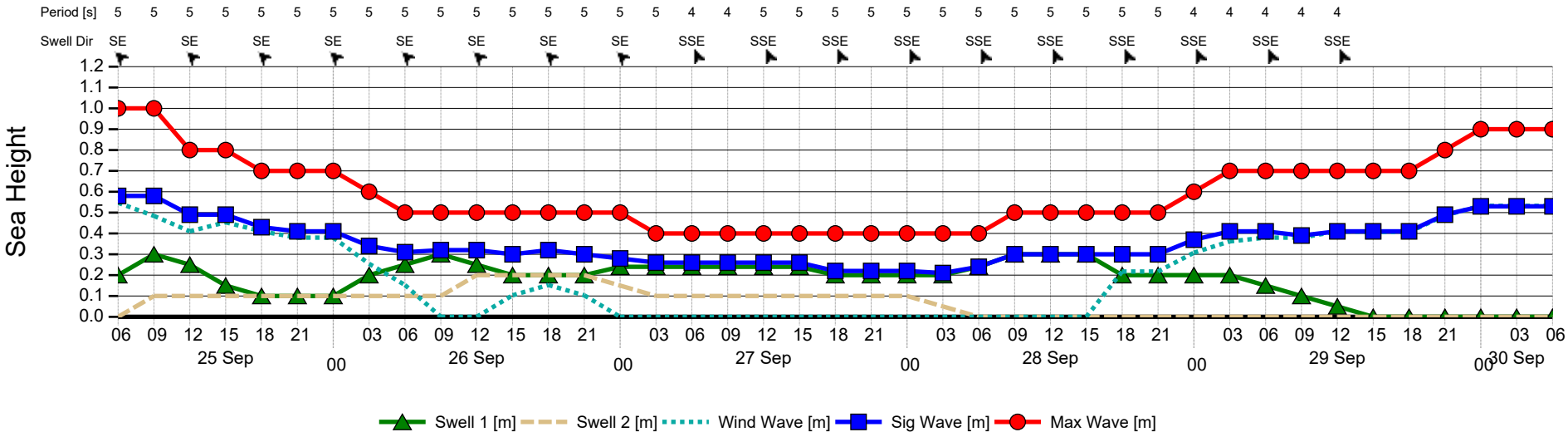
Wind Chart



Wave Chart



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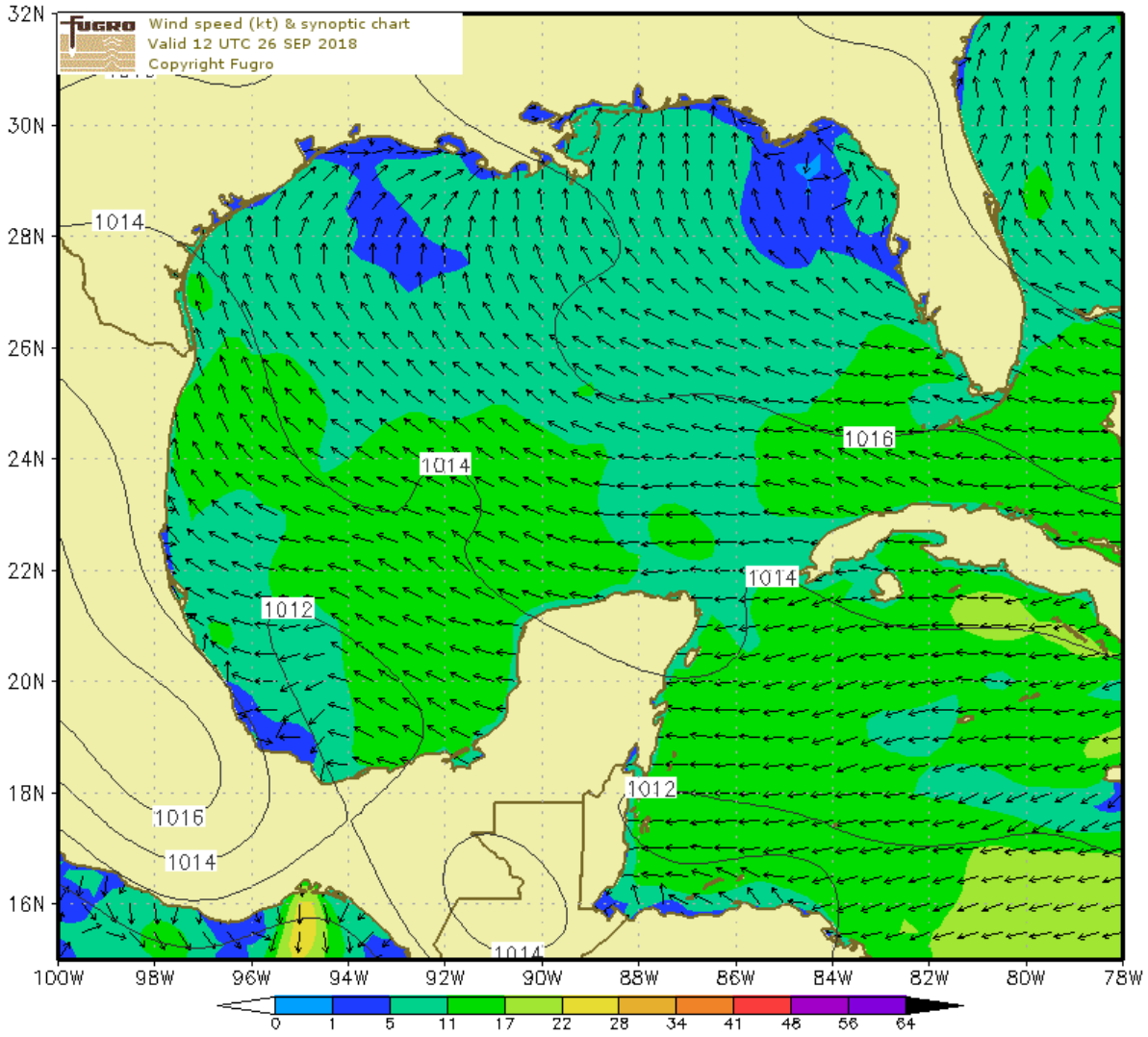

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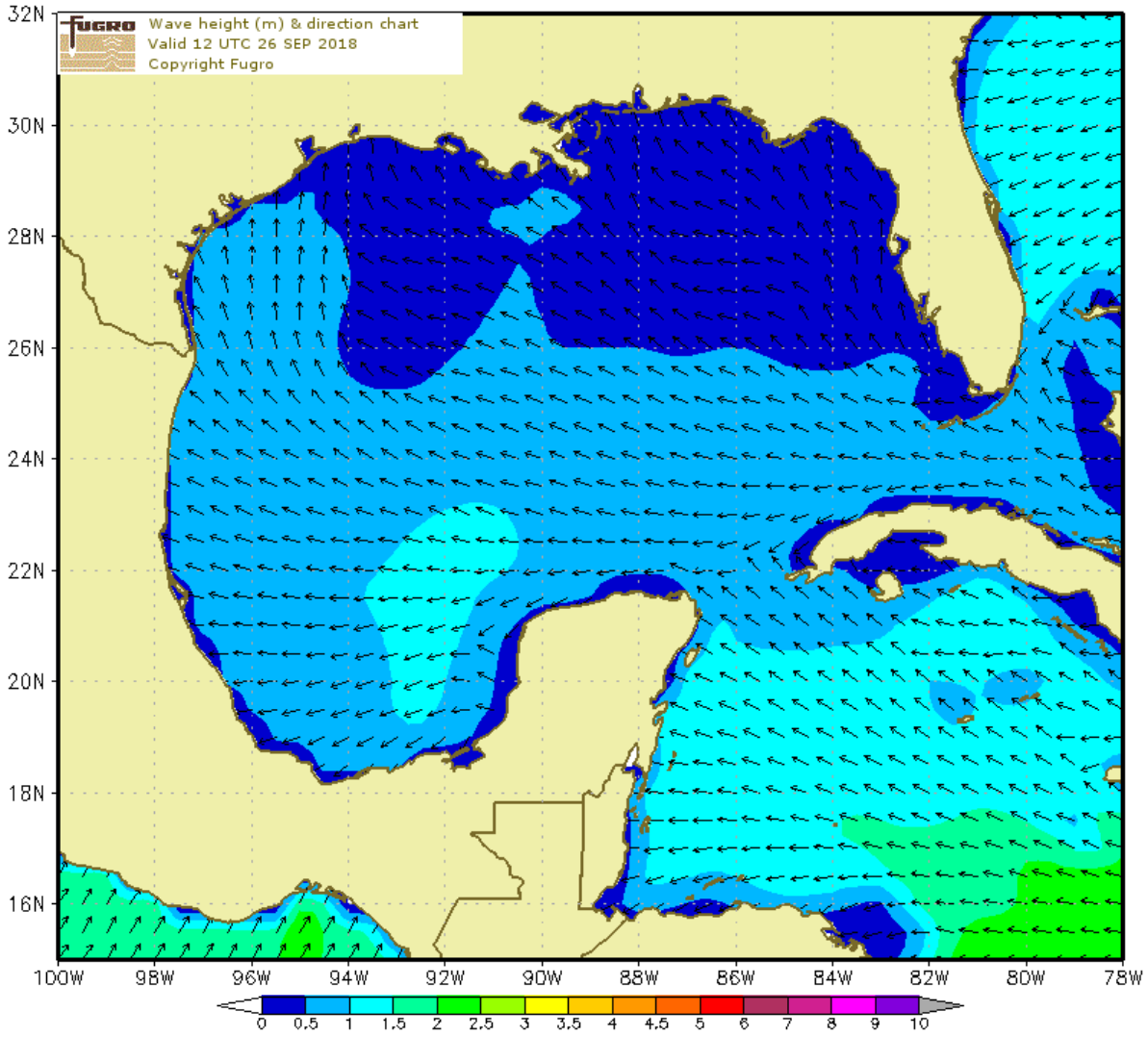

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 26 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) A weak ridge extends SW-WSW into the NE GoM while a series of fragmented showery troughs move across the GoM throughout. A more organised frontal trough moves E over the S States from this morning, gradually filling by Friday morning.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Occasional showers/thunderstorms, becoming more frequent for a time in the mornings.

Confidence: Fairly high for trend, but moderate for peak wind/wave detail as showery troughs at times develop and move across the area. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
26/0600	SW	9	12	0.2	SSW	0.3	4	SE	0.3	5	0.4	0.7
26/0900	WSW	7	9	0.1	SSW	0.3	4	SE	0.3	5	0.4	0.7
26/1200	SW	6	8	0.1	SSW	0.3	4	SE	0.3	5	0.4	0.7
26/1500	S	7	9	0.2	SSW	0.3	4	SE	0.2	4	0.4	0.7
26/1800	SSE	9	12	0.2	SSW	0.3	5	SE	0.2	4	0.4	0.7
26/2100	S	8	10	0.2	SSW	0.3	5	SE	0.2	4	0.4	0.7
27/0000	SSW	8	10	0.2	S	0.2	5	SE	0.2	4	0.4	0.6
27/0300	SW	9	12	0.2	S	0.2	5	SE	0.2	4	0.4	0.6
27/0600	W	10	13	0.1	S	0.2	5	SE	0.2	4	0.3	0.6
27/0900	NW	8	10	0.0	S	0.2	5	SE	0.2	5	0.3	0.5
27/1200	NNW	7	9	0.0	S	0.2	5	SE	0.2	5	0.3	0.5
27/1500	ENE	6	8	0.0	S	0.2	5	SE	0.2	5	0.3	0.5
27/1800	ESE	6	8	0.1	S	0.2	5	SE	0.1	5	0.3	0.4
27/2100	E	7	9	0.1	SE	0.2	4	SSW	0.1	5	0.2	0.4
28/0000	ESE	8	10	0.1	SE	0.2	4	SSW	0.1	5	0.3	0.4
28/0300	SE	8	10	0.1	SE	0.2	4	SSW	0.1	4	0.3	0.4
28/0600	E	9	12	0.1	SE	0.2	5	SSW	0.1	4	0.3	0.4
28/0900	E	11	14	0.2	SE	0.2	5	SSW	0.1	4	0.3	0.5
28/1200	ESE	12	16	0.2	S	0.2	5	SSW	0.1	4	0.3	0.6
28/1500	ESE	12	16	0.3	S	0.2	5	SSW	0.1	4	0.4	0.7
28/1800	ESE	12	16	0.3	S	0.2	5	-	0.0	-	0.4	0.7
28/2100	ESE	12	16	0.3	SSE	0.2	6	-	0.0	-	0.4	0.7
29/0000	ESE	12	16	0.3	SSE	0.2	6	-	0.0	-	0.4	0.7
29/0300	ESE	12	16	0.3	SE	0.2	7	-	0.0	-	0.4	0.7
29/0600	E	13	17	0.5	SE	0.2	7	-	0.0	-	0.5	0.8
29/0900	ENE	13	17	0.5	SE	0.1	7	-	0.0	-	0.5	0.9
29/1200	E	13	17	0.5	SE	0.1	7	-	0.0	-	0.5	0.9
29/1500	E	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.8
29/1800	E	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.8
29/2100	E	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.9
30/0000	E	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.9
30/0300	ESE	12	16	0.5	SE	0.1	5	-	0.0	-	0.6	0.9
30/0600	ESE	11	14	0.5	SE	0.2	5	-	0.0	-	0.5	0.9
30/0900	SE	10	13	0.4	SE	0.3	5	-	0.0	-	0.5	0.9
30/1200	ESE	9	12	0.3	SE	0.4	5	-	0.0	-	0.5	0.9
30/1500	E	10	13	0.4	SE	0.4	5	-	0.0	-	0.5	0.9
30/1800	E	12	16	0.5	SE	0.3	4	-	0.0	-	0.6	1.0
30/2100	E	15	20	0.6	SE	0.2	4	-	0.0	-	0.6	1.1
01/0000	ESE	16	21	0.6	SE	0.1	4	-	0.0	-	0.7	1.1
01/0300	SE	15	20	0.7	-	0.0	-	-	0.0	-	0.7	1.1
01/0600	SE	13	17	0.7	-	0.0	-	-	0.0	-	0.7	1.1

Forecaster: Hannah Mallinson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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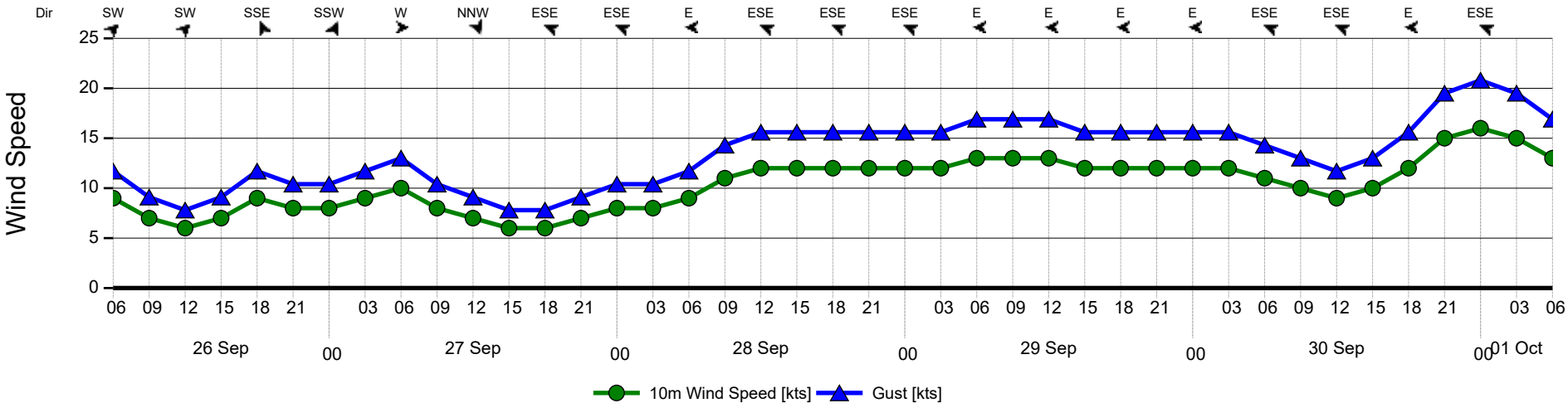
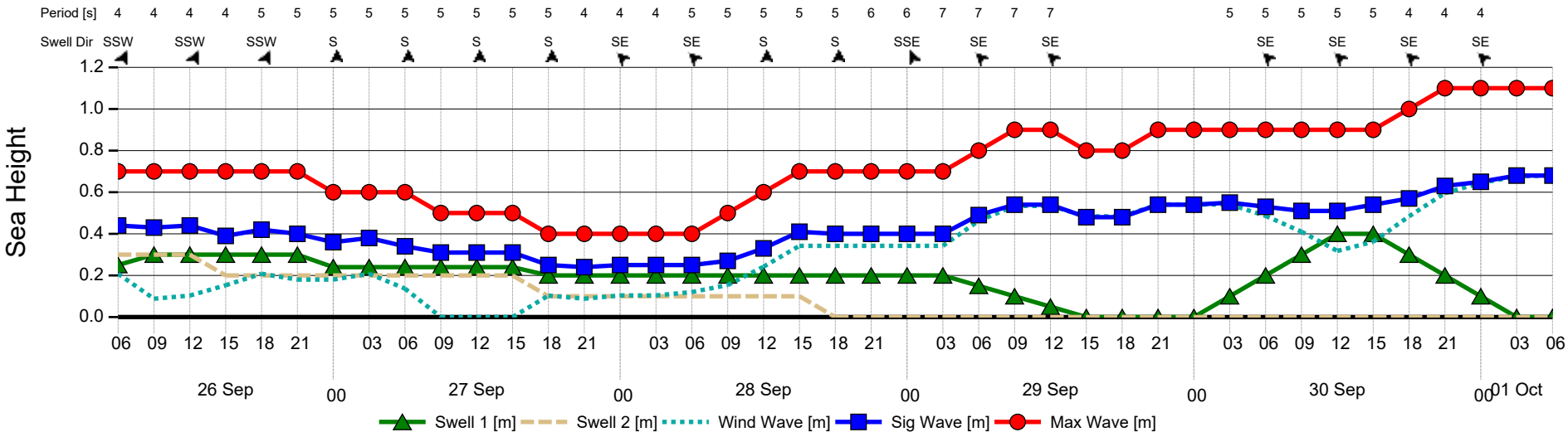
Wind Chart



Wave Chart



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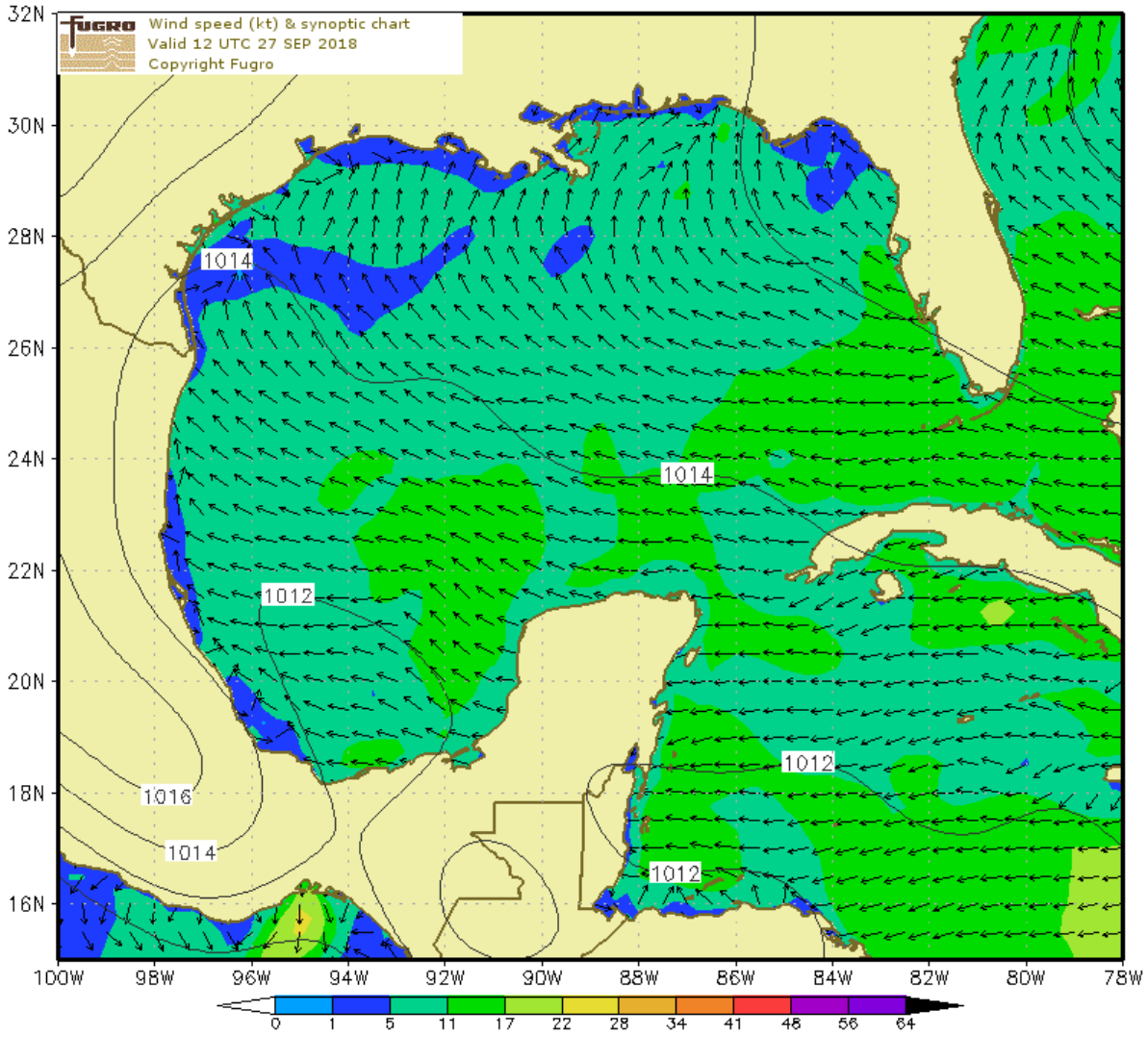

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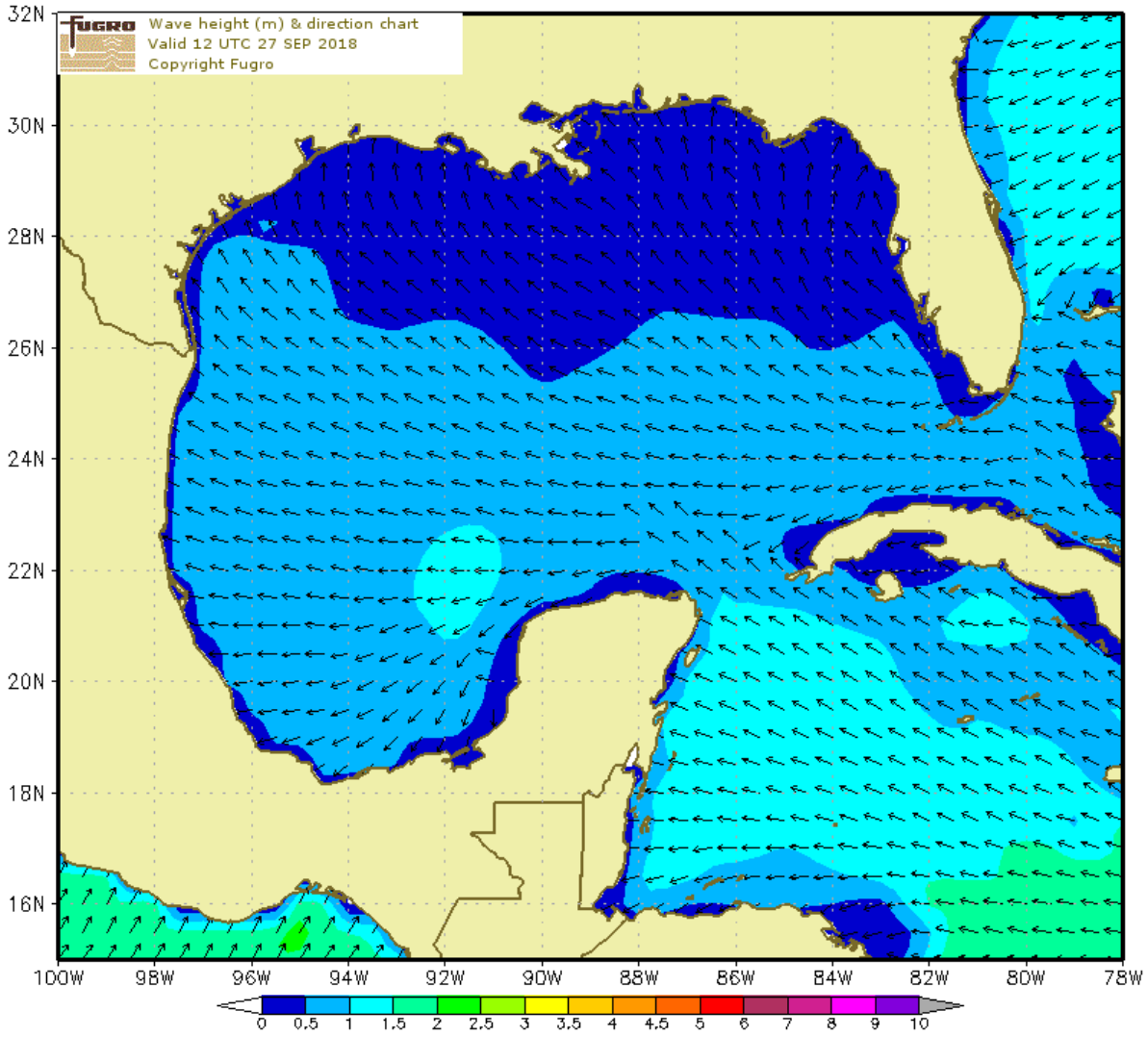

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 27 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) A frontal trough lying SW/NE moves ESE into the N GoM this morning. Through the afternoon this fragments and clears by tomorrow morning. Weak showery troughs then move WNW over the GoM from tomorrow afternoon, as a weak ridge becomes oriented S-SSW across the S States and into the N GoM by Saturday morning.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Showers or longer spells of rain likely today, which may contain embedded thunderstorms. Conditions will turn largely fair from this evening, as showers/thunderstorms become more isolated.

Confidence: Fairly high for trend, but moderate for peak wind/wave detail as a frontal trough moves over your location today. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
27/0600	NW	14	18	0.0	SE	0.4	4	S	0.2	5	0.5	0.8
27/0900	NNW	14	18	0.0	SE	0.4	4	S	0.2	5	0.5	0.8
27/1200	N	12	16	0.0	SE	0.4	4	S	0.2	5	0.4	0.7
27/1500	N	9	12	0.0	SE	0.3	4	S	0.2	5	0.4	0.6
27/1800	NNE	7	9	0.0	SE	0.3	4	S	0.1	5	0.3	0.5
27/2100	NNE	6	8	0.0	SE	0.2	5	S	0.1	5	0.2	0.4
28/0000	NE	6	8	0.0	SE	0.2	5	S	0.1	5	0.2	0.4
28/0300	NE	6	8	0.0	SE	0.2	5	SSW	0.1	4	0.2	0.4
28/0600	ENE	7	9	0.0	SE	0.3	5	SSW	0.1	4	0.3	0.5
28/0900	ENE	9	12	0.1	SE	0.3	5	SSW	0.1	4	0.3	0.5
28/1200	E	10	13	0.2	SE	0.2	5	SSW	0.1	4	0.3	0.5
28/1500	E	10	13	0.2	SE	0.2	5	-	0.0	-	0.3	0.5
28/1800	ESE	9	12	0.2	SE	0.2	5	-	0.0	-	0.3	0.5
28/2100	ESE	8	10	0.2	SE	0.2	5	-	0.0	-	0.3	0.5
29/0000	ESE	8	10	0.2	SE	0.2	4	-	0.0	-	0.3	0.5
29/0300	ESE	8	10	0.2	SE	0.2	4	SSE	0.1	4	0.3	0.5
29/0600	E	9	12	0.2	SE	0.2	5	SSE	0.1	4	0.3	0.5
29/0900	ENE	11	14	0.0	SE	0.3	5	SSE	0.1	4	0.3	0.5
29/1200	ENE	11	14	0.0	SE	0.3	5	SSE	0.1	4	0.3	0.5
29/1500	ENE	10	13	0.0	SE	0.2	5	SSE	0.2	4	0.3	0.5
29/1800	ENE	9	12	0.0	SE	0.2	5	SSE	0.2	3	0.3	0.5
29/2100	ENE	9	12	0.3	SE	0.1	5	SSE	0.1	3	0.4	0.6
30/0000	E	10	13	0.4	SE	0.1	5	-	0.0	-	0.4	0.6
30/0300	E	11	14	0.4	SE	0.1	5	-	0.0	-	0.4	0.7
30/0600	E	12	15	0.5	SE	0.2	5	-	0.0	-	0.5	0.8
30/0900	E	11	14	0.4	SE	0.3	5	-	0.0	-	0.5	0.9
30/1200	ESE	10	13	0.4	SE	0.4	5	-	0.0	-	0.5	0.9
30/1500	E	10	13	0.4	SE	0.4	5	-	0.0	-	0.5	0.9
30/1800	E	12	16	0.5	SE	0.3	5	-	0.0	-	0.6	1.0
30/2100	E	15	19	0.6	SE	0.2	5	-	0.0	-	0.6	1.0
01/0000	ESE	15	20	0.6	SE	0.1	5	-	0.0	-	0.6	1.0
01/0300	ESE	14	18	0.6	-	0.0	-	-	0.0	-	0.6	1.0
01/0600	SE	13	18	0.6	-	0.0	-	-	0.0	-	0.6	1.0
01/0900	ESE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0
01/1200	ESE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0
01/1500	ESE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0
01/1800	ESE	13	17	0.7	-	0.0	-	-	0.0	-	0.7	1.1
01/2100	ESE	14	18	0.7	-	0.0	-	-	0.0	-	0.7	1.2
02/0000	ESE	14	18	0.8	-	0.0	-	-	0.0	-	0.8	1.3
02/0300	SE	13	17	0.8	-	0.0	-	-	0.0	-	0.8	1.3
02/0600	ESE	12	16	0.7	-	0.0	-	-	0.0	-	0.7	1.2

Forecaster: Hannah Mallinson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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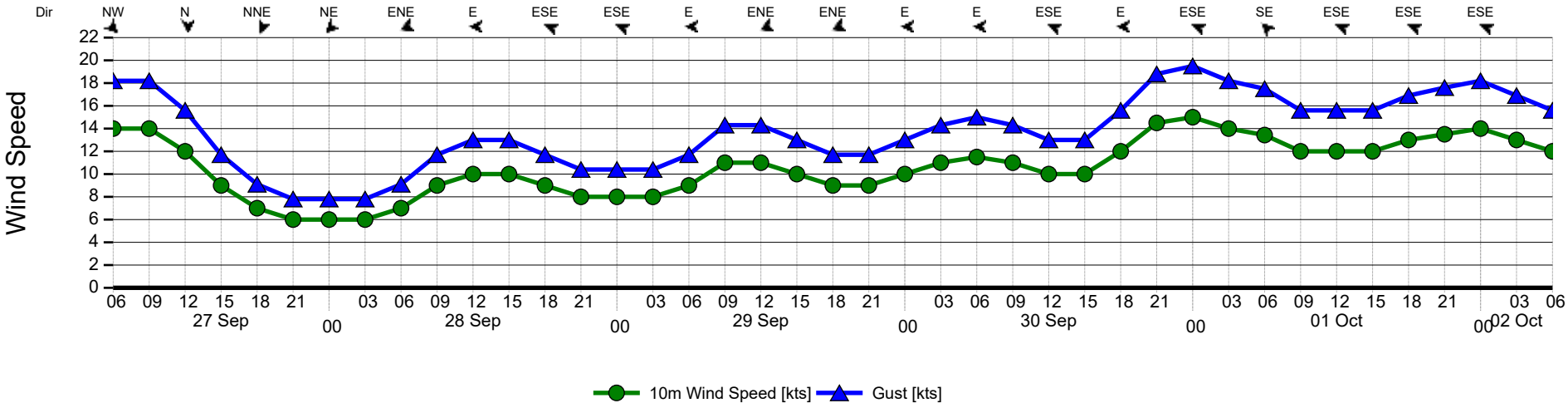
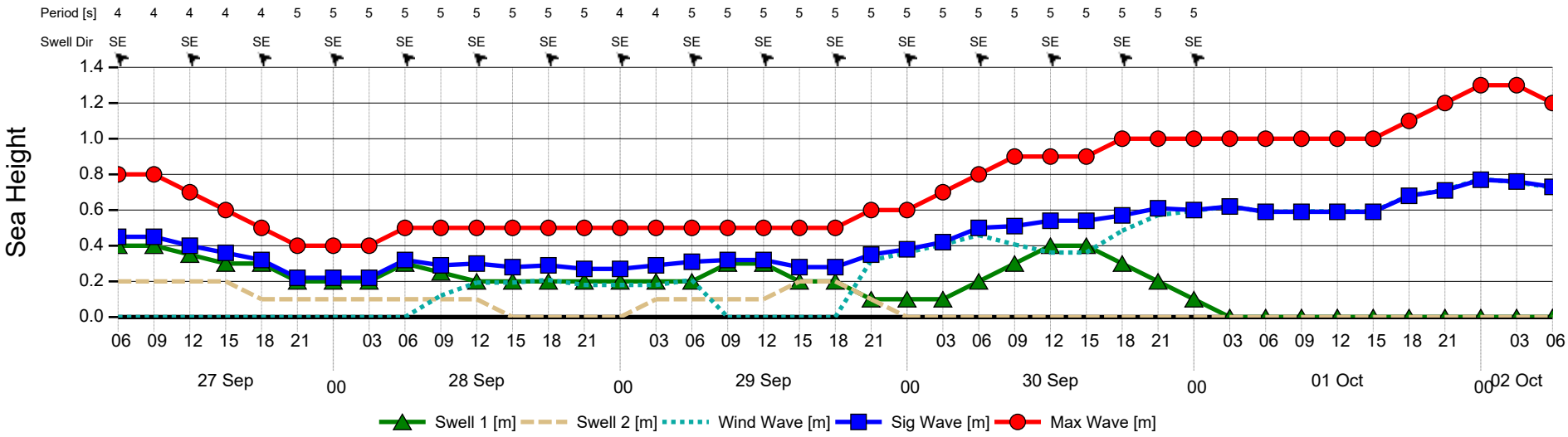
Wind Chart



Wave Chart



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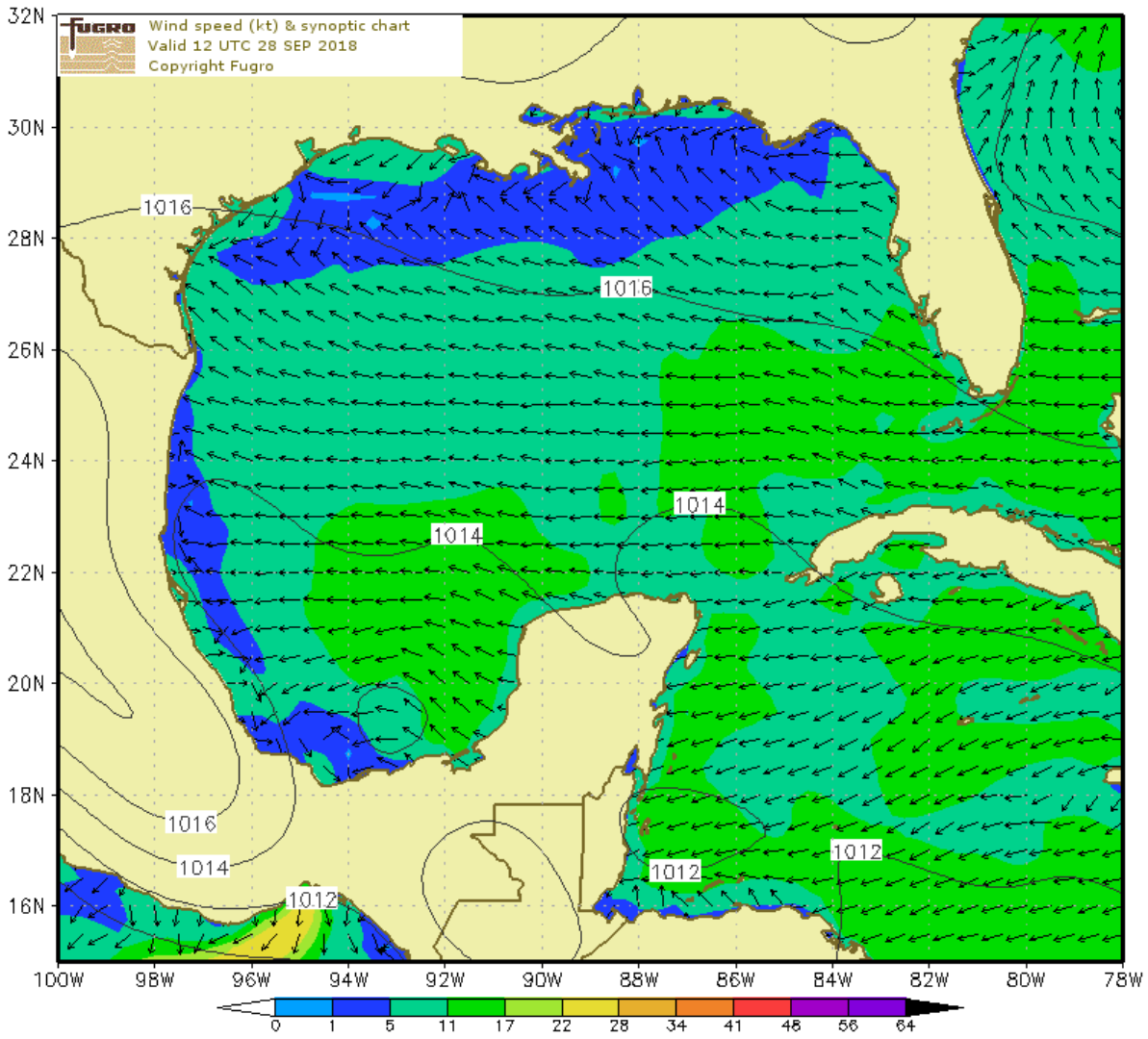

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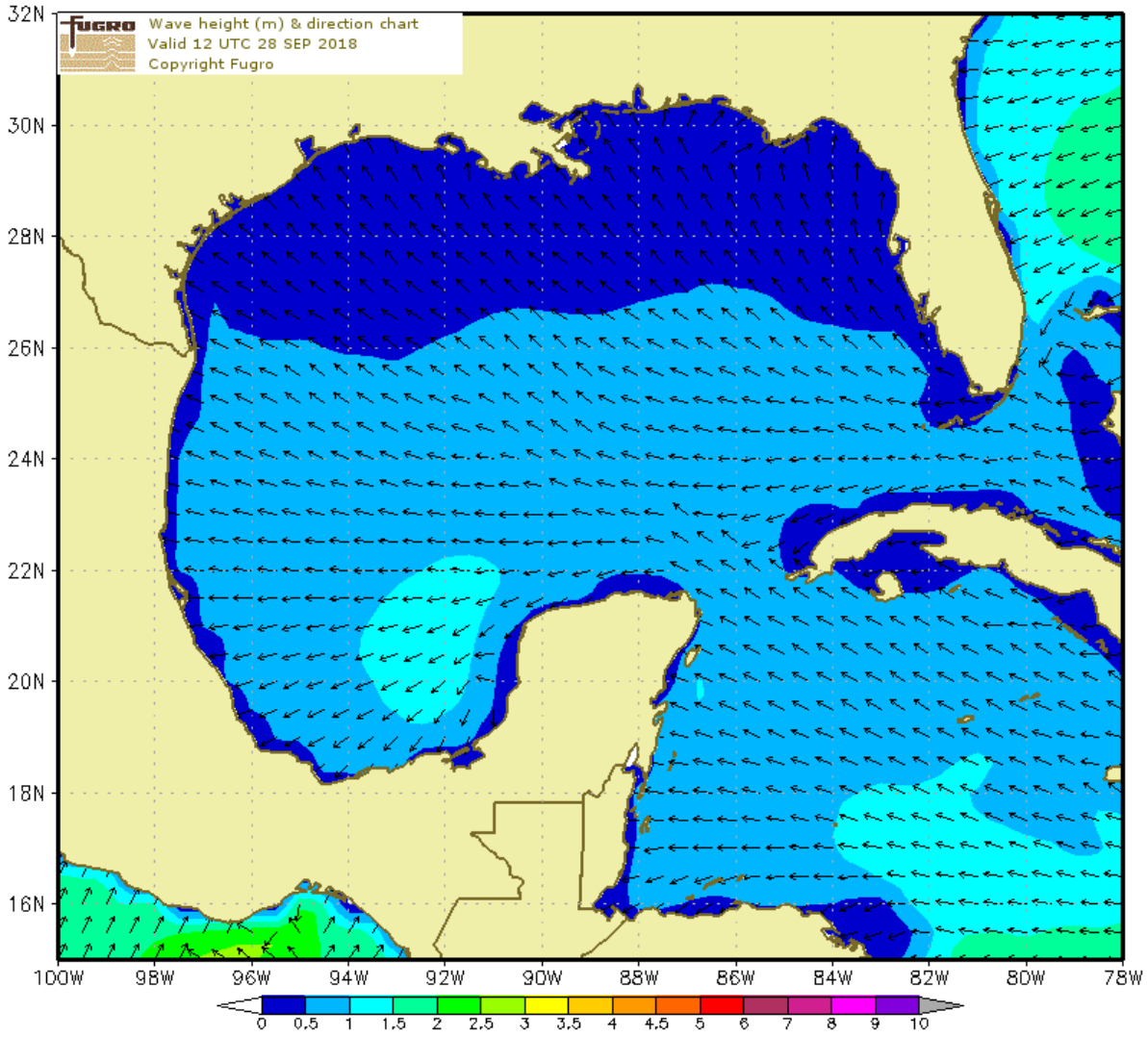

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 28 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) Weak showery troughs move WNW over the central GoM from this afternoon onwards, and deepen at times over the NW GoM. Meanwhile a ridge extends SSW over the SE States towards the N GoM coastline.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Heavy showers/thunderstorms during late mornings and the afternoons. Clearing fair during the evenings and overnight.

Confidence: Fairly high for trend, but moderate for peak wind/wave detail during the afternoons with troughs deepening nearby. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
28/0600	ENE	7	9	0.0	SE	0.3	5	SSW	0.1	4	0.3	0.5
28/0900	ENE	9	12	0.0	SE	0.3	5	SSW	0.1	4	0.3	0.5
28/1200	E	9	12	0.2	SE	0.2	5	SSW	0.1	4	0.3	0.5
28/1500	ESE	9	12	0.2	SE	0.2	5	-	0.0	-	0.3	0.4
28/1800	ESE	10	13	0.3	SE	0.2	5	-	0.0	-	0.3	0.6
28/2100	ESE	13	17	0.4	SE	0.2	5	-	0.0	-	0.4	0.7
29/0000	ESE	12	16	0.3	SE	0.2	4	-	0.0	-	0.4	0.7
29/0300	E	11	14	0.3	SE	0.2	4	-	0.0	-	0.4	0.6
29/0600	ENE	12	16	0.0	SE	0.3	5	SSE	0.1	5	0.3	0.5
29/0900	ENE	12	16	0.0	SE	0.3	5	SSE	0.1	5	0.3	0.5
29/1200	ENE	10	13	0.0	SE	0.4	5	SSE	0.1	5	0.4	0.7
29/1500	ENE	8	10	0.0	SE	0.4	5	-	0.0	-	0.4	0.7
29/1800	NE	9	12	0.0	SE	0.4	5	-	0.0	-	0.4	0.7
29/2100	ENE	12	16	0.3	SE	0.3	5	-	0.0	-	0.5	0.8
30/0000	E	12	16	0.3	SE	0.2	5	-	0.0	-	0.4	0.7
30/0300	E	11	14	0.4	SE	0.2	5	-	0.0	-	0.5	0.8
30/0600	E	11	14	0.4	SE	0.4	5	-	0.0	-	0.6	1.0
30/0900	E	13	17	0.4	SE	0.4	5	-	0.0	-	0.6	0.9
30/1200	E	15	20	0.5	SE	0.3	5	-	0.0	-	0.6	1.0
30/1500	E	14	18	0.5	SE	0.3	5	-	0.0	-	0.6	0.9
30/1800	E	13	17	0.5	SE	0.3	5	-	0.0	-	0.6	1.0
30/2100	E	15	19	0.6	SE	0.2	5	-	0.0	-	0.7	1.1
01/0000	E	14	18	0.6	SE	0.1	5	-	0.0	-	0.6	1.1
01/0300	ESE	13	17	0.7	-	0.0	-	-	0.0	-	0.7	1.1
01/0600	ESE	11	14	0.6	-	0.0	-	-	0.0	-	0.6	1.1
01/0900	ESE	10	13	0.5	-	0.0	-	-	0.0	-	0.6	0.9
01/1200	ESE	10	13	0.5	-	0.0	-	-	0.0	-	0.6	0.9
01/1500	ESE	11	14	0.6	-	0.0	-	-	0.0	-	0.6	1.1
01/1800	ESE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0
01/2100	ESE	13	17	0.7	-	0.0	-	-	0.0	-	0.7	1.1
02/0000	ESE	13	17	0.7	-	0.0	-	-	0.0	-	0.7	1.1
02/0300	ESE	13	17	0.8	-	0.0	-	-	0.0	-	0.8	1.3
02/0600	ESE	12	16	0.7	-	0.0	-	-	0.0	-	0.7	1.2
02/0900	ESE	12	16	0.7	-	0.0	-	-	0.0	-	0.7	1.2
02/1200	ESE	12	16	0.7	-	0.0	-	-	0.0	-	0.7	1.2
02/1500	ESE	11	14	0.6	-	0.0	-	-	0.0	-	0.6	1.1
02/1800	ESE	11	14	0.6	-	0.0	-	-	0.0	-	0.6	1.1
02/2100	ESE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0
03/0000	SE	13	17	0.7	-	0.0	-	-	0.0	-	0.7	1.1
03/0300	SE	13	17	0.7	-	0.0	-	-	0.0	-	0.7	1.1
03/0600	SE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0

Forecaster: Hannah Mallinson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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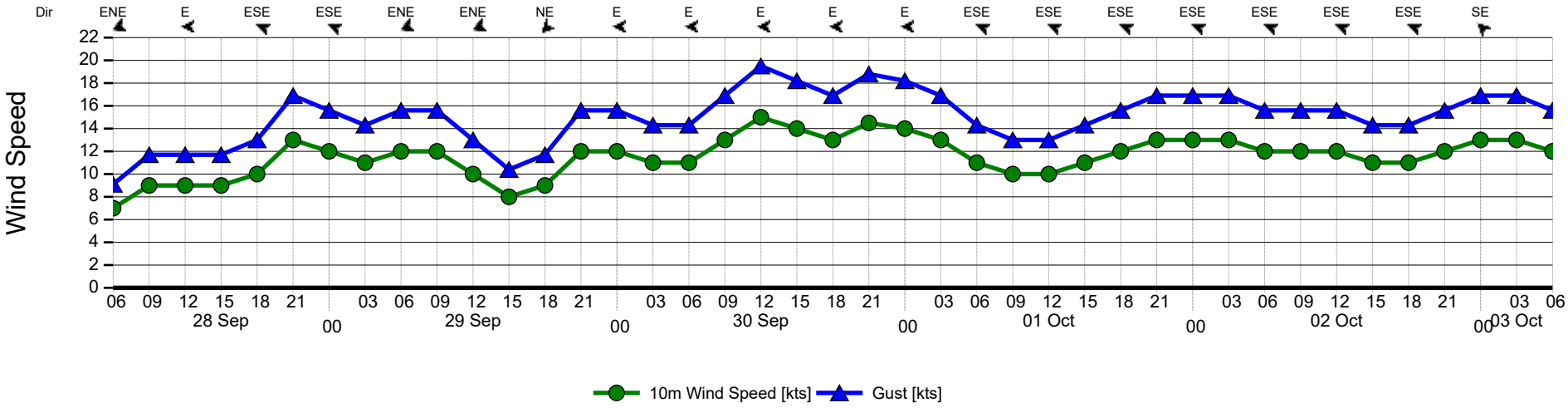
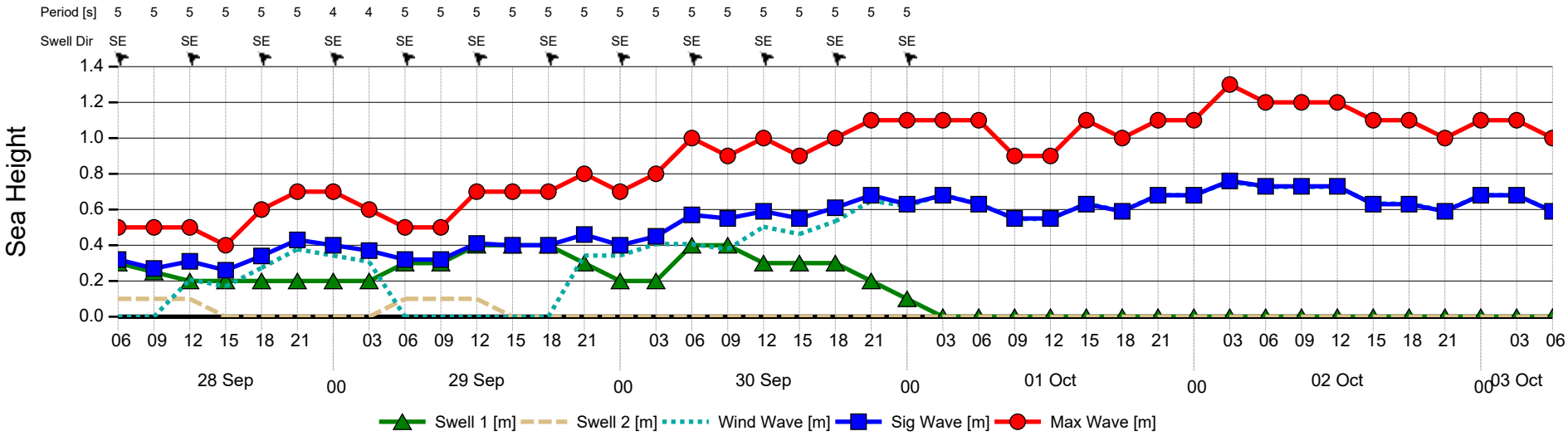
Wind Chart



Wave Chart



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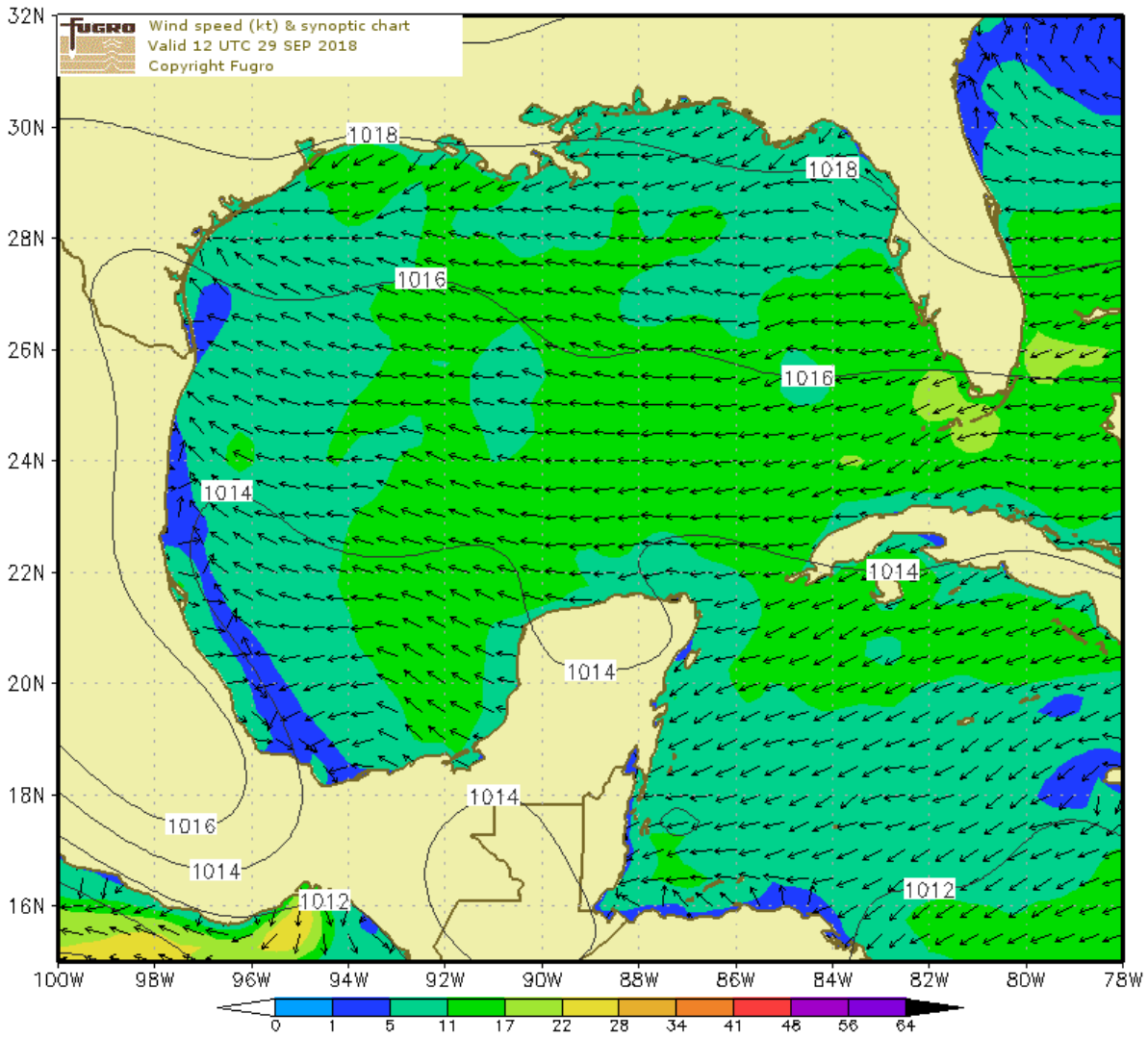

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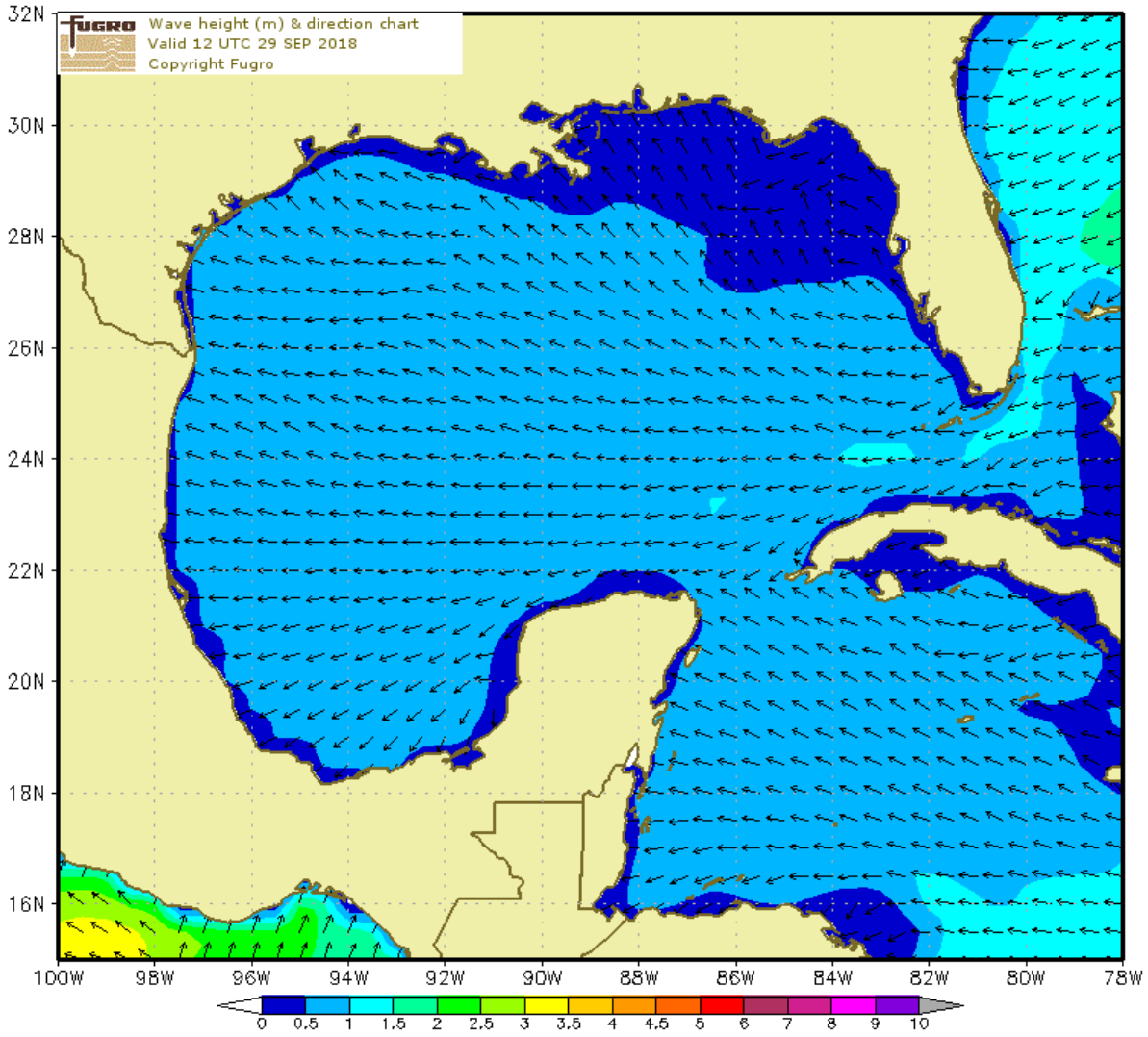

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 29 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) Weak showery troughs move WNW over the central GoM and deepen at times over the NW GoM. Meanwhile a weak ridge extends SSW over the SE States towards the N GoM coastline. The ridge becomes orientated SW by tomorrow evening and into Monday morning.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Heavy showers/thunderstorms during late mornings and the afternoons. Clearing mainly fair during the evenings and overnight as these become more isolated.

Confidence: Fairly high for trend, but moderate for peak wind/wave detail during the afternoons with troughs deepening nearby. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
29/0600	E	11	14	0.2	SE	0.5	7	-	0.0	-	0.5	0.9
29/0900	ENE	12	16	0.2	SE	0.5	7	-	0.0	-	0.5	0.9
29/1200	ENE	13	17	0.2	SE	0.5	7	-	0.0	-	0.5	0.9
29/1500	E	13	17	0.2	SE	0.5	7	-	0.0	-	0.5	0.9
29/1800	E	14	18	0.2	SE	0.5	6	-	0.0	-	0.5	0.9
29/2100	E	14	18	0.4	SE	0.5	6	-	0.0	-	0.6	1.0
30/0000	E	15	20	0.5	SE	0.4	6	-	0.0	-	0.6	1.1
30/0300	E	15	20	0.5	SE	0.4	6	-	0.0	-	0.6	1.1
30/0600	E	15	20	0.5	SE	0.4	6	-	0.0	-	0.6	1.1
30/0900	E	15	20	0.5	SE	0.4	6	-	0.0	-	0.6	1.1
30/1200	E	15	20	0.5	SE	0.3	6	-	0.0	-	0.6	1.0
30/1500	E	15	20	0.5	SE	0.3	6	-	0.0	-	0.6	1.0
30/1800	E	14	18	0.5	SE	0.3	6	-	0.0	-	0.6	1.0
30/2100	E	14	18	0.5	SE	0.3	5	-	0.0	-	0.6	1.0
01/0000	E	13	17	0.5	SE	0.3	5	-	0.0	-	0.6	1.0
01/0300	ESE	11	14	0.5	SE	0.3	5	-	0.0	-	0.6	1.0
01/0600	ESE	9	12	0.5	SE	0.4	5	-	0.0	-	0.6	1.0
01/0900	ESE	9	12	0.5	SE	0.4	5	-	0.0	-	0.6	1.0
01/1200	ESE	10	13	0.5	SE	0.3	5	-	0.0	-	0.6	1.0
01/1500	ESE	11	14	0.6	SE	0.1	5	-	0.0	-	0.6	1.0
01/1800	ESE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0
01/2100	ESE	12	16	0.6	SE	0.1	5	-	0.0	-	0.6	1.0
02/0000	SE	11	14	0.5	SE	0.3	5	-	0.0	-	0.6	1.0
02/0300	SE	10	13	0.5	SE	0.4	5	-	0.0	-	0.6	1.0
02/0600	ESE	9	12	0.5	SE	0.4	5	-	0.0	-	0.6	1.0
02/0900	ESE	9	12	0.5	SE	0.2	5	-	0.0	-	0.5	0.9
02/1200	ESE	11	14	0.5	SE	0.1	5	-	0.0	-	0.5	0.9
02/1500	ESE	12	16	0.6	-	0.0	-	-	0.0	-	0.6	1.0
02/1800	ESE	13	17	0.6	-	0.0	-	-	0.0	-	0.6	1.1
02/2100	SE	13	17	0.6	SE	0.1	6	-	0.0	-	0.6	1.1
03/0000	SE	12	16	0.6	SE	0.2	6	-	0.0	-	0.6	1.1
03/0300	SE	11	14	0.5	SE	0.4	6	S	0.1	4	0.7	1.1
03/0600	SSE	9	12	0.4	SE	0.4	6	S	0.2	4	0.6	1.0
03/0900	SSE	8	10	0.3	SE	0.4	6	S	0.2	4	0.6	0.9
03/1200	SE	9	12	0.4	SE	0.3	6	S	0.1	4	0.5	0.8
03/1500	SE	10	13	0.5	SE	0.2	6	-	0.0	-	0.5	0.8
03/1800	SE	10	13	0.5	SE	0.2	6	-	0.0	-	0.5	0.8
03/2100	SE	10	13	0.5	SE	0.2	6	-	0.0	-	0.5	0.8
04/0000	SSE	10	13	0.4	SE	0.2	6	S	0.1	4	0.5	0.8
04/0300	SSE	9	12	0.3	SE	0.2	6	S	0.2	4	0.4	0.7
04/0600	SE	7	9	0.2	SE	0.3	6	S	0.2	4	0.4	0.7

Forecaster: Megan Pearson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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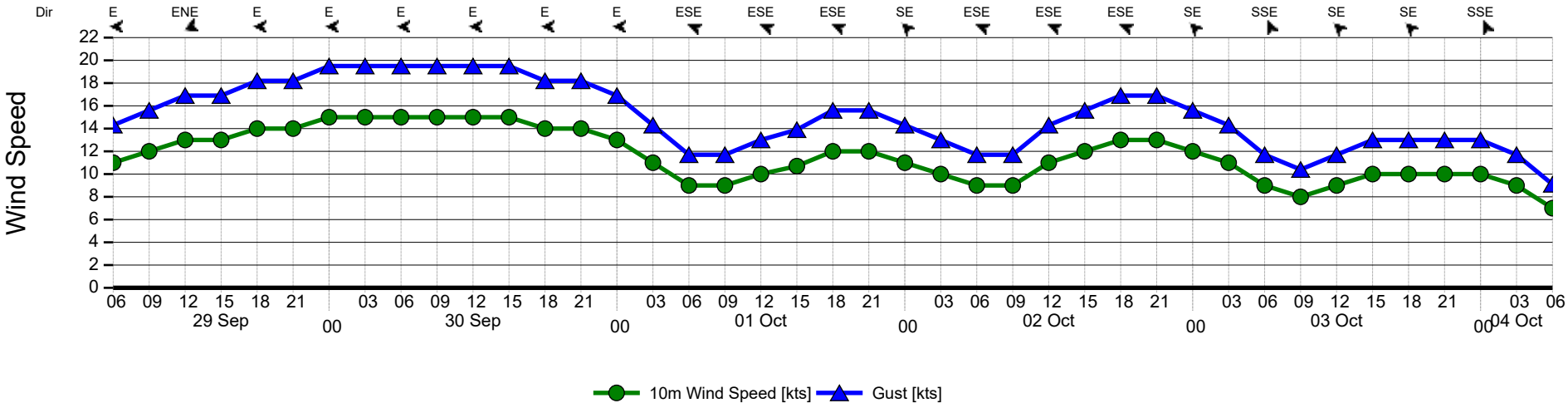
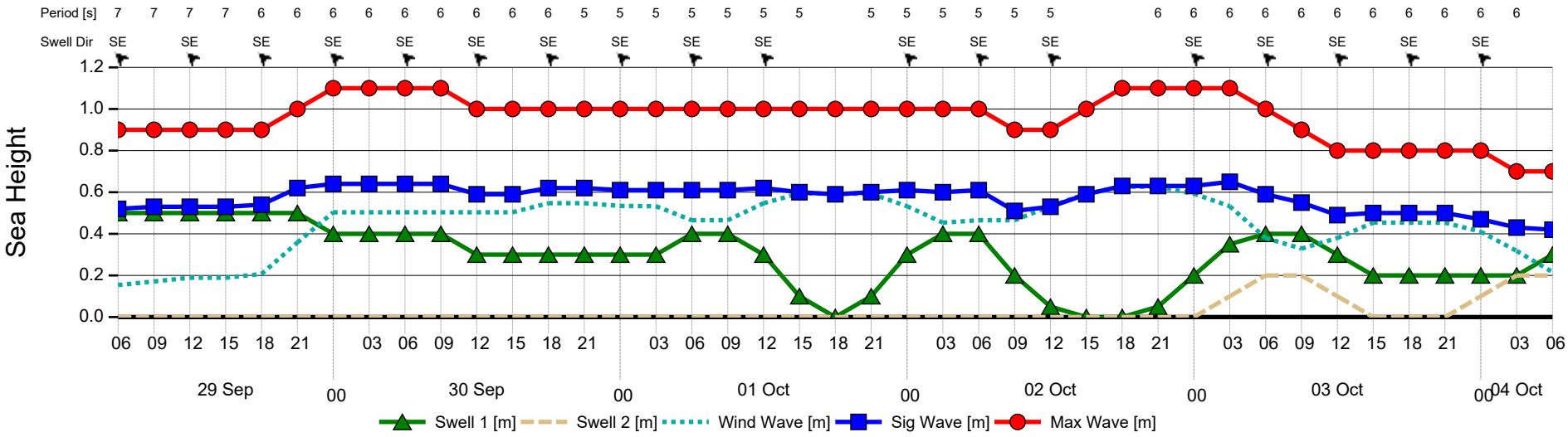
Wind Chart



Wave Chart



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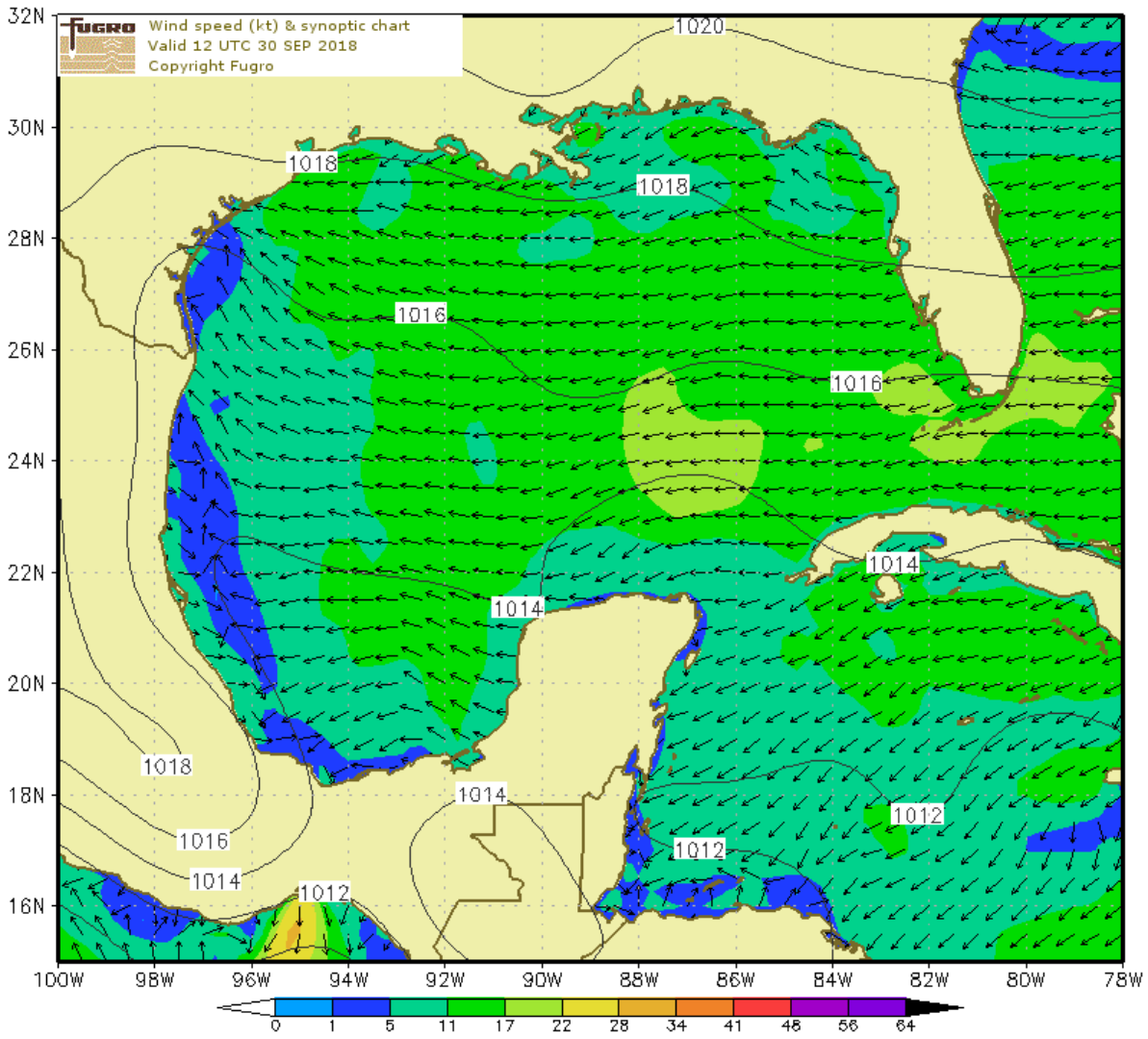

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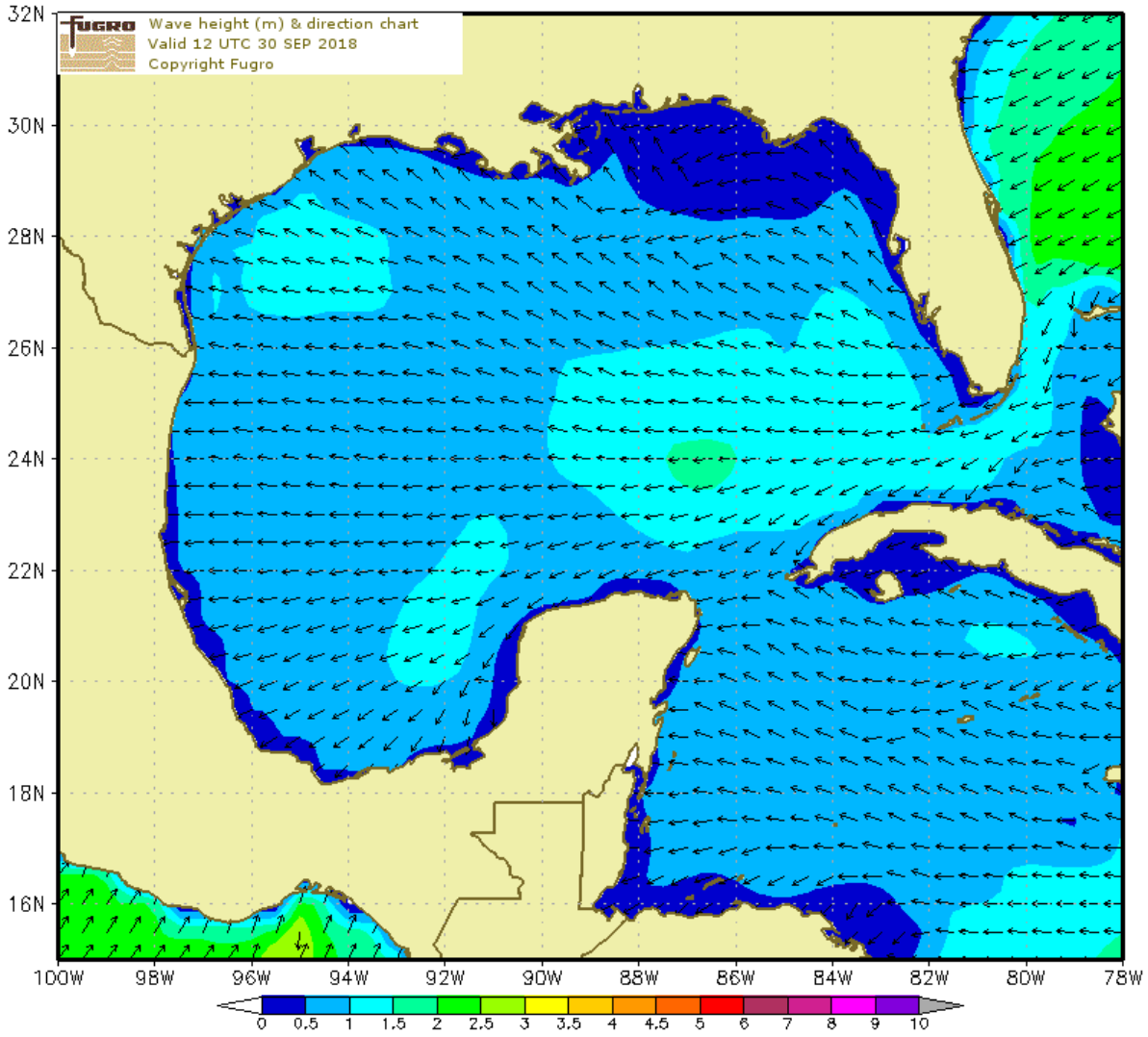

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To: Fugro USA Land Inc

Subject: **Weather Forecast for Galveston at 29.32N 94.67W**

Validity: Forecast valid 120 hours from 0600 (UTC-5) on 30 Sep 2018

Tropical Advisory: NIL.

Met Situation: (Next 48 hours) Weak showery troughs move WNW over the central GoM and deepen at times over the NW GoM. Meanwhile a weak ridge extends SSW over the SE States towards the N GoM coastline. This becomes oriented SW by tomorrow afternoon and into Tuesday morning.

WARNINGS: (Next 24 hours) THUNDERSTORMS. SQUALLS.

Weather: (Next 48 hours) Heavy showers/thunderstorms during late mornings and afternoons. Clearing mainly fair during the evenings and overnight as these become more isolated.

Confidence: Fairly high for trend, but moderate for peak wind/wave detail during the afternoons with troughs deepening nearby. Low overall by late period. Stronger gusts in/near showers.

Valid At	10m Wind Dir	10m Wind Speed	Gust	Wind Sea	Swell 1 Dir	Swell 1 Height	Swell 1 Period	Swell 2 Dir	Swell 2 Height	Swell 2 Period	Sig. Height	Max Wave
30/0600	ESE	17	22	0.6	SE	0.5	6	-	0.0	-	0.8	1.3
30/0900	ESE	17	22	0.6	SE	0.5	6	-	0.0	-	0.8	1.3
30/1200	ESE	16	21	0.6	SE	0.4	6	-	0.0	-	0.8	1.3
30/1500	ESE	15	20	0.7	SE	0.3	6	-	0.0	-	0.7	1.2
30/1800	ESE	14	18	0.7	SE	0.2	6	-	0.0	-	0.7	1.2
30/2100	ESE	14	18	0.7	SE	0.1	6	-	0.0	-	0.7	1.2
01/0000	ESE	14	18	0.7	-	0.0	-	-	0.0	-	0.7	1.2
01/0300	ESE	12	16	0.7	-	0.0	-	-	0.0	-	0.7	1.1
01/0600	ESE	12	15	0.6	SE	0.2	5	-	0.0	-	0.7	1.1
01/0900	ESE	11	14	0.5	SE	0.4	5	-	0.0	-	0.6	1.1
01/1200	ESE	11	14	0.5	SE	0.4	5	-	0.0	-	0.6	1.1
01/1500	ESE	11	14	0.5	SE	0.4	5	-	0.0	-	0.6	1.1
01/1800	ESE	11	14	0.5	SE	0.3	5	-	0.0	-	0.6	1.0
01/2100	ESE	12	16	0.5	SE	0.1	5	-	0.0	-	0.6	0.9
02/0000	SE	12	16	0.5	-	0.0	-	-	0.0	-	0.5	0.9
02/0300	SE	11	14	0.5	-	0.0	-	-	0.0	-	0.5	0.9
02/0600	SE	10	13	0.5	SE	0.2	6	-	0.0	-	0.5	0.8
02/0900	ESE	9	12	0.4	SE	0.3	6	-	0.0	-	0.5	0.8
02/1200	ESE	10	13	0.5	SE	0.2	6	-	0.0	-	0.5	0.8
02/1500	ESE	12	16	0.5	SE	0.1	6	-	0.0	-	0.5	0.8
02/1800	ESE	13	17	0.5	-	0.0	-	-	0.0	-	0.5	0.9
02/2100	SE	13	16	0.6	SE	0.1	5	-	0.0	-	0.6	1.0
03/0000	SE	12	16	0.6	SE	0.2	5	-	0.0	-	0.6	1.1
03/0300	SSE	11	14	0.5	SE	0.4	4	-	0.0	-	0.6	1.1
03/0600	SSE	10	13	0.5	SE	0.4	4	-	0.0	-	0.6	1.0
03/0900	SE	9	12	0.4	SE	0.4	4	-	0.0	-	0.6	0.9
03/1200	SE	9	12	0.4	SE	0.4	5	-	0.0	-	0.6	0.9
03/1500	SE	9	12	0.4	SE	0.3	5	-	0.0	-	0.5	0.8
03/1800	SE	9	12	0.4	SE	0.2	5	-	0.0	-	0.4	0.7
03/2100	SE	9	12	0.4	SE	0.2	6	-	0.0	-	0.4	0.7
04/0000	SSE	8	10	0.3	SE	0.3	6	-	0.0	-	0.4	0.7
04/0300	SSE	7	9	0.2	SE	0.3	6	-	0.0	-	0.4	0.6
04/0600	SSE	5	7	0.1	SE	0.3	6	-	0.0	-	0.3	0.5
04/0900	ESE	5	7	0.1	SE	0.3	6	-	0.0	-	0.3	0.5
04/1200	ESE	6	8	0.2	SE	0.3	6	-	0.0	-	0.3	0.5
04/1500	ESE	8	10	0.3	SE	0.2	6	-	0.0	-	0.3	0.5
04/1800	ESE	10	13	0.3	SE	0.1	6	-	0.0	-	0.3	0.5
04/2100	ESE	11	14	0.4	-	0.0	-	-	0.0	-	0.4	0.6
05/0000	SE	11	14	0.4	-	0.0	-	-	0.0	-	0.4	0.7
05/0300	SSE	11	14	0.4	SE	0.2	6	-	0.0	-	0.5	0.8
05/0600	SSE	10	13	0.4	SE	0.4	6	-	0.0	-	0.5	0.9

Forecaster: Megan Pearson

Notes: Wind speeds are in knots. Wave heights are in metres. The significant wave height is defined as the average of the highest 1/3rd of the waves. The maximum wave height is the average of the highest 1% of the waves.

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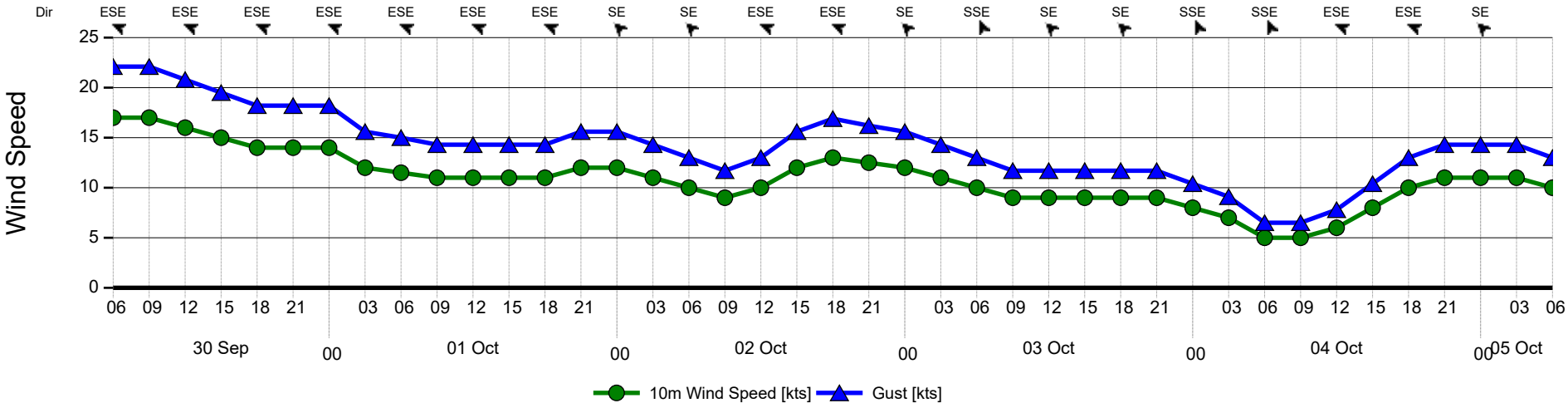
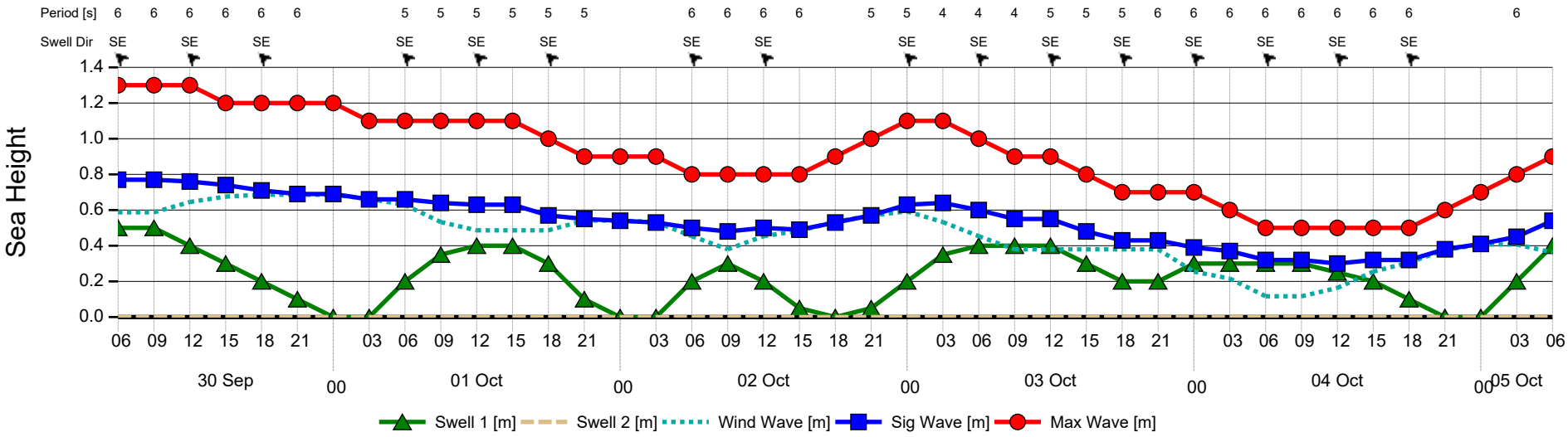
Wind Chart



Wave Chart



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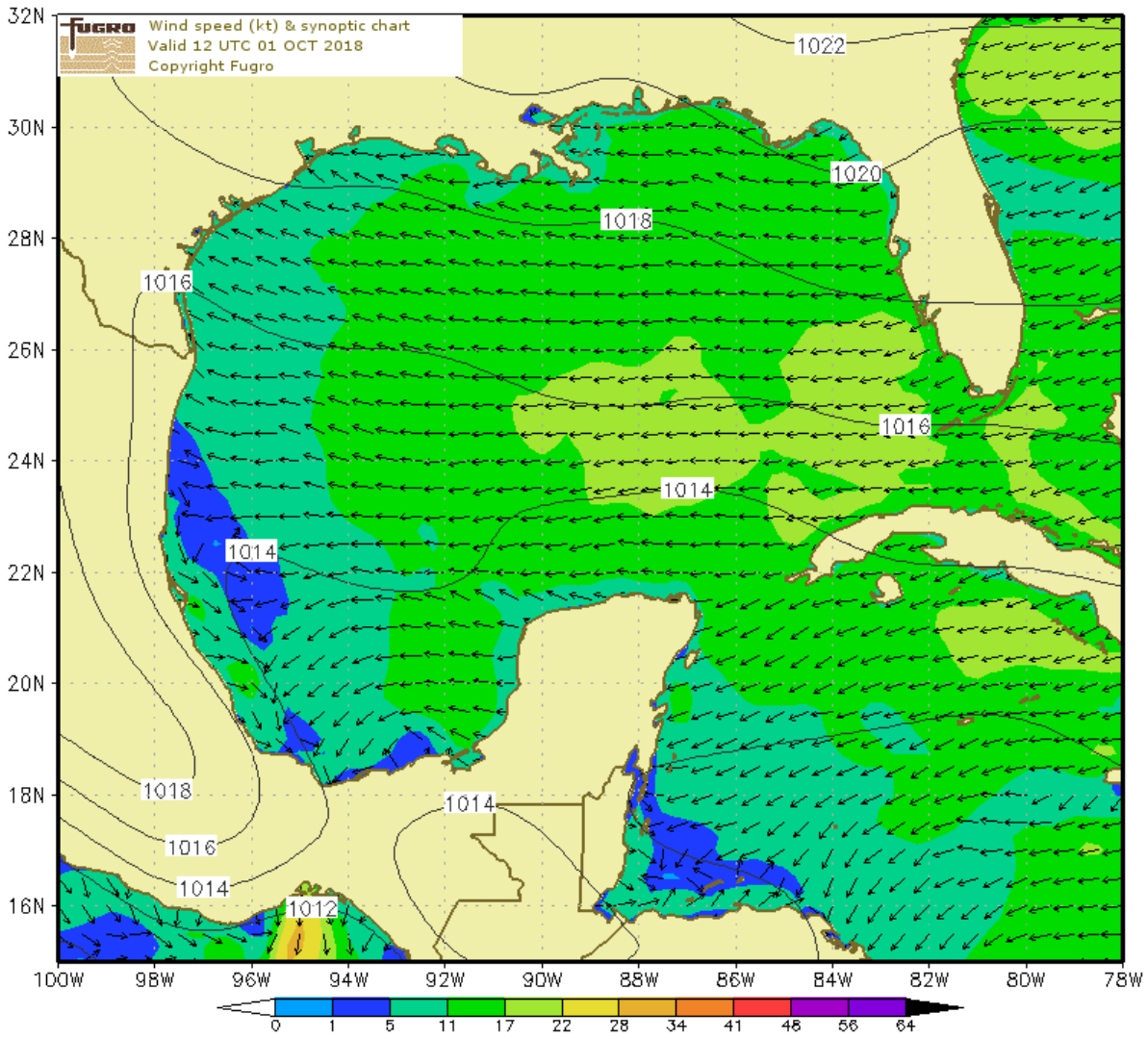

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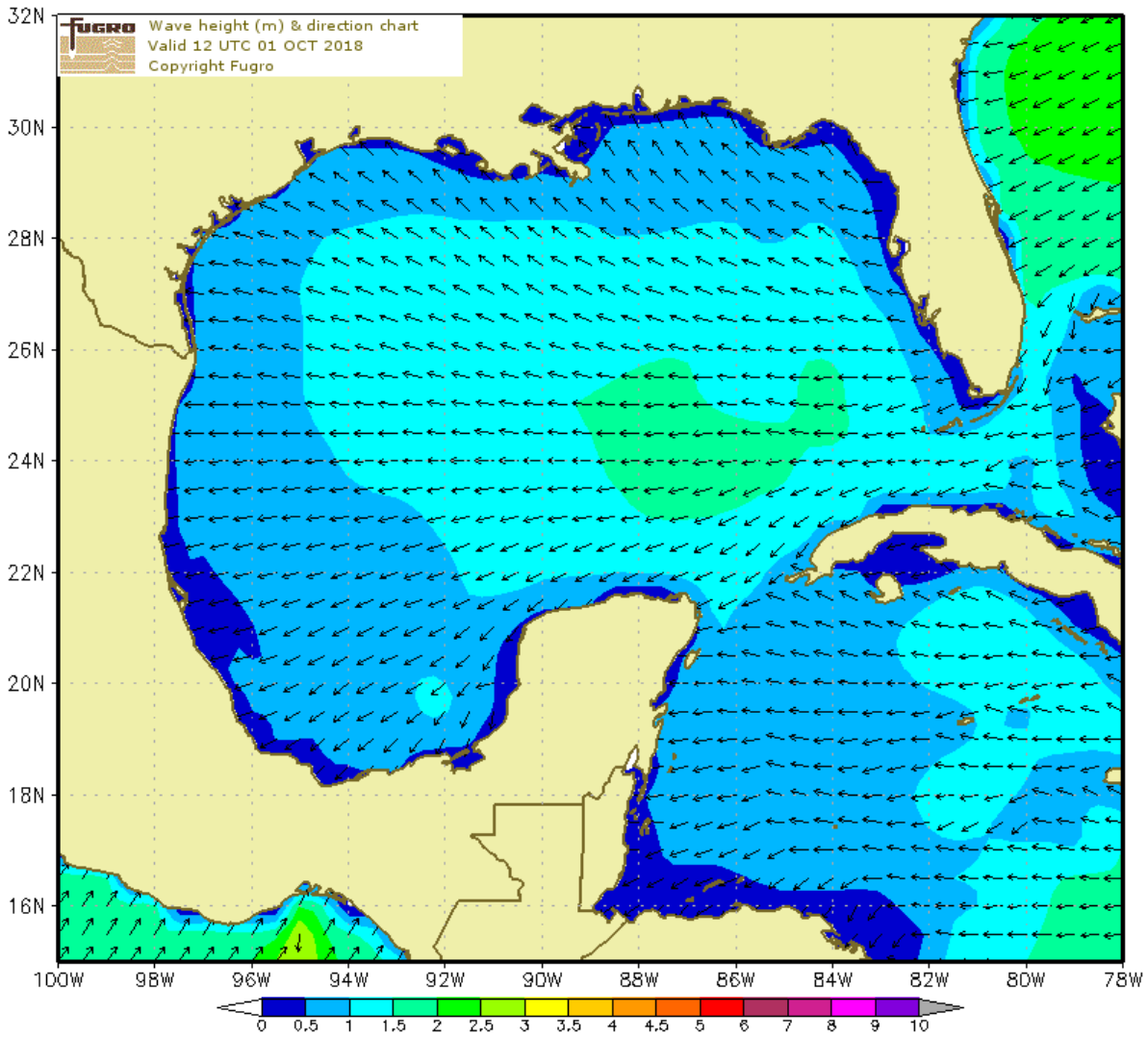

Houston Weather History for October 1, 2018

Show weather for: October 1, 2018

Scroll right to see more

	Conditions			Comfort			
Time		Temp	Weather	Wind	Humidity	Barometer	Visibility
12:53 am Mon, Oct 1		76 °F	Mostly cloudy.	10 mph ↑	91%	30.08 "Hg	10 mi
1:53 am		76 °F	Overcast.	5 mph ↑	91%	30.09 "Hg	10 mi
2:53 am		76 °F	Mostly cloudy.	No wind ↑	88%	30.09 "Hg	10 mi
3:53 am		75 °F	Mostly cloudy.	5 mph ↑	90%	30.09 "Hg	10 mi
4:53 am		75 °F	Mostly cloudy.	3 mph ↑	90%	30.08 "Hg	9 mi
5:53 am		75 °F	Passing clouds.	6 mph ↑	94%	30.09 "Hg	8 mi
6:26 am		75 °F	Fog.	5 mph ↑	94%	30.08 "Hg	5 mi
6:53 am		76 °F	Passing clouds.	6 mph ↑	91%	30.10 "Hg	7 mi
7:53 am		76 °F	Fog.	6 mph ↑	91%	30.11 "Hg	6 mi
8:53 am		78 °F	Fog.	5 mph ↑	90%	30.13 "Hg	6 mi
9:32 am		78 °F	Thunderstorms. Cloudy.	5 mph ↑	90%	30.14 "Hg	7 mi
10:08 am		72 °F	Strong thunderstorms. Mostly cloudy.	10 mph ↑	84%	30.15 "Hg	1 mi
10:21 am		72 °F	Thunderstorms. Fog.	No wind ↑	87%	30.17 "Hg	3 mi
10:53 am		72 °F	Thunderstorms. Fog.	3 mph ↑	93%	30.18 "Hg	4 mi
11:53 am		74 °F	Thundershowers. Mostly cloudy.	3 mph ↑	91%	30.17 "Hg	9 mi

	Conditions			Comfort				
Time		**Temp**	**Weather**	**Wind**		**Humidity**	**Barometer**	**Visibility**
12:36 pm		75 °F	Light rain. Partly sunny.	7 mph	↑	88%	30.15 "Hg	10 mi
12:53 pm		75 °F	Light rain. Partly sunny.	6 mph	↑	88%	30.16 "Hg	10 mi
1:53 pm		78 °F	Light rain. Broken clouds.	9 mph	↑	82%	30.13 "Hg	10 mi
2:53 pm		81 °F	Partly sunny.	6 mph	↑	74%	30.10 "Hg	10 mi
4:34 pm		80 °F	Partly sunny.	12 mph	↑	74%	30.08 "Hg	10 mi
4:53 pm		80 °F	Partly sunny.	12 mph	↑	74%	30.09 "Hg	10 mi
5:53 pm		79 °F	Broken clouds.	9 mph	↑	77%	30.07 "Hg	10 mi
6:53 pm		78 °F	Broken clouds.	3 mph	↑	79%	30.09 "Hg	10 mi
7:53 pm		77 °F	Passing clouds.	6 mph	↑	82%	30.10 "Hg	10 mi
8:53 pm		76 °F	Partly cloudy.	5 mph	↑	82%	30.11 "Hg	10 mi
9:53 pm		76 °F	Passing clouds.	5 mph	↑	82%	30.12 "Hg	10 mi
10:53 pm		75 °F	Passing clouds.	5 mph	↑	88%	30.13 "Hg	10 mi
11:53 pm		74 °F	Passing clouds.	3 mph	↑	91%	30.12 "Hg	10 mi

Show weather for: October 2, 2018

Scroll right to see more

	Conditions		Comfort			
Time	**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
12:53 am Tue, Oct 2	74 °F	Passing clouds.	5 mph ↑	91%	30.11 "Hg	10 mi
1:53 am	74 °F	Passing clouds.	No wind ↑	91%	30.11 "Hg	10 mi
2:53 am	73 °F	Passing clouds.	5 mph ↑	94%	30.09 "Hg	10 mi
3:53 am	73 °F	Passing clouds.	3 mph ↑	94%	30.09 "Hg	8 mi
4:23 am	73 °F	Passing clouds.	No wind ↑	94%	30.08 "Hg	7 mi
4:53 am	74 °F	Fog.	5 mph ↑	94%	30.09 "Hg	4 mi
5:53 am	74 °F	Fog.	5 mph ↑	97%	30.10 "Hg	3 mi
6:10 am	74 °F	Fog.	6 mph ↑	97%	30.09 "Hg	5 mi
6:53 am	74 °F	Fog.	6 mph ↑	94%	30.11 "Hg	6 mi
7:53 am	74 °F	Fog.	No wind ↑	97%	30.12 "Hg	4 mi
9:03 am	78 °F	Partly sunny.	5 mph ↑	90%	30.12 "Hg	8 mi
9:53 am	80 °F	Partly sunny.	7 mph ↑	87%	30.14 "Hg	8 mi
10:40 am	83 °F	Partly sunny.	6 mph ↑	82%	30.13 "Hg	10 mi
11:01 am	84 °F	Broken clouds.	7 mph ↑	77%	30.13 "Hg	10 mi
11:02 am	84 °F	Partly sunny.	8 mph ↑	77%	30.13 "Hg	10 mi
11:34 am	86 °F	Scattered clouds.	8 mph ↑	72%	30.13 "Hg	10 mi

	Conditions			Comfort			
Time	**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
11:53 am	86 °F	Scattered clouds.	9 mph ↑	70%	30.14 "Hg	10 mi
12:53 pm	87 °F	Scattered clouds.	10 mph ↑	67%	30.12 "Hg	10 mi
1:53 pm	86 °F	Scattered clouds.	8 mph ↑	67%	30.09 "Hg	10 mi
2:53 pm	86 °F	Scattered clouds.	9 mph ↑	70%	30.06 "Hg	10 mi
3:53 pm	86 °F	Broken clouds.	13 mph ↑	67%	30.05 "Hg	10 mi
4:53 pm	85 °F	Broken clouds.	9 mph ↑	72%	30.04 "Hg	10 mi
5:53 pm	83 °F	Broken clouds.	8 mph ↑	79%	30.05 "Hg	10 mi
6:53 pm	82 °F	Broken clouds.	7 mph ↑	82%	30.05 "Hg	10 mi
7:53 pm	81 °F	Passing clouds.	3 mph ↑	85%	30.06 "Hg	10 mi
8:53 pm	80 °F	Passing clouds.	3 mph ↑	87%	30.07 "Hg	9 mi
9:53 pm	79 °F	Passing clouds.	6 mph ↑	90%	30.08 "Hg	8 mi
10:53 pm	78 °F	Passing clouds.	No wind ↑	93%	30.08 "Hg	8 mi
11:53 pm	77 °F	Fog.	3 mph ↑	96%	30.07 "Hg	6 mi

Show weather for: October 3, 2018

Scroll right to see more

	Conditions		Comfort			
Time	**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
12:53 am **Wed, Oct 3**	76 °F	Fog.	No wind	97%	30.06 "Hg	8 mi
1:53 am	75 °F	Fog.	No wind	96%	30.06 "Hg	8 mi
2:53 am	75 °F	Fog.	No wind	96%	30.04 "Hg	7 mi
3:17 am	75 °F	Fog.	No wind	96%	30.02 "Hg	7 mi
3:53 am	76 °F	Fog.	No wind	94%	30.03 "Hg	7 mi
4:53 am	75 °F	Fog.	3 mph	96%	30.02 "Hg	6 mi
5:44 am	75 °F	Fog.	No wind	96%	30.01 "Hg	2 mi
6:09 am	75 °F	Fog.	No wind	96%	30.01 "Hg	5 mi
6:53 am	74 °F	Fog.	No wind	97%	30.03 "Hg	6 mi
7:53 am	75 °F	Passing clouds.	No wind	96%	30.03 "Hg	10 mi
8:53 am	81 °F	Passing clouds.	No wind	88%	30.04 "Hg	10 mi
9:53 am	82 °F	Scattered clouds.	3 mph	82%	30.05 "Hg	10 mi
10:53 am	86 °F	Scattered clouds.	5 mph	70%	30.05 "Hg	10 mi
11:53 am	87 °F	Scattered clouds.	7 mph	65%	30.04 "Hg	10 mi
1:02 pm	88 °F	Scattered clouds.	9 mph	65%	30.01 "Hg	10 mi
1:53 pm	89 °F	Scattered clouds.	10 mph	61%	30.00 "Hg	10 mi

	Conditions			Comfort			
Time		**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
2:53 pm		87 °F	Scattered clouds.	10 mph ↑	67%	29.97 "Hg	10 mi
3:53 pm		88 °F	Partly sunny.	10 mph ↑	63%	29.95 "Hg	10 mi
4:53 pm		89 °F	Broken clouds.	9 mph ↑	63%	29.95 "Hg	10 mi
5:53 pm		87 °F	Broken clouds.	9 mph ↑	63%	29.96 "Hg	10 mi
6:53 pm		84 °F	Scattered clouds.	9 mph ↑	70%	29.97 "Hg	10 mi
7:53 pm		82 °F	Passing clouds.	7 mph ↑	77%	29.98 "Hg	10 mi
8:53 pm		80 °F	Passing clouds.	3 mph ↑	85%	30.00 "Hg	10 mi
9:53 pm		79 °F	Passing clouds.	3 mph ↑	88%	30.01 "Hg	10 mi
10:53 pm		79 °F	Passing clouds.	No wind ↑	88%	30.01 "Hg	10 mi
11:53 pm		78 °F	Passing clouds.	No wind ↑	90%	30.01 "Hg	10 mi

Show weather for: October 4, 2018

Scroll right to see more

	Conditions		Comfort			
Time	**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
12:53 am Thu, Oct 4	78 °F	Passing clouds.	No wind	90%	30.00 "Hg	10 mi
1:53 am	77 °F	Passing clouds.	3 mph	94%	29.99 "Hg	10 mi
2:53 am	77 °F	Passing clouds.	3 mph	94%	29.99 "Hg	10 mi
3:53 am	76 °F	Passing clouds.	3 mph	97%	29.99 "Hg	10 mi
4:53 am	76 °F	Passing clouds.	No wind	94%	29.99 "Hg	10 mi
5:53 am	76 °F	Passing clouds.	No wind	94%	30.01 "Hg	10 mi
6:53 am	75 °F	Passing clouds.	No wind	94%	30.02 "Hg	10 mi
7:53 am	76 °F	Passing clouds.	No wind	94%	30.04 "Hg	10 mi
8:53 am	81 °F	Passing clouds.	No wind	82%	30.06 "Hg	10 mi
9:53 am	83 °F	Scattered clouds.	3 mph	77%	30.07 "Hg	10 mi
10:53 am	85 °F	Scattered clouds.	3 mph	68%	30.07 "Hg	10 mi
11:53 am	88 °F	Scattered clouds.	No wind	61%	30.06 "Hg	10 mi
12:53 pm	88 °F	Scattered clouds.	6 mph	57%	30.03 "Hg	10 mi
1:53 pm	90 °F	Scattered clouds.	8 mph	61%	30.01 "Hg	10 mi
2:53 pm	87 °F	Light rain. Broken clouds.	8 mph	67%	29.99 "Hg	10 mi
3:53 pm	87 °F	Partly sunny.	7 mph	65%	29.97 "Hg	10 mi

	Conditions			Comfort			
Time		**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
4:53 pm		87 °F	Broken clouds.	9 mph ↑	65%	29.96 "Hg	10 mi
5:53 pm		88 °F	Scattered clouds.	7 mph ↑	61%	29.97 "Hg	10 mi
6:53 pm		84 °F	Scattered clouds.	7 mph ↑	70%	29.98 "Hg	10 mi
7:53 pm		82 °F	Passing clouds.	6 mph ↑	72%	29.99 "Hg	10 mi
8:53 pm		80 °F	Passing clouds.	3 mph ↑	79%	30.01 "Hg	10 mi
9:53 pm		79 °F	Passing clouds.	3 mph ↑	82%	30.01 "Hg	10 mi
10:53 pm		78 °F	Passing clouds.	No wind ↑	87%	30.02 "Hg	10 mi
11:53 pm		78 °F	Passing clouds.	No wind ↑	87%	30.00 "Hg	10 mi

Show weather for: October 5, 2018

Scroll right to see more

	Conditions		Comfort			
Time	**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
12:53 am **Fri, Oct 5**	77 °F	Passing clouds.	No wind	94%	29.99 "Hg	10 mi
1:53 am	77 °F	Passing clouds.	No wind	90%	29.99 "Hg	10 mi
2:53 am	77 °F	Passing clouds.	No wind	90%	29.99 "Hg	10 mi
3:53 am	76 °F	Passing clouds.	3 mph	94%	29.98 "Hg	9 mi
4:53 am	77 °F	Passing clouds.	No wind	90%	29.98 "Hg	10 mi
5:53 am	76 °F	Passing clouds.	No wind	94%	29.99 "Hg	10 mi
6:53 am	76 °F	Passing clouds.	3 mph	94%	30.00 "Hg	10 mi
7:53 am	78 °F	Passing clouds.	5 mph	90%	30.01 "Hg	10 mi
8:53 am	82 °F	Passing clouds.	8 mph	82%	30.01 "Hg	10 mi
9:53 am	84 °F	Scattered clouds.	9 mph	74%	30.03 "Hg	10 mi
10:53 am	86 °F	Scattered clouds.	7 mph	67%	30.02 "Hg	10 mi
11:53 am	87 °F	Scattered clouds.	No wind	63%	30.00 "Hg	10 mi
12:53 pm	89 °F	Scattered clouds.	8 mph	63%	29.98 "Hg	10 mi
1:53 pm	87 °F	Scattered clouds.	13 mph	67%	29.97 "Hg	10 mi
2:53 pm	87 °F	Scattered clouds.	13 mph	65%	29.94 "Hg	10 mi
3:53 pm	86 °F	Light rain. Broken clouds.	14 mph	65%	29.94 "Hg	10 mi

	Conditions			Comfort			
Time		**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
4:53 pm		87 °F	Scattered clouds.	12 mph ↑	61%	29.93 "Hg	10 mi
5:53 pm		86 °F	Scattered clouds.	9 mph ↑	59%	29.93 "Hg	10 mi
6:53 pm		83 °F	Scattered clouds.	7 mph ↑	70%	29.93 "Hg	10 mi
7:53 pm		82 °F	Passing clouds.	6 mph ↑	74%	29.95 "Hg	10 mi
8:53 pm		80 °F	Passing clouds.	7 mph ↑	81%	29.96 "Hg	10 mi
9:53 pm		80 °F	Passing clouds.	6 mph ↑	81%	29.96 "Hg	10 mi
10:53 pm		79 °F	Passing clouds.	6 mph ↑	84%	29.95 "Hg	10 mi
11:53 pm		79 °F	Passing clouds.	3 mph ↑	82%	29.94 "Hg	10 mi

Show weather for: October 6, 2018

Scroll right to see more

	Conditions		Comfort			
Time	**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
12:53 am **Sat, Oct 6**	78 °F	Passing clouds.	3 mph ↑	84%	29.94 "Hg	10 mi
1:53 am	77 °F	Passing clouds.	5 mph ↑	88%	29.94 "Hg	10 mi
2:53 am	77 °F	Passing clouds.	5 mph ↑	88%	29.94 "Hg	10 mi
3:53 am	77 °F	Passing clouds.	No wind	88%	29.94 "Hg	10 mi
4:53 am	76 °F	Passing clouds.	No wind	88%	29.94 "Hg	10 mi
5:53 am	75 °F	Passing clouds.	No wind	94%	29.95 "Hg	10 mi
6:53 am	76 °F	Passing clouds.	6 mph ↑	91%	29.95 "Hg	10 mi
7:53 am	76 °F	Scattered clouds.	3 mph ↑	88%	29.96 "Hg	10 mi
8:53 am	81 °F	Scattered clouds.	5 mph ↑	77%	29.97 "Hg	10 mi
9:53 am	84 °F	Scattered clouds.	10 mph ↑	67%	29.98 "Hg	10 mi
10:53 am	86 °F	Broken clouds.	8 mph ↑	59%	29.98 "Hg	10 mi
11:53 am	88 °F	Scattered clouds.	3 mph ↑	55%	29.98 "Hg	10 mi
12:53 pm	88 °F	Broken clouds.	7 mph ↑	59%	29.96 "Hg	10 mi
1:53 pm	91 °F	Broken clouds.	8 mph ↑	54%	29.94 "Hg	10 mi
2:53 pm	91 °F	Broken clouds.	6 mph ↑	54%	29.92 "Hg	10 mi
3:53 pm	89 °F	Broken clouds.	9 mph ↑	59%	29.91 "Hg	10 mi

	Conditions			Comfort			
Time		**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
4:53 pm		89 °F	Broken clouds.	12 mph ↑	61%	29.90 "Hg	10 mi
6:00 pm		82 °F	Heavy rain. Partly sunny.	3 mph ↑	79%	29.90 "Hg	7 mi
6:53 pm		82 °F	Partly sunny.	5 mph ↑	77%	29.92 "Hg	10 mi
7:53 pm		81 °F	Passing clouds.	5 mph ↑	79%	29.93 "Hg	10 mi
8:53 pm		81 °F	Passing clouds.	6 mph ↑	82%	29.93 "Hg	10 mi
9:53 pm		81 °F	Passing clouds.	7 mph ↑	82%	29.93 "Hg	10 mi
10:53 pm		80 °F	Passing clouds.	3 mph ↑	85%	29.94 "Hg	10 mi
11:53 pm		80 °F	Passing clouds.	6 mph ↑	87%	29.93 "Hg	10 mi

Show weather for: October 7, 2018

Scroll right to see more

	Conditions			Comfort			
Time		**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
12:53 am **Sun, Oct 7**		80 °F	Passing clouds.	7 mph ↑	87%	29.93 "Hg	10 mi
1:53 am		79 °F	Passing clouds.	5 mph ↑	88%	29.94 "Hg	10 mi
2:53 am		79 °F	Passing clouds.	7 mph ↑	88%	29.93 "Hg	10 mi
3:53 am		79 °F	Passing clouds.	8 mph ↑	82%	29.93 "Hg	10 mi
4:53 am		77 °F	Passing clouds.	3 mph ↑	82%	29.93 "Hg	10 mi
5:53 am		76 °F	Passing clouds.	3 mph ↑	88%	29.93 "Hg	10 mi
6:53 am		77 °F	Passing clouds.	No wind ↑	88%	29.95 "Hg	10 mi
7:53 am		77 °F	Broken clouds.	5 mph ↑	90%	29.95 "Hg	9 mi
8:53 am		82 °F	Broken clouds.	8 mph ↑	82%	29.96 "Hg	10 mi
9:53 am		85 °F	Partly sunny.	10 mph ↑	72%	29.97 "Hg	10 mi
10:53 am		86 °F	Partly sunny.	10 mph ↑	63%	29.98 "Hg	10 mi
11:53 am		89 °F	Broken clouds.	16 mph ↑	57%	29.97 "Hg	10 mi
12:23 pm		86 °F	Thunderstorms. Broken clouds.	13 mph ↑	63%	29.96 "Hg	10 mi
12:32 pm		86 °F	Thunderstorms. Broken clouds.	12 mph ↑	63%	29.95 "Hg	10 mi
1:05 pm		90 °F	Broken clouds.	13 mph ↑	56%	29.93 "Hg	10 mi
1:53 pm		89 °F	Broken clouds.	17 mph ↑	55%	29.91 "Hg	10 mi

	Conditions			Comfort			
Time		**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
2:53 pm		90 °F	Broken clouds.	13 mph ↑	54%	29.90 "Hg	10 mi
3:53 pm		84 °F	Thunderstorms. Broken clouds.	8 mph ↑	59%	29.91 "Hg	10 mi
4:24 pm		86 °F	Broken clouds.	10 mph ↑	65%	29.89 "Hg	10 mi
4:53 pm		86 °F	Broken clouds.	13 mph ↑	65%	29.90 "Hg	10 mi
5:53 pm		84 °F	Broken clouds.	12 mph ↑	61%	29.89 "Hg	10 mi
6:53 pm		82 °F	Broken clouds.	8 mph ↑	72%	29.90 "Hg	10 mi
7:53 pm		77 °F	Passing clouds.	5 mph ↑	85%	29.90 "Hg	10 mi
8:53 pm		78 °F	Passing clouds.	5 mph ↑	87%	29.90 "Hg	10 mi
9:53 pm		79 °F	Passing clouds.	6 mph ↑	84%	29.91 "Hg	10 mi
10:53 pm		78 °F	Passing clouds.	6 mph ↑	84%	29.91 "Hg	10 mi
11:53 pm		79 °F	Passing clouds.	6 mph ↑	82%	29.90 "Hg	10 mi

Show weather for: October 8, 2018

Scroll right to see more

	Conditions		Comfort			
Time	**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
12:53 am Mon, Oct 8	79 °F	Passing clouds.	6 mph ↑	84%	29.90 "Hg	10 mi
1:53 am	78 °F	Passing clouds.	5 mph ↑	84%	29.90 "Hg	10 mi
2:53 am	77 °F	Passing clouds.	6 mph ↑	85%	29.89 "Hg	10 mi
3:53 am	76 °F	Passing clouds.	No wind ↑	88%	29.88 "Hg	10 mi
4:53 am	75 °F	Passing clouds.	No wind ↑	90%	29.86 "Hg	10 mi
5:53 am	76 °F	Passing clouds.	5 mph ↑	88%	29.87 "Hg	10 mi
6:53 am	76 °F	Passing clouds.	3 mph ↑	88%	29.87 "Hg	10 mi
7:53 am	77 °F	Passing clouds.	5 mph ↑	85%	29.88 "Hg	10 mi
8:53 am	81 °F	Passing clouds.	8 mph ↑	79%	29.88 "Hg	10 mi
9:53 am	85 °F	Scattered clouds.	10 mph ↑	68%	29.89 "Hg	10 mi
10:53 am	86 °F	Scattered clouds.	12 mph ↑	63%	29.89 "Hg	10 mi
11:53 am	86 °F	Partly sunny.	14 mph ↑	63%	29.88 "Hg	10 mi
12:53 pm	81 °F	Scattered clouds.	9 mph ↑	79%	29.87 "Hg	10 mi
1:29 pm	78 °F	Light rain. Broken clouds.	10 mph ↑	82%	29.84 "Hg	5 mi
1:53 pm	85 °F	Scattered clouds.	13 mph ↑	72%	29.83 "Hg	10 mi
2:53 pm	86 °F	Scattered clouds.	10 mph ↑	63%	29.81 "Hg	10 mi

	Conditions			Comfort			
Time		**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
3:53 pm		86 °F	Broken clouds.	13 mph ↑	65%	29.81 "Hg	10 mi
4:53 pm		84 °F	Broken clouds.	13 mph ↑	70%	29.80 "Hg	10 mi
5:53 pm		84 °F	Broken clouds.	13 mph ↑	67%	29.79 "Hg	10 mi
6:53 pm		82 °F	Scattered clouds.	9 mph ↑	74%	29.79 "Hg	10 mi
7:53 pm		80 °F	Passing clouds.	7 mph ↑	79%	29.80 "Hg	10 mi
8:53 pm		80 °F	Passing clouds.	6 mph ↑	79%	29.81 "Hg	10 mi
9:53 pm		79 °F	Passing clouds.	5 mph ↑	82%	29.83 "Hg	10 mi
10:53 pm		78 °F	Passing clouds.	5 mph ↑	84%	29.82 "Hg	10 mi
11:53 pm		79 °F	Passing clouds.	5 mph ↑	84%	29.81 "Hg	10 mi

Show weather for: October 22, 2018

Scroll right to see more

	Conditions			Comfort			
Time		**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
12:53 am **Mon, Oct 22**		61 °F	Passing clouds.	8 mph ↑	62%	30.19 "Hg	10 mi
1:53 am		60 °F	Passing clouds.	6 mph ↑	65%	30.18 "Hg	10 mi
2:53 am		59 °F	Passing clouds.	6 mph ↑	67%	30.16 "Hg	10 mi
3:53 am		59 °F	Partly cloudy.	7 mph ↑	67%	30.16 "Hg	10 mi
4:53 am		57 °F	Passing clouds.	8 mph ↑	69%	30.16 "Hg	10 mi
5:53 am		56 °F	Passing clouds.	7 mph ↑	72%	30.16 "Hg	10 mi
6:53 am		55 °F	Partly cloudy.	8 mph ↑	72%	30.16 "Hg	10 mi
7:53 am		55 °F	Overcast.	8 mph ↑	72%	30.17 "Hg	8 mi
8:53 am		56 °F	Overcast.	7 mph ↑	70%	30.19 "Hg	10 mi
9:53 am		58 °F	Overcast.	7 mph ↑	67%	30.20 "Hg	10 mi
10:53 am		60 °F	Cloudy.	7 mph ↑	65%	30.20 "Hg	10 mi
11:53 am		64 °F	Overcast.	8 mph ↑	61%	30.19 "Hg	10 mi
12:53 pm		66 °F	Mostly cloudy.	6 mph ↑	59%	30.17 "Hg	10 mi
1:53 pm		67 °F	Mostly cloudy.	8 mph ↑	59%	30.14 "Hg	10 mi
2:53 pm		69 °F	Mostly cloudy.	6 mph ↑	53%	30.13 "Hg	10 mi
3:53 pm		69 °F	Overcast.	8 mph ↑	53%	30.12 "Hg	10 mi

	Conditions			Comfort			
Time	**Temp**	**Weather**	**Wind**	**Humidity**	**Barometer**	**Visibility**
4:53 pm		67 °F	More clouds than sun.	10 mph ↑	59%	30.12 "Hg	10 mi
5:53 pm		65 °F	More clouds than sun.	10 mph ↑	61%	30.11 "Hg	10 mi
6:53 pm		64 °F	Mostly cloudy.	14 mph ↑	58%	30.13 "Hg	10 mi
7:53 pm		63 °F	Mostly cloudy.	10 mph ↑	65%	30.14 "Hg	10 mi
8:53 pm		63 °F	Mostly cloudy.	12 mph ↑	65%	30.15 "Hg	10 mi
9:53 pm		62 °F	Mostly cloudy.	12 mph ↑	65%	30.16 "Hg	10 mi
10:53 pm		62 °F	Mostly cloudy.	9 mph ↑	65%	30.16 "Hg	10 mi
11:53 pm		62 °F	Mostly cloudy.	10 mph ↑	65%	30.15 "Hg	10 mi

APPENDIX D

BENCHMARK SAMPLE DESCRIPTIONS

APPENDIX D - STRATIGRAPHY HSCNew-NMP-01
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
HSCNew-NMP-01AH3-1	10/06/19	-33.0	5.0	5.0	1	0-5 ft. Dark gray silt	Hydrocarbon	3,209,399	13,844,992
HSCNew-NMP-01AH3-2	10/06/19	-36.1	5.5	5.5	1	0-4 ft. Dark gray silt 4-5.5 ft. Tan and gray silty sand	none	3,209,391	13,845,001
HSCNew-NMP-01AH3-3	10/06/19	-36.1	5.5	5.5	1	0-4.5 ft. Dark gray silt 4.5-5.5 ft. Dark gray sandy silt	Hydrocarbon	3,306,062	13,706,660
HSCNew-NMP-01AH3-4	10/06/19	-35.1	5.0	5.0	1	0-4 ft. Dark gray silt 4-5.5 ft. Dark gray sandy silt	none	3,209,370	13,844,967

APPENDIX D - STRATIGRAPHY HSCNew-NMP-02
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
HSCNew-NMP-02-A-1	10/06/19	-34.7	-	-	-	0-10.5 ft Not sampled	-	3,190,670	13,835,075
		-44.7	5.0	5.0	1	10.5-15.5 ft. Dark gray silt	Hydrocarbon		
HSCNew-NMP-02-A-2	10/06/19	-34.2	-	-	-	0-10 ft. Not sampled	-	3,190,674	13,835,065
		-44.2	5.0	5.0	1	10-15 ft. Dark gray silt	Hydrocarbon		
HSCNew-NMP-02-C-1	10/06/19	-16.1	-	-	-	0-11 ft Not sampled	-	3190740	13835560
		-27.1	4.0	4.0	1	11-16 ft. Tan sandy clay with shell hash and shell fragments	none		
		-32.1	5.0	5.0	2	16-20 ft. Tan sandy clay with some shell hash	none		
						20-21 ft. Tan/orange firm clay			
		-37.1	5.0	5.0	3	21--25 ft. Tan/orange firm clay	none		
						25-26 ft. Tan/orange sandy clay			
		-42.1	5.0	5.0	5	26-31 ft. Green and orange sandy clay with calcite nodules	none		
		-47.1	2.5	2.5	6	31-33.5 ft. Firm orange clay with firm green clay			

APPENDIX D - STRATIGRAPHY HSCNew-NMP-03
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)

APPENDIX D - STRATIGRAPHY HSCNew-NMP-03
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
HSCNew-NMP-03-A-1	10/05/18	-31.2	5.0	3.0	1	0-3 ft. Clayey sand, light gray with trash (debris) with brown sand at timp of core head	none	3,185,272	13,837,839
						3-5 ft. Not sampled (no retrieval)			
		-36.2	5.0	5.0	2	5-10 ft. Hard gray green clay	none		
		-41.2	5.0	3.0	3	10-12 ft. Not sampled (not retrieval)			
		-46.2	5.0	2.9	4	12-14 ft. Gray green orange tan clay mix	none		
						14-14.25 light brown sand			
						14.25-15 ft. Gray green orange tan clay mix			
		-51.2	3.0	3.0	5	15-18 ft. Orange clay	none		
HSCNew-NMP-03-A-1 (Dup)	10/05/18	-30.6	5.0	3.0	1	0-3 ft. Not sampled (no retrieval)	none	3,185,291	13,837,849
						3-5 ft. Dark gray silty sand			
		-35.6	5.0	5.0	2	5-7 ft. Dark gray silty sand	none		
						7-9 ft. Tan firm clay			
						9-10 ft. Green firm clay			
		-40.6	5.0	3.0	3	10-12.5 ft. Not sampled (no retrieval)	none		
						12.5-13.5 ft. Light tan sand			
						13.5-15 ft. Tan orange sandy clay			
		-45.6				14.25-15 ft. Gray green orange tan clay mix			
		-50.6	4.0	4.0	4	15-16 ft. Tan firm clay	none		
						16-19 ft. Green firm clay mised with sandy clay			
HSCNew-NMP-03-C-1	10/05/18	-22.0	2.0	1.0	1	0-1 ft. Brpwn sand and gray silt mix	none	3,185,164	13,838,758
						1-2 ft. Not sampled (no retrieval)			
		-24.0	5.0	5.0	2	2-6 ft. Not sampled (no retrieval)	none		
						6-7 ft. Brown sand			
		-29.0	5.0	3.0	3	7-9 ft.Brown sand with shell pieces	none		
						9-12 ft. Not sampled (not retrieval)			
		-34.0	5.0	3.0	4	12-15 ft. Brown sand	none		
						15-17 ft. Not sampled (no retrieval)			
		-39.0	5.0	5.0	5	17-22 ft. Orange clay	none		
		-44.0	5.0	5.0	6	22-26 ft. Orange clay with brown sand pockets	none		
						26-27 ft. Brown sand with clay nodules			
HSCNew-NMP-03-C-1 (Dup)	10/05/18	-19.7	4.0	2.0	1	0-2 ft. Brown sand with black silt	none	3,185,164	13,838,762
						2-4 ft. Not sampled (no retrieval)			
		-23.7	5.0	5.0	3	4-6 ft. Gray sand	none		
						6-7.5 ft. Gray black silt			
						7.5-8.5 ft.Gray sandy clay			
						8.5-9 ft. Gray sand			
						9-12 ft. Not sampled (no retrieval)			

APPENDIX D - STRATIGRAPHY HSCNew-NMP-03
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
		-28.7	5.0	2.0	4	12-13 ft.Brown gray sand	none		
						13-14 ft. Light brown sand			
		-33.7	5.0	5.0	5	14-19 ft. Gray sand with clay pug in core head	none		
		-38.7	5.0	3.0	6	19-21 ft. Not sampled (no retrieval)	none		
						21-24 ft. Gray sand			
		-43.7	4.0	4.0	7	24-28 ft. Gray sand	none		

APPENDIX D - STRATIGRAPHY HSCNew-NMP-04
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
HSCNew-NMP-04A-1	10/05/18	-30.5	-	-	-	0-14 ft. Not sampled		3,177,578	13,837,883
		-44.5	5.0	5.0	1	14-16.25 ft. Black silt	none		
						16.25-16.5 ft. Gray sand			
						16.5-19 ft. Orange clay			
HSCNew-NMP-04A-2	10/05/18	-37.7	-	-	-	0-7 ft. Not sampled		3,177,560	13,837,887
		-44.7	5.0	5.0	1	7-10.5 ft. Black silt	none		
						10.5-10.75 ft. Gray brown sand layer			
						10.75-12 ft. Orange clay			
HSCNew-NMP-04C-1	10/05/18	-43.3	-	-	-	0-1.5 ft. Not sampled	-	3,177,446	13,838,353
		-44.8	4.5	1.5	1	1.5-4 ft. Gray and black silt	none		
						4-6 ft. Not sampled (No retrieval)			
HSCNew-NMP-04C-2	10/05/18	-43.4	-	-	-	0-1.5 ft. Not sampled	-	3,177,448	13,838,374
		-44.9	4.0	4.0	1	1-5 ft. Black silt with shell hash and gravel	none		
HSCNew-NMP-04C-3	10/05/18	-43.0	-	-	-	0-1.5 ft. Not sampled	-	3,177,473	13,838,383
		-44.5	5.0	5.0	1	1.5-3 ft. Gray and black silt	none		
						3-6.5 ft. Not sampled (gravel)			
HSCNew-NMP-04C-4	10/05/18	-43.0	-	-	-	0-1.7 ft. Not sampled	-	3,177,493	13,838,377
		-44.7	5.0	5.0	1	1-5 ft. Black silt	none		
						5-6 ft.Orange clay			

APPENDIX D - STRATIGRAPHY HSCNew-NMP-05
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
HSCNew-NMP-05A-1	10/05/18	-37.7	-	-	-	0-8 ft. Not sampled	-	3,171,789	13,832,332
		-45.7	5.0	5.0	1	8-12 ft. Gray and black silt with clay at the bottom 3 inches	none		
HSCNew-NMP-05A-2	10/05/18	-39.5	-	-	-	0-8 ft. Not sampled	-	3,171,785	13,832,337
		-47.5	4.0	4.0	1	8-11.5 ft. Black silt	none		
						11.5-12 ft. Orange sandstone clay			
HSCNew-NMP-05A-3	10/04/18	-40.5	-	-	-	0-5 ft. Not sampled	-	3,171,778	13,832,329
		-45.5	5.0	5.0	1	5-9 ft. Black silt	none		
HSCNew-NMP-05C-1	10/04/18	-11.5	-	-	-	0-33 ft. Not sampled	-	3,171,351	13,832,522
		-44.5	5.0	5.0	1	33-36 ft. Orange and white clay, sampler hit hard sandstone and could not drill down to -49.5	none		
HSCNew-NMP-05C-2	10/04/19	-14.1	-	-	-	0-30.5 ft. Not sampled	-	3,171,367	13,832,517
		-44.6	5.5	5.5	1	30.5-33 ft. Red brown orange sand with clay pockets	none		
						33-35.5 ft. Orange and light gray clay			
HSCNew-NMP-05C-3	10/04/19	-19.5	-	-	-	0-25 ft. Not sampled	-	3,171,393	13,832,512
		-44.5	5.0	5.0	1	25-26 ft.Light gray and orange clay	none		
						26-28 ft. Light brown gray and orange sand			
						28-30 ft. Not sampled (no retrieval)			

APPENDIX D - STRATIGRAPHY HSCNew-NMP-06
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
HSCNew-NMP-06A-1	10/04/19	-27.4	-	-	-	0-14 ft. Not sampled	-	3,157,010	13,830,360
		-41.4	3.0	3.0	1	14-17 ft. Light and dark gray silt	Hydrocarbon		
HSCNew-NMP-06A-2	10/04/19	-34.5	-	-	-	0-7 ft. Not sampled	-	3,156,997	13,830,374
		-41.5	3.0	3.0	1	7-10 ft. Black clayey silt	none		
HSCNew-NMP-06A-3	10/04/19	-36.7	-	-	-	0-5 ft. Not sampled	-	3,156,993	13,830,383
		-41.7	3.0	3.0	1	5-8 ft. Black clayey silt with debis (trash)	none		
						30.5-33 ft. Orange clay			
HSCNew-NMP-06C-1	10/04/19	-11.6	-	-	-	0-29 ft. Not sampled	-	3,157,267	13,830,791
		-40.6	3.0	3.0	1	29-31.25 ft. Orange clayey sand	none		
						31.25-33 ft. Orange clay			
HSCNew-NMP-06C-2	10/04/19	-12.0	-	-	-	0-29 ft. Not sampled	-	3,157,252	13,830,786
		-41.0	4.0	4.0	1	29-30.5 ft. Orange sandy clay	none		
						30.5-33 ft. Orange clay			

APPENDIX D - STRATIGRAPHY HSCNew-NMP-07
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
HSCNew-NMP-07(ALT1-1)	10/03/19	-19.4	-	-	-	0-21.5 ft. Not sampled	-	3,151,936	13,829,813
		-40.9	4.0	4.0	1	21.5 - 24.5 ft. Soft black silt with clay	none		
						24.5-25.5 Gray black brown silty sandy clay			
HSCNew-NMP-07(ALT1-2)	10/03/19	-20.2	-	-	-	0-21.5 ft. Not sampled	-	3,151,936	13,829,809
		-40.7	4.0	4.0	1	21.5 - 24.5 ft. Soft black silt with clay	none		
						24.5-25.5 ft. Gray black silty sandy clay			
HSCNew-NMP-07(ALT1-3)	10/03/19	-19.8	-	-	-	0-21 ft. Not sampled	-	3,151,924	13,829,798
		-40.8	4.0	4.0	1	21 - 23 ft. Soft black/dark gray silt with clay	none		
						23-25 ft. Gray and brown soft silty sand			
HSCNew-NMP-07(ALT1-4)	10/03/19	-19.7	-	-	-	0-21 ft. Not sampled	-	3,151,916	13,829,792
		-40.7	4.0	4.0	1	21-22 ft. Soft black silt with vegetation	none		
						22-25 ft. Gray and black silty sand with vegetation			
HSCNew-NMP-07(ALT1-5)	10/03/19	-19.4	-	-	-	0-21 ft. Not sampled	-	3,151,921	13,829,775
		-40.4	4.0	4.0	1	21-24 ft. Black sandy silt with vegetation	none		
						24-25 ft. Gray sand			

APPENDIX D - STRATIGRAPHY HSCNew-NMP-08
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
HSCNew-NMP-08-A-1	10/03/19	-14.7	-	-	-	0-26 ft. Not sampled	-	3,149,974	13,831,274
		-40.7	4.0	4.0	1	26-30 ft. Orange clay	none		
HSCNew-NMP-08-A-2	10/03/19	-22.1	-	-	-	0-19 ft. Not sampled	-	3,150,021	13,831,253
		-41.1	4.0	4.0	1	19-23 ft. Black silt with pieces of coke	Hydrocarbon		
HSCNew-NMP-08-C-1	10/03/19	-37.7	-	-	-	0-3 ft. Not sampled	-	3,150,638	13,831,379
		-40.7	4.0	3.0	1	3-4.5 ft. Not sampled (no retrieval)	-		
						4-5.5 ft. Dark gray silt with vegetation	none		
						5.5-6 ft. Black silt			
						6-7 ft.Orange clay with brown sand pockets			
HSCNew-NMP-08-C-2	10/03/19	-38.0	-	-	-	0-2.5 ft. Not sampled	-	3,150,649	13,831,382
		-40.5	4.0	3.0	1	3-4.5 ft. Not sampled (no retrieval)	-		
						4.5.5.5 ft. Dark gray silt with vegetation	none		
						5.5-7 ft. Orange clay woth wood chunks			
HSCNew-NMP-08-C-3	10/03/19	-37.6	-	-	-	0-3 ft. Not sampled	-	3,150,637	13,831,389
		-40.6	4.0	3.0	1	3-4 ft. Not sampled (no retrieval)	-		
						4-5 ft. Black gray silt with vegetation	none		
						5-5.5 ft.Orange clay			
						5.5-6.5 ft. Dark gray brown sand layers			
						6.5-7 ft. Orange clay			
HSCNew-NMP-08-C-4	10/03/19	-37.7	-	-	-	0-3 ft. Not sampled	-	3,150,629	13,831,393
		-40.7	4.0	2.0	1	3-5 ft. Not sampled (no retrieval)	-		
						5-6 ft. Black silt with vegetation	none		
						6-7 ft.Orange clay			

APPENDIX D - STRATIGRAPHY HSCNew-NMP-09
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
HSCNew-NMP-09-A-1	10/02/19	-38.2	-	-	-	0-2 ft. Not sampled	-	3,149,149	13,833,987
		-40.2	4.0	4.0	1	2-5 ft. Dark gray silt with ligh gray streak in the middle	none		
						5-6 ft. Orange clay			
HSCNew-NMP-09-A-2	10/02/19	-37.7	-	-	-	0-3 ft. Not sampled	-	3,149,153	13,833,975
		-40.7	4.0	4.0	1	3-3.5 ft. Black silt with orange clay globules	none		
						3.5-7 ft. Orange clay			
HSCNew-NMP-09-A-3	10/02/19	-37.8	-	-	-	0-3 ft. Not sampled	-	3,149,159	13,833,976
		-40.3	4.0	4.0	1	3-4 ft. Black silt with orange clay globules	none		
						4-6 ft. Orange clay			
						6-7 ft. Not sampled (no retrieval)			
HSCNew-NMP-09-C-1	10/03/19	-38.0	-	-	-	0-3 ft. Not sampled	-	3,149,514	13,834,136
		-41.0	4.0	3.0	1	3-4 ft. Not sampled (no retrieval)	none		
						4-5.5 ft. Dark brown silt			
						5.5-7 ft. Orange clay			
HSCNew-NMP-09-C-2	10/03/19	-38.6	-	-	-	0-2 ft. Not sampled	-	3,149,510	13,834,140
		-40.6	4.0	2.5	1	2-3.5 ft. Not sampled (no retrieval)	none		
						3.5-4.5 ft. Dark gray and black silt			
						4.5-5 ft. Brown silty sand			
						5-6 ft. Orange clay			
HSCNew-NMP-09-C-3	10/03/19	-38.5	-	-	-	0-2 ft. Not sampled	-	3,149,513	13,834,137
		-40.5	4.0	2.5	1	2-4.5 ft. Not sampled (no retrieval)	none		
						4.5-5 ft. Dark gray silt with brown sand pockets			
						5-6 ft. Orange clay			
HSCNew-NMP-09-C-4	10/03/19	-38.4	-	-	-	0-2 ft. Not sampled	-	3,149,511	13,834,149
		-40.9	4.0	4.0	1	2-3 ft. Dark gray silt	none		
						3-3.5 ft. Brown sandy silt			
						3.5-6 ft. Orange clay			

APPENDIX D - STRATIGRAPHY HSCNew-NMP-10
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
HSCNew-NMP-10A-1	10/02/19	-37.4	-	-	-	0-3 ft. Not sampled	-	3,147,880	13,836,082
		-40.4	4.0	4.0	1	3-7 ft. Dark brown silty clay	none		
HSCNew-NMP-10A-2	10/02/19	-36.9	-	-	-	0-3.5 ft. Not sampled	-	3,148,882	13,836,063
		-40.4	4.0	3.0	1	3.5-4.5 ft. Not sampled (no retrieval)	none		
						4.5-7.5 ft. Dark gray, brown, and black modules of silt			
HSCNew-NMP-10A-3	10/02/19	-36.4	-	-	-	0-4 ft. Not sampled	-	3,147,894	13,836,050
		-40.4	4.0	3.0	1	4.0-4.5 ft. Not sampled (no retrieval)	Hydrocarbon		
						4.5-7.5 ft. Dark gray silt with sheen and 2 inch orange clay plug			
HSCNew-NMP-10A-4	10/02/19	-36.4	-	-	-	0-4 ft. Not sampled	-	3,147,894	13,836,063
		-40.4	4.0	2.0	1	4.0-5.5 ft. Not sampled (no retrieval)	none		
						5.5-7.5 ft. Dark gray and black silt			
HSCNew-NMP-10C-1	10/02/19	-33.6	-	-	-	0-7 ft. Not sampled	-	3,147,863	13,836,670
		-40.6	4.0	4.0	1	7-9 ft. Dark brown silt	none		
						9-11 ft. Orange clay			
HSCNew-NMP-10C-2	10/02/19	-34.2	-	-	-	0-6.5 ft. Not sampled	-	3,147,862	13,836,675
		-40.7	4.0	4.0	1	6.5-7 ft. Black silt	none		
						7-10.5 ft. Orange clay			

APPENDIX D - STRATIGRAPHY HSCNew-NMP-11
SUMMARY OF BENCHMARK SEDIMENT LOGS - HSC NMP
Fugro Project No. 04.18180008 - NMP

Location Identification	Date	Top of Sediment Elevation MLLW (ft.)	Core Length (ft.)	Recovery (ft.)	Core Segment	Typical Description	Odor	GPS Coordinates (Actual) NAD83	
								X (ft)	Y (ft)
HSCNew-NMP-11A-1	10/02/19	-31.3	-	-	-	0-4 ft. Not sampled	-	3,145,331	13,838,513
		-35.3	5.0	5.0	1	4-5 ft. Black watery silty sand	none		
						5-6.5 ft. Gray silty sand			
						6.5-9-ft. Brown sand			
		-40.3	4.0	4.0	2	9-11 ft. Brown sand	none		
						11-12 ft. Dark brown sandy clay			
						12-13 ft. Orange clay			
HSCNew-NMP-11A-2	10/02/19	-31.3	-	-	-	0-0-4 ft. Not sampled	-	3,145,340	13,838,513
		-35.3	5.0	5.0	1	4-7 ft. Gray silty sand	none		
						7-9 ft. Brown sand			
		-40.3	5.0	1.0	2	9-13-ft. Not sampled (no retrieval)	none		
						13-14 ft. Brown sand			
HSCNew-NMP-11C-1	10/02/19	-33.1	-	-	-	0-0-7.5 ft. Not sampled	-	3,145,773	13,839,568
		-40.6	4.0	4.0	1	7.5-10.5 ft. Brown silty clay with sand pockets	none		
						10.5-11 ft. Black silty clay			
						11-11.5-ft. Orange clay			
HSCNew-NMP-11C-2	10/02/19	-33.2	-	-	-	0-0-7.5 ft. Not sampled	-	3,145,774	13,839,559
		-40.7	4.0	4.0	1	7.5-9 ft. Brown silty sand	none		
						9-9.25 ft. Black silt			
						9.25-11.5-ft. Orange clay			
HSCNew-NMP-11C-3	10/02/19	-33.2	-	-	-	0-0-7.5 ft. Not sampled	-	3,145,774	13,839,567
		-40.7	4.0	4.0	1	7.5-9 ft. Brown silty sand	none		
						9-9.25 ft. Black silt			
						9.25-11.5-ft. Orange clay			

APPENDIX E

PROJECT HSSE MANAGEMENT PLAN

SEDIMENT AND WATER SAMPLING FOR HOUSTON SHIP CHANNEL EXPANSION CHANNEL IMPROVEMENT PROJECT

MARINE GEOTECHNICAL SITE INVESTIGATION

PROJECT HSSE MANAGEMENT PLAN

Houston Ship Channel, Houston, Texas

Fugro Project No: 04.18180008

Revision: 0

Date: 4 September 2018

Client: **AECOM**

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REVISIONS

1	Final				
0	Draft	B.Mosher	J. Aramburu		9/4/2018
Rev	**Description**	**Prepared**	**Checked**	**Approved**	**Date**

AMENDMENTS

	Revision Details
00	Draft Submitted for review
01	Final Submitted
02	
03	
04	

CONTENTS

APPENDICES

ABBREVIATIONS

ALARP	As Low As Reasonably Practical
ANSI	American National Standards Institute
CI	Client Company Initials
CR	Client Representative
CPR	Cardio Pulmonary Resuscitation
D&A	Drugs and Alcohol
DOT	Department of Transportation
ERP	Emergency Response Plan
FRC	Fire Resistant Clothing
FUGRO	Fugro USA Land, Inc.
HAZID	Hazard Identification
HIPO	High Potential Incidents
HOC	Hazard Observation Card
HSSE	Health, Safety, Security, and Environment
IDLH	Immediately Dangerous to Life or Health
JHA	Job Hazard Analysis
MOC	Management of Change
SDS	Safety Data Sheet
MUTCD	Manual of Uniform Traffic Control Devices
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
PTW	Permit to Work
RAM	Risk Assessment Matrix
SIMOPS	Simultaneous Operations
SLAM	Stop, Look, Assess, Manage
SOM	Safe Operations Manual
SSW	Short Service Worker
TRA	Task Risk Assessment
PROJECT HSSE PLAN	Project Health, Safety, Security, Environment Management Plan

1 INTRODUCTION AND INTERFACE STATEMENT

This document is to act as a Bridging Document between Fugro USA Land, Inc.(Fugro), AECOM JV (AECOM), and Fugro's Sub-Contractors Management System or HSSE program to form a document that addresses the site-specific work activities.

Our Vision is that Fugro companies will be the safest places to work in the worldwide geotechnical, survey and geosciences service industry, through working together and taking personal responsibility for the safety of ourselves and others.

To achieve this, we ALL must:

- **Always act in a safe and responsible manner**
- **Lead by example and promote trust**
- **Intervene and welcome intervention from others**
- **Stop any activity we feel is unsafe or where control is being lost**
- **Accept responsibility for our actions**
- **Contribute to continual improvement**

To supplement this vision Fugro has implemented **GOLDEN RULES OF HSSE**, which reinforces, but does not replace the HSSE Management System, Risk Assessments, Statutory Requirements or specific training in Safety. Their purpose is to instill a culture of personal safety awareness throughout the company and to ensure that all staff work as a team to avoid incidents. **Fugro is totally committed** to uphold and enforce the policies and principles that form the core values of our company-wide HSSE Management System. Likewise, Fugro expects that everyone gives their own personal commitment in their work and as they go about their day-to-day activities.

1.1 PURPOSE

The purpose of this Project HSSE PLAN is to:

- Provide the client with a clear statement of the methods by which Fugro shall conduct the contracted services in a safe manner and in accordance with our own policies and procedures, local and international regulations and client requirements.
- Define the safety responsibilities, reporting systems and operational procedures that are to be used by the Fugro staff and subcontractors throughout the geotechnical component of the project.
- Identify and define the applicable Task Risk Assessment (TRA). (TRA Registry is included in APPENDIX B and applicable TRA's will be available on-site.)
- Act as a bridging document between the Client and Sub-Contractor Management Systems.

1.2 MANAGEMENT HSSE COMMITMENT

Fugro has a core value of maintaining and improving the health, safety, protection of the environment and security of all personnel and contractors under its work control. Visible leadership and commitment are key elements towards achieving the HSSE best practice performance and ensuring the effective implementation of this Project HSSE Plan.

The Management of Fugro is committed to providing a safe and efficient place of work for its employees, sub-contractors and clients. This is achieved by adhering to standards and controls that continually strive to improve the performance of its operations and management systems.

Fugro's senior management for the contract shall take an active and visible role in HSSE engagement activities which shall include, but not be limited to, the following:

- Ensuring that all decisions and practices are in line with the principles of Fugro's Health, Safety, Security, and Environment Policy;
- Providing adequate resources for HSSE matters;
- Participating in the HSSE audit program and hazard identification systems;
- Dealing appropriately and immediately with any non-compliance with HSSE deficiencies or departure from approved procedures;
- Demonstrating personal commitment to HSSE;
- Participating in safety walk-rounds, safety inspections, audits, observations, incident investigation, risk assessments, training, and other management input as required to maintain required HSSE standards;
- Participating in accident investigations and reviews of accident reports, determination, and implementation of remedial actions;
- Provide an appropriate climate for participation in HSSE management at all levels and work groups within the project's organization;
- Ensure that all subcontractors and suppliers are aware of and comply with the client's and Fugro's HSSE policies and their objectives;
- Implement a safety awareness program (HOC - Hazard Observation Card);
- Manage all produced wastes in line with government regulations;
- Comply with all applicable HSSE government regulations;
- Monitor and strive to continually improve the HSSE performance;

- Promote and communicate lessons learned to the Contractor's Personnel;
- Reinforcing positive behavior and recognition of excellence in HSSE performance.

1.3 PROJECT SPECIFIC GOALS

Our goals are simply stated - no accidents, no harm to people, and no damage to property or the environment.

Our objective is to maintain a prevention based program for HSSE Loss Prevention that results in this project being recognized as exemplary - and each participating company as a leader - in the engineering and geotechnical field work for the project. The foundation for this program is based upon establishing an HSSE culture using not only the normal compliance programs, but a behavioral process, an observation process, tracking leading and lagging indicators, and recognizing those contributing to positive HSSE performance with the expectations of "no accidents", "no harm to people" and "no damage to property or the environment". Our HSSE program is a continuous improvement process, defining compliance with governmental rules and regulations as a minimum requirement. The implementation of contractor systems that incorporate Client, Fugro, subcontractor and employee participation results in growth and achievement of our goals as well as providing a safe workplace in which all project employees can excel.

The following principles will guide the collective project Team in all project activities:

- People are our most important asset.
- All incidents and injuries are preventable.
- Safety is everyone's responsibility.
- Management has the responsibility to train employees to work safely and to develop a "work-safe" culture.
- Working safely is a condition of employment.
- All tasks must be planned and performed with a concern for safety.
- Working safely makes financial sense.
- The project team will commit to implement a behavior based safety process.

It is the objective and target of Fugro to provide a safe and healthy place of work as well as promote health, safety, security, and environmental protection for all personnel during this project. It is Fugro's belief that all accidents are preventable. For this project, the objectives and targets are:

- Zero (0) Recordable Incidents
- Zero (0) Environmental Incidents
- Zero (0) Nuisance Reports (e.g., noise, light, traffic, smells) from the surrounding community potentially caused by investigation or field activities
- Zero (0) Auto Incidents
- Zero (0) Property Damage Incidents
- Zero (0) Security Related Incidents

1.4 MONITORING

Monitoring involves the measurement and control of the targets as set out above. All personnel and sub-contractors will have access to this plan and all attachments. Monitoring will include verification that:

- TRA sheets have been be prepared for each task
- TRA sheets reviewed prior to commencement of the activities.
- Fugro and its sub-contractor personnel have attended project inductions.
- Fugro and its sub-contractors personnel have attended the project start-up meeting.
- Fugro and its sub-contractor personnel have received site orientation.
- Toolbox Meetings / JHA held and documented daily.
- Daily Equipment inspection completed
- Proper shift change hand-over completed

The summary of objectives and targets set down in this plan are compiled into a HSSE Commitment Register, which is to be found as an attachment in APPENDIX A.

2 SCOPE OF WORK

The scope of work and how Fugro will undertake to complete is has been described in detail in the Project Work Plan. However, in order that this HSSE Plan can be read as a standalone document, a short summary of the work to be performed on this project is summarized below:

The marine field operations will be conducted for future dredging of the Houston Ship Channel. The work will be conducted from two vessels, the Lift Boat Shallow Draft 17 a Class 70 Lift Boat and a 32-ft support boat contracted through Shallow Draft Elevating Boats, Inc. and for environmental sampling a 24-ft vessel contracted through Benchmark Ecological Services, Inc (Benchmark). Field operations will be on a 10 to12-hour operation bases, until the geotechnical drill program is completed. The planned activities will be 20 sampling locations throughout the Houston Ship Channel specifically

- 9 stations South of Morgan’s Point
- 11 station North of Morgan’s Point

The field program will be tailored to adequately drill, sample, and recover soil and waters samples in water depths that range from 7 to 50ft and to depth up to 50.5ft below Mean Low Lower Water (MLLW). The Site Manager and Captains of the L/B will ensure the safety of all onboard and the Captain will have ultimate authority and responsibility for the safety of personnel.

2.1 SITE FACILITIES

2.1.1 Shallow Draft 17

The Lift Barge (LB) is a 70ft Jack Up type vessel, with a twin 671 diesel engine, length 64ft, beam 24ft and draft of 4.4ft. The LB has a 10-ton crane. Facilities aboard the Lift Boat (LB) Shallow Draft #17 consist of a work deck, small tea/mess room, portable potty, and drilling and ancillary equipment. Accommodations

onboard the LB is mainly for captain and one crew member. The maximum working depth is 45 to 50ft which will allow for a 5 to 10ft air gap.

2.1.2 Benchmark 24 Foot Sediment Water Sample Vessel

Sediment grab samples will be collected and processed using the Benchmark 24-foot sample vessel. Samples from the offshore Reference sample station will be collected using this boat. When collecting sediment grab samples, the sample vessel will be equipped with an A-frame and winch to raise and lower the Van Veen grab sampler. Water samples from all sample stations will also be collected using Benchmark's sample vessel. For all sampling events, the sample vessel will be equipped (at a minimum) with a sub-meter Trimble Geo XH 6000 GPS unit, appropriate sample containers, coolers with ice to store processed samples, field data sheets, and drink cooler.

2.1.3 Shallow Draft 32 Foot Support Vessel

Shallow Draft will operate a 32-foot support vessel powered by dependable Yamaha outboards with 7,000 lb deck payload capacity. The boat will be used to transport personnel from/to the land points and the sampling vessel. The vessel will standby during operations tide all times to the LB. The support vessel will include all safety features to accommodate crew transfers and will be in constant contact with the LB captain. Samples will also be transported to shore via this vessel.

2.1.4 Duration

The anticipated start date is approximately mid-September and completion the by the first week of October. The anticipated schedule is 12-hour operations for approximately 20 days, subject to weather and drilling performance, etc.

3 HSSE POLICES AND PROCEDURES

Fugro has developed a set of safety policies and procedures that ensure employees and subcontractors can work safely. The following sections cross-reference all safety documentation that will be used during the project. All documents containing the job number are project specific. Any changes or additions to standard company documents for this project will appear in the project specific documents.

The Fugro Safety Management System has been configured to meet the requirements of OHSAS18001 and maintains accreditation by an external agency.

3.1 UPDATING THE PROJECT HSSE PLAN

The Project HSSE Advisor shall review the safety plan with the Project Manager, Project Engineer, and Field Supervisor at regular intervals and revise the safety plan if necessary during the project life cycle. This review shall be conducted during the pre-mobilization planning. Any updates of the Project HSSE Plan will be issued through the Project Manager for all holders of controlled copies. Changes to this Project HSSE Plan will be communicated to affected project personnel.

3.2 CONFIDENTIALITY

4 PROJECT ROLES AND RESPSONIBILITIES

Details of project contractual, organizational arrangements and interfaces can be found in the Project Work Plan. A summary of the project safety responsibilities is outlined in the following sub-sections.

4.1 FUGRO PROJECT MANAGER

- Has the ultimate responsibility of ensuring the directives of this document (Project HSSE Plan) Must provide the necessary resources and trained personnel and provide the authority for those persons to carry out the plan in a safe and proper manner in compliance with all relevant legislation.
- Empowering all project management with STOP WORK AUTHORITY, and; ensuring management reinforces that all project personnel understand that they have STOP WORK RESPONSIBILITY in accordance to Fugro policy
- Have an appreciation of health and safety standards / legislation affecting site operations and an understanding of their role in the management of health and safety.
- Ensure that health and safety documentation is suitable and sufficient and meets contract HSSE requirements.
- Ensure that all management staff are formally assigned appropriate duties and responsibilities to assist with the implementation of the project safety
- Has responsibility for the health and safety of project staff.
- Has responsibility for project compliance in regard to environmental protection and security management.

4.2 FUGRO PROJECT ENGINEER

- The Fugro Project Manager is the primary point of contact with the Client Project Manager.
- It is their responsibility to monitor and address project risks and ensure implementation of this plan.
- Liaise with the Fugro QHSSE Managers and with site Project Managers on all matters related to QHSSE.
- Empowering all project personnel with STOP WORK AUTHORITY, and will ensure all personnel understand that they have STOP WORK RESPONSIBILITY in accordance to Fugro policy
- Have an appreciation of health and safety standards / legislation affecting site operations and an understanding of their role in the management of health and safety.
- Ensure that health and safety documentation is suitable and sufficient and meets project HSSE requirements.
- Ensure that site project management are formally assigned appropriate duties and responsibilities to assist with the implementation of the project safety

- Work with Project HSSE Manager to prepare project-specific health and safety documentation and disseminate this information to all parties involved in the project.
- Organize appropriate welfare arrangements.
- Arrange for the mobilization of appropriate equipment and tools for the job including safety equipment and protective clothing.
- Ensure that equipment is properly selected and that procedures are in place to ensure that equipment is maintained in good working order
- Ensure only trained and competent personnel are allocated to operate equipment and tools on site.
- Ensure that the subcontractor's managers are aware of the safety requirements of the work involved to undertake this task.
- Monitor the health and safety aspects of the project and operations for which they are responsible.
- Ensure that security measures are in place and utilized.

4.3 THE FIELD SUPERVISOR(S)

- Oversee the implementation of work of this plan in the field.
- Approve the appropriate trained personnel to perform the field functions of the plan.
- All incident and accident reporting shall be reviewed and where necessary, investigated by the Project Manager to FUGRO's satisfaction.
- Liaise with the FUGRO QHSSE Manager, Project HSSE Advisor, and with Fugro's Project Manager on all matters related to QHSSE.
- Empowering all project personnel with STOP WORK AUTHORITY, and will ensure all personnel understand that they have STOP WORK RESPONSIBILITY in accordance to Fugro policy
- Have an appreciation of health and safety standards / legislation affecting site operations and an understanding of their role in the management of health and safety.
- Ensure that health and safety documentation is suitable and sufficient and meets contract HSSE requirements.
- Ensure field supervisors are formally assigned appropriate duties and responsibilities to assist with the implementation of the project safety
- Ensure that no person affected by alcohol or drug abuse is allowed on site
- Organize appropriate fire precautions, spill response and first aid measures.
- Ensure that plant and equipment is properly maintained in good working order
- Ensure only trained and competent personnel are allocated to operate equipment and tools on site.
- Ensure that the subcontractor's managers are aware of the safety requirements of the work involved to undertake this task.
- Monitor the health and safety aspects of the project and operations.
- Ensure that security measures are in place and utilized.
- Ensure that all incidents are immediately communicated with the client.

4.4 THE QHSSE MANAGER

- The QHSSE Manager is the designated management representative on occupational health, safety, security, and environment for the project.
- Ensure that the company complies with the QHSSE Management policy and standards, strategic QHSSE objectives, client QHSSE policies, and relevant state and local HSSE laws, regulations and codes of practice.
- Provides specialist support and advice to project team in driving the QHSSE management process.
- Represents the company in QHSSE matters when dealing with the client, external parties, professional and statutory bodies.

4.5 THE PROJECT HSSE ADVISOR

- The Project HSSE Manager is the designated management representative on occupational health, safety, security, and environment for Fugro and subcontractor's operations.
- Provides specialist support and advice to project team in driving the QHSSE management process.
- Participate in HSSE Induction of project staff.
- Provides support as required to the Fugro QHSSE Manager in representing the company in QHSSE matters when dealing with clients, external parties, professional and statutory bodies.
- In the event of an incident will promptly investigate and perform root cause analysis if required.
- Perform (or coordinate) project HSSE compliance site audits.
- Work with the project team to continually improve or grow the HSSE program throughout the project duration
- Empowering all project personnel with STOP WORK AUTHORITY, and ensure all personnel understand that they have STOP WORK RESPONSIBILITY in accordance to Fugro policy
- Responsible for health, safety, security environmental awareness from a project level.

4.6 FIELD CREW LEADERS / MENTORS

- The Field Crew Leader / Mentor in conjunction with the Drilling Supervisor, will be responsible for ensuring that the geotechnical operations are conducted in a safe and efficient manner for the duration of the project.
- Report all incidents immediately to the Field Supervisor and the Project HSSE Manager.
- Be aware of the limits of access to project sites. Stop work and seek clarification if unsure of access.
- The Field Crew Leader / Mentor will ensure that safe work practices and procedures are defined, documented and that geotechnical personnel are appropriately trained for their assigned tasks.
- Onsite environmental monitor. They must ensure that all personnel are aware of their environmental responsibilities and that all specific environmental procedures are adhered to.
- Empowering all project personnel with STOP WORK AUTHORITY, and; ensuring all personnel understand that they have STOP WORK RESPONSIBILITY in accordance to Fugro policy.

4.7 SUBCONTRACTOR MANAGEMENT

Subcontractor management is expected to meet or exceed the following:

- Communicate the requirements of "Subcontractor Employees Safety Expectations", as described in this section.
- Have written safety and environmental policies and procedures that are effectively communicated to all employees.
- Require employees to report all occupational injuries, illnesses and incidents immediately to their supervisor.
- Cooperate fully in any incident investigations conducted by Fugro or client.
- Provide employees who are physically fit, adequately trained, and qualified to perform their jobs.
- Provide employees with proper and safe tools and equipment and ensure that they are used appropriately. This includes personal protective equipment.
- Provide a training program that meets or exceeds the minimum requirements of Fugro.
- As evidence that personnel have been trained to perform their assigned duties, management should be capable of providing documentation of its employees' training.
- Have a substance abuse policy, which meets or exceeds Fugro and Client requirements.
- Meet appropriate government regulations and Fugro policies and procedures.

4.8 VESSEL / LIFT BOAT MASTER

The Vessel Master shall implement the company's QHSSE policies and procedures and motivate employees in support of the company's QHSSE policies and procedures. The Vessel Master will ensure compliance to all requirements of maritime law and the rules and regulations as defined by state and federal authorities.

The Vessel / Lift Boat Master:

- Has the overriding responsibility to ensure that the operations onboard his/her vessel are performed in a safe manner in respect of the vessel, crew, equipment, and environmental aspects.
- Is responsible for the welfare and security of all onboard. She/he ensures that all personnel onboard maintain high standards of hygiene and personal care.
- Implements regular inspections by relevant personnel of work and accommodation areas to maintain a safe and healthy environment.
- Has total authority concerning the safe navigation of the vessel and all associated operations. The Master's decisions, with regards to the, shall be acted upon, respected and supported by all parties concerned with operations.

4.9 SUBCONTRACTOR EMPLOYEES

Employees of all subcontractors are expected to meet or exceed the following:

- Participate in Fugro on-site safety programs, meetings, etc.
- Report all incidents that result in injuries, illness, equipment damage/loss, fires, a near miss, or cause environmental damage.

- Use personal protective equipment (PPE) appropriate to the job being done.
- Correct or shut down and report unsafe conditions, unsafe acts, and near misses.
- Adhere to instructions given in Fugro site specific orientations and all posted warnings.
- Arrive at the work site free of drugs, alcohol, and firearms.
- Understand their right and responsibility to use STOP Work Authority is they see an unsafe act or conditions that could put themselves or others in danger.

4.10 FIRST AID RESPONDER

- In addition to the roles and responsibilities above, the role of the First Aid Responder will be fulfilled by field staff that will be identified prior to mobilization. The First Aid responder is responsible for providing first aid (within their level of training as a Good Samaritan) as necessary for any personnel. In order to fulfill this role of First Aid Responder will possess the required qualifications.

4.11 CLIENT REPRESENTATIVE

- The Client Representatives are to represent the client in all matters, which effect the client's commitment to health, safety and environmental performance and ensure that the QHSSE and technical expectations are met.
- The Client Representatives will be invited to participate in safety meetings and may be a member of the investigation team activated as the result of an accident or incident. The Client Representative is also responsible for advising the client management of any incidents.
- The Client representatives are required to comply with all site rules, regulations, policies and procedures as defined within the HSSE manual and this document.

Additional information can be found in the individual crew member's job description which can be provided upon request. In addition to the responsibilities described above, other assigned duties may be assigned in other section of this Project HSSE Plan.

5 HSSE REFERENCE DOCUMENTATION

The geotechnical drilling sampling will adopt the project governance of policies and procedure described in the Work Plan

5.1 HSE INTERFACE – BRIDGING

This section aims to demonstrate that the management systems covering the fieldwork activities have been reviewed and are clearly stated, resulting in safe operation to agreed procedures and compliance with all regulatory requirements. The management systems interface between AECOM and Fugro business lines and any relevant third-party contractor are defined here in order to highlight differences and define how these will be managed.

5.2 CLIENT

A project bridging document has been created to bridge HSE requirements / specifications of the Master Service Agreement between AECOM and Fugro and project requirements for the Houston Ship Channel Expansion Improvement Project in Appendix C.

5.3 SUB-CONTRACTORS

A project bridging document has been created all relevant sub-contractors listed below and Fugro company HSE policies and procedures. These procedures have been aligned in accordance with industry best practice.

A project bridging document has been created for the follow sub-contractors:

- Shallow Draft Elevating Boats
- Benchmark Ecological Services Inc.

5.4 POLICIES

Fugro acknowledges Client's commitment to health, safety and the environment and wish to confirm that the published Fugro policies on Occupational Health & Safety and the Environment and all project specific policies or procedures are widely disseminated and understood among our employees and sub-contractors. The following policies have been drawn up and published by Fugro management:

Integrated Management System Document (QHSSE)	QHSSE-IMS-002
Integrated Management System QHSSE Policy (QHSSE)	QHSSE-IMS-001
Company Project Organizational Chart	SM-R20
Drug, Alcohol Weapon Free Policy	HR-R50
Whistleblower Policy	HR-R47
General Business Principles	HR-46
Productive Work Environment and Anti-Harassment Policy	HR-R52
Information Technology Policy	HR-R53
Use of New Media Policy	HR-R55
Driving Policy	HR-R56
DOT Cell Phone Policy	DOT-F08
DOT Policy	DOT-PO1
Injury Illness Prevention-Code of Safe Practice / Disciplinary	HS-R38
Hazard Identification and Risk Assessment	HS-P10
Management of Change	HS-P15
Subcontractor Management	HS-P58
Incident Investigation and Reporting	QHSSE-IMS-P002
QHSSE Incentive Program	HS-R30
Code of Safe Practices	HS-R39
Lifting Guidelines	HS-R41

Confined Space	HS-R44
Hand and Power Tools	HS-R47
Ladders	HS-R48
Energy Isolation Lockout/Tagout	HS-R49
Crane Safety	HS-R54
Excavation and Trenching	HS-R59
Stretching Guidelines	HS-R68
Permit to Work	HS-R72
Slings & Rigging Material Handling	HS R73
Waste Management	HS-R74
Personal Protective Equipment	HS-R66
Behavior Based Safety	HS-R77

The policies are reviewed at regular intervals by the project team and revised as necessary to be brought into line with current requirements and new legislation. If there are differences between Fugro and client procedures, the more stringent shall apply. The policies will be available at the Fugro Project Offices. All new employees and contractors are introduced to these policies at the initial Fugro Safety Induction.

5.5 PLANS & REGISTERS

HSSE Commitment Register	APPENDIX A
TRA Register	APPENDIX B
Over Water Emergency Response Plan (OERP)	APPENDIX C
HSSE Bridging Document	APPENDIX D

5.6 QHSSE RECORDS

The following forms may be used during the project. Completed document will be collected by the Field Manager. Upon completion of the project these records will be passed to the Project Manager for archiving.

Record of HSSE Meeting	HS-F05
Daily Meeting Form	HS-F06
Job Hazard Analysis Form	HS-F08
Incident Report	GD-HSSE-F01
Incident Investigation Form	GD-HSSE-F02
Lift Plan Form	HS-F20
Management of Change Request Form	HS-F80
Permit to Work Form	HS-F15
Journey Management Form	HS-F81
Jobsite Audit/Field Inspection Form	HS-F95
Management Visit Form	GD-HSSE-F03
TRA Review Form	HS-F09
Facility Inspection Form	HS-F125
Visitor Sign-In / Sign-Out Form	HS-F14
Emergency Drill Record	HS-F90

Vehicle Inspection Checklist	HS-F88

Personnel must have read and understood their own company documents and any other relevant document that impacts their assigned tasks. Documents that will be used by subcontractors on this project shall be submitted for inclusion.

6 COMMUNICATIONS

6.1 "KICK OFF" HSSE MEETING

A "kick off" project HSSE meeting will be held prior to the commencement of field activities and may be part of the initial induction. The "kick off" may also be held when deemed necessary or prior to a new phase of work if applicable. All members of the project team will attend. The meeting will be part of the Project Specific Safety Induction process.

A list of all attendees as well as points raised, and decisions made during the meeting shall be documented and addressed by the Field Supervisor or Project HSSE Advisor.

6.2 WEEKLY HSE MEETINGS

Weekly HSE safety meetings are held onboard during the project. Points discussed at the meeting include:

i. Review of any HSE issues that have arisen since the last meeting;
ii. Review of HOCs raised that week;
iii. Reports on any incidents or near misses;
iv. Reports/lessons learned following any incident investigations;
v. Any HSE Alerts received from onshore;
vi. Review of the proposed scope of work and the need for risk assessment reviews.

6.3 HSE BRIEFINGS

A toolbox talk is held as part of the shift changeover briefing at the start of each shift. In addition, toolbox talks are held for any significant or abnormal task or change in operations. These meetings address the exact nature of the task and HSE issues specific to the task performed during a shift or task change. A list of attendees is recorded at each toolbox meeting.

6.4 VESSEL INDUCTION AND DRILLS

The purpose of the induction is to explain the vessel's emergency procedures and the operation of safety equipment. The induction includes a tour of the vessel with the Vessel Master or First Officer who points out the muster stations, escape routes, personnel transfer procedure-primary and secondary, emergency evacuation, and safety equipment locations.

Vessel induction is conducted within 24 hours of anyone joining the vessel for the first time and is recorded on the ships log or appropriate form. The Vessel Master holds the completed log or forms.

Emergency drills are conducted at not more than weekly intervals. The first drill is conducted once personnel arrive on the L/B. All personnel onboard are required to attend and take an active part as directed by the marine crew. The drills are recorded in the vessel log and in the DPR/DOR.
Persons temporarily on board the vessel in port (e.g. service engineers, or Client/Fugro staff attending kick-off meetings) receive a short briefing about emergency exits, muster areas and alarms.

All Marine and Project crew who will be working offshore will be inducted in the kick-off briefings, communicating project plans and any specific procedure as well as combined AECOM and Fugro project objectives.

Any on signing personnel who have not worked on the vessel will be given a thorough vessel familiarization within 24 hours of departure from the mobilization port. This familiarization shall cover; safety, rescue equipment and procedures, also give the individual a good understanding of areas and equipment on board to be given specific attention. New personnel are also to be informed about what and to whom to report, and who is the Vessel's Safety Officer.

Prior to fieldwork commencement all key members of the project team will be provided with access to copies of the Execution / Operations Plan either electronically or in hard-copy. These documents are considered ‘live’ documents and are therefore updated and re-distributed to the project team throughout the duration of the project as required.

6.5 AUDIT

The objectives and frequency of the audit or inspection will be determined by the level of perceived risk and type of activity at a particular department, location or site. Auditing is a useful tool in quality assurance which in itself is a mitigation of the risk of not following procedure.

If a review of audit or performance feedback findings highlights areas where HSE performance does not meet agreed standards, Fugro and its subcontractor management will cooperate with AECOM to produce and implement an appropriate improvement plan. Any actions arising from the HSE continual improvement process will be entered into Fugro IMPACT and assigned to a responsible person; the Project Manager will monitor the actions and ensure they are closed out.

6.6 LESSONS LEARNT

Actions from the lessons learnt sessions are captured in Fugro’s IMPACT system and assigned to a responsible person, with estimated completion dates. Revisions to HAZID worksheets, project plan templates and procedures include the approved recommendations from the lessons learnt sessions. Lessons learnt are captured throughout the project life cycle.

7 EMERGENCY

7.1 FIELD EMERGENCY

Fugro is well prepared to handle any situation that may arise that requires emergency response. The Overwater Emergency Response Plan (OERP) is attached in APPENDIX C of this Plan.

8 TRAINING AND EXPERIENCE

8.1 COMPETENCE OF EACH EMPLOYEE

Training is a key component in the enhancement of safety awareness, skills, knowledge, and attitudes of each project team member and in developing their competency to deal with risks and take appropriate bodily injury or loss prevention measures. It is mandatory for all, Fugro personnel, sub-contractors and client representatives to have a current safety and environmental training required for the task(s) that will be performed. All Fugro and subcontract personnel shall be suitably qualified and experienced and shall be physically capable of performing the services to be provided. The Project Manager shall verify the suitability of all personnel proposed. Auditable records of all induction and safety courses will be maintained for each employee.

8.1.1 Project Induction

A Project Induction will be the mechanism that Fugro uses to introduce the HSSE requirements of the project to all crew. Project Induction shall be documented using a Project Induction Checklist. Items that will be included are described in the remainder of this section.

Title	Content
Project Overview / Management Commitment	Client Presentation on project expectations
Roles / Responsibilities / Accountability	Review Project Staff Roles and Responsibilities SSW (Mentor) / Direct Supervisor / 2 Way Communication / Stop Work Authority
Behaviour Based Safety	iPOWER Introduction
Pre-Task Planning	Fugro SLAM (Stop, Look, Assess, Manage)
Health	Review of the Health Section of the Project HSSE Plan: Sanitation, Fatigue Management, Smoking Policy, Substance Abuse Program,
Safety	Review of the Safety Section of the Project HSSE Plan: Task Risk Assessments, Hazard Observation Card (HOC), Jobsite Hazard Analysis (JHA), Golden Rules of HSE, Permit to Work, Housekeeping, Equipment Inspections, Vehicle Inspections, Right Tool for the Job, Weather
Environmental Management	Introduction to project environmental policies
Incident / Near Miss Reporting	Review of Project Incident Reporting procedure

Disciplinary Program	Review of Project Disciplinary Actions (EX: D&A violation, smoking, unsafe driving, cell phone while driving, violating safety rules, violating golden rules)

8.2 SHORT SERVICE WOKERS (SSW)

Fugro utilizes a mentoring system to address the issues associated with the safety and health of temporary or Short Service Workers (SSW). The purpose of the mentoring system is to ensure that employees new to the project are adequately supervised, trained, and managed so as to prevent injury to themselves or others, property damage, or environmental harm.

An SSW works with a qualified Crew Leader / Mentor (a project employee that has sufficient experience and leadership qualities and has undergone project HSSE Supervisor training), who will ensure that the SSW is only performing tasks for which they have received the proper training and are following regulations as well as policies and procedures set forth by this Project HSSE Plan. SSW employees and Crew Leaders / Mentors will be identified with a hard hat sticker.

9 WORKING WITH SUPPLIERS, CONTRACTORS AND OTHERS

Fugro is committed to using only contractors who demonstrate that they are committed to preventing accidents and protecting the environment. If there is a conflict concerning HSSE requirements with a contractor, the more stringent requirements will be followed. The Fugro Project Manager, in consultation with the Fugro HSSE Department, will handle HSSE conflict resolution.

10 HEALTH MANAGEMENT

10.1 WELFARE FACILITIES

Proper welfare facilities will be available near each site, including but not limited to: a rest area, shade and protection from the sun, and access to toilets / lavatories. The Field Supervisor is responsible for ensuring that welfare facilities are kept clean and tidy, however, all those who use the facilities are required to leave facilities clean and tidy after use.

10.2 SANITATION

- Trash is not permitted to accumulate in work areas.
- Meal trash is to be placed in garbage containers only.
- Personal hygiene is to be maintained by all employees working on site.
- Project personnel shall use only toilet facilities, hand wash facilities, and drinking water facilities designated for employees.

10.3 FATIGUE MANAGEMENT

Fatigue will be carefully monitored throughout the program and will take into consideration the season changes in temperature and ambient light. Operations are anticipated relatively short duration and are to be conducted at a maximum of 12 hours shifts per day. Following is the tentative plan for fatigue management:

- Employees must be in a fit state to undertake work. See Fugro HS-R79 Fatigue Management.
- Employees must be fit to complete work.
- Employees must take at least minimum periods of rest to safely perform their work.
- Daily work will typically be conducted on a fixed shift schedule to be agreed upon at commencement of the project. These times may be updated based on expected sunrise and sunset times.
- No personnel will be allowed to work more than 14 hours including travel to and from site and will be required to have a rest period of at least 8 hours between shifts.
- No field personnel will be allowed to work more than 14 continuous days.
- Operations will be carried out in shifts that comply with the above.
- During working hours regular rest breaks will be taken to allow staff to stay alert hydrated and adjust to environmental conditions on site.

10.4 JEWELRY SAFETY

Jewelry can be dangerous and shall not be worn during field activities. Large earrings, long necklaces, loose-fitting bracelets, rings, watches, etc. can become entangled in machinery with the potential of serious injury / fatality, as well as be conductive of electricity.

10.5 SMOKING POLICY

Fugro is strongly committed to providing a safe working environment for all staff and contractors. This includes the control of smoking, so it does not impact people who do not smoke. Each location shall designate a smoking area. The Captain will ensure that smoking areas are clearly understood. Under no circumstance will smoking be permitted inside the cabin area of any vessel. The smoking area is required to have all of the following:

- Cigarette Butt Can (constructed of metal and earthen material) ensuring that they are project from being blown or washed overboard.
- Fire Extinguisher in the immediate area (Fire extinguisher shall have an A rating (or other applicable rating) based on flammable materials present in the smoking area.
- Select smoking area away from flammable materials, fuel vents and fresh air intakes.

Before leaving the smoking area, the individual shall verify that all smoking materials have been extinguished. Cigarettes are not permitted to be discarded overboard or anywhere but in the cigarette butt container in the designated smoking area.

The use of “strike anywhere” matches is prohibited: only “safety matches” shall be allowed.
During high fire risk conditions additional hazard controls are required.

Smoking is prohibited while driving. Smoking while driving can distract the driver and potentially cause an incident. Violation of the site smoking rules will result in disciplinary action and may include dismissal from the project.

10.6 SUBSTANCE ABUSE PROGRAM

The consumption of alcohol and the use of un-prescribed drugs have been identified as a serious safety hazard on work sites. The project strictly prohibits the use, manufacture, possession, purchase, sale, distribution, taking, carrying, transfer, handling, or other involvement with controlled substances, illegal drugs, legal drugs illegally used (not taken as directed by employee's physician), alcohol, alcoholic beverages, or any other intoxicants (such as inhalants) by any project employee.

All personnel using prescription and/or non-prescription drugs must advise the Field Supervisor prior to joining a work crew. The Field Supervisor may ask for the drugs to be left in their care for the duration of the work cycle. Additionally, since the Captain of the L/B SD#17 and the Benchmark work vessel have overall responsibility for the safety of all onboard he/she will need to be informed of medication onboard as well as medical conditions such as allergies, heart condition, etc. of the passengers.

The project substance abuse policy includes substance testing of all project employees and may include, pre-access testing, random testing, reasonable suspicion testing, and post-accident testing.

Project management staff reserves the right to search an employee's work area and company equipment / vehicles for prohibited dugs and paraphernalia, alcoholic beverages, and/or unauthorized property or equipment. Violation of this substance abuse policy may result in immediate discharge from the project.

If an incident occurs, project staff involved in the incident shall be taken for post-accident drug (10-Panel Non-DOT) and alcohol testing immediately after any incidents has been evaluated. Employees will be restricted from working or driving on the project until the results have been confirmed.

For post-accident and random drug tests, if the preliminary drug tests results show a positive result, the employee will be removed from the jobsite immediately (pending MRO (Medical Review Officer) review).

- If the MRO confirms a positive drug test, the employee will be banned from the site indefinitely.
- If the MRO confirms a negative drug test, the employee will be allowed to return to the site.

11 JOURNEY MANAGEMENT

Journey Management Planning is essential to ensure adequate safety and security protocols are in place and reduce the risk of affected personnel while traveling by land, air, or sea. Fugro utilizes two protocols to manage journey planning, 'Journey Management Plan' for driving and 'Passage Planning Procedures' for sea travel.

11.1 DRIVING

It is the responsibility of every employee who drives a Company vehicle to do so safely. All employees must adhere to all local, state, and federal laws related to transportation on our highway or road systems. Employees are responsible for the proper use and care of company vehicles. Employees are also responsible for following Journey Management Procedures.

11.2 TRAVEL BY SEA PLAN

Marine vessels will plot courses for passage and Expected Time of Arrival (ETA) and location should be recorded. Onboard crew list shall be recorded in the Vessel logbook.

12 SAFETY MANAGEMENT

Risk Management and hazard evaluation is the key to effective implementation of any safety management system. The principles of 'identify, assess, control and recover' form the basis of hazard management.

Hazards are initially identified by a risk assessment process whereby the project team compiles a Hazard Register based on their experience of carrying out similar operations. In addition, hazards that are specific to this project will be identified.

Tools used for the management of hazards include, Hazard Identification Meeting (HAZID), Task Risk Assessment, Job Hazard Analysis (JHA), Toolbox Meetings, Management of Change, the Hazard Observation Card Program (HOC), and Permit to Work systems as discussed in this document.

Offsite and onsite training will be provided to ensure that all project personnel understand and can use these tools effectively.

12.1 HAZARD IDENTIFICATION AND RISK MANAGEMENT

Activities that pose a risk to health and safety are identified during the project preparation stage. The principle of "identify, evaluate, eliminate and / or control forms the basis of hazard management. The aim is to reduce the risk to a level that is acceptable and as low as reasonably practicable (ALARP).

A formal hazard and risk identification workshop has been undertaken and the outcome used to develop this plan and associated project procedures and method statements.

Risk are assessed and used to establish suitable procedures that reduce the risk to acceptable levels. The project standard operating procedures and method statement taking into account the outcome of the risk assessments. Should an activity be performed that was not initially considered during the risk assessment process, additional risk assessments and method statements will be created by the project Team.

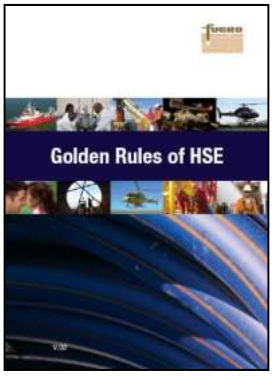
12.2 BEHAVIOR BASED SAFETY

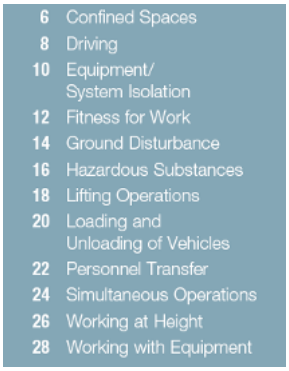
12.2.1 Golden Rules of Safety

Our organization is diverse with many HSSE risks which need to be managed. These Golden Rules of HSSE provide basic guidance which is based on our experience and lessons learned. Compliance with the rules is essential to preventing personal injury and ill health. Each crew on this project is required to have a copy of the Golden Rules of HSSE and should review aspects of the Golden Rules of HSSE during the project.

The safety of everyone requires commitment, leadership, and the willingness to intervene when you see someone working unsafely or when a situation deteriorates. Some of the key principles of the Golden Rules of HSSE include:

- Everyone has a responsibility to themselves and others to act and work safely.
- Carefully planned work will prevent unsafe situations.
- Learning from our experience will improve our HSSE performance.
- Support of our principles by suppliers and subcontractors will assist us in improving our standards
- Empowering all employees and contractors to stop unsafe acts will reduce incidents and personal injury.





12.2.2 iPOWER

It is recognized that high levels of technology and HSSE management systems are not sufficient for achieving zero incidents. Motivating people to want to work safely requires a culture where behaviors and attitudes are safety focused. Accordingly, an iPower initiative intended to strengthen the health and safety culture within Fugro and its subcontractors.

The iPower icon consists of an "I" with an "Eye" above it. The "I" stands for the Individual and the "Eye" is the watchful eye that keeps a lookout for not only the individual's safety, but the safety of others. Individual commitment will be required from all crew members and shall be discussed in the daily safety meeting.

12.2.3 Stop Work Authority

The main objective of the stop work authority is to intervene or correct any unsafe action. Intervention can consist of speaking with employee(s), interrupting or stopping an act or action, or protecting someone from an immediately dangerous to life or health (IDLH) situation. All Fugro employees have the RESPONSIBILITY to stop the job if they believe that the work environment or procedures could jeopardize their personal health or safety, the health and safety of other personnel, or the environment.
Employees shall stop any activity:

- Where there is good reason to believe that the circumstances involved could jeopardize their health and safety or those of any other individual or have an adverse effect on the environment.
- When the control methods for reducing the HSSE risk are not clearly defined.

Management shall:

- Providethe fullest possible support to any employee who finds him or herself in such a situation.
- Not reprimand any employee for using Stop Work Authority in an attempt to prevent injury/illness/damage from an identified hazard.
- Review all reports of Stop Work Authority being used.
- Ensure that Stop Work Interventions are documented using a Hazard Observation Card.
- Follow-up on all Stop Work Interventions that have been initiated and/or closed.

It is important that:

1) All employees must be trained on Stop Work Authority before their initial assignment. This includes knowing the steps of Stop Work Authority which are: Stop, Notify, Correct, and Resume.

2) No work resumes until all issues and concerns have been addressed.

3) Every employee understands their responsibility and obligation to stop any work that they consider compromising health, safety or the environment.

4) All Fugro personnel are trained to intervene whenever unsafe work is witnessed and report incidents and near misses to their immediate supervisor.

12.2.3.1 Hazard Observation Card (HOC)

The Fugro "Hazard Observation Card (HOC)" program will be utilized throughout the project. The HOC program should be used by Fugro employees, Fugro subcontractors, clients or visitors to report the following:

Safe Act or Suggestion

- any exceptional safe act or suggestion that promotes safe working practice and demonstrates good safety awareness;

Unsafe Act or Condition

- an unsafe act is a specific action or lack of action by an individual, e.g. removal of safety guards, standing under a suspended load, not following a procedure, or
- an unsafe condition is a situation or event which may result in an accident, e.g. poor housekeeping, blocked escape routes, unguarded or defective machinery, lack of edge protection, etc.

All completed cards should be reviewed by the Project HSSE Manager and Field Supervisor, and where appropriate the necessary remedial action(s) taken. If a hazard cannot be addressed and remedied immediately it should be reported through the HSSE reporting structure.

HOCs will be reviewed during the daily toolbox meetings, as necessary.

12.3 SUB-SURFACE AND OVERHEAD HAZARDS

A hazard survey will be conducted by Fugro using a magnetometer to detect metallic debris or utility's through the proposed work area.

Additionally the L/B SD # 17 legs are 70' in length. Along the route from the mobilization berth the Houston Ship Channel through to the worksite (boring locations) the area has been reviewed and there are no low bridges, obstacles.

12.4 TASK RISK ASSESSMENT

Task Risk Assessment (TRA) sheets will be completed by Fugro and any sub-contractors for all tasks where there is a potential for personal injury (serious or minor), damage to property and equipment or loss, or harm to the environment. TRAs identify and assess the hazards for each step of the task and define the appropriate controls and recovery measures. Changes to equipment, personnel or the equipment will require a review and possible revision of existing TRAs to capture all associated hazards. If a TRA does not exist for a certain task one must be created. Revised and new TRAs will be covered during the Toolbox meeting prior to undertaking the task. A risk assessment is also required for a new or revised TRA. A management of change may also be required in such cases.

Where specific activities or tasks have a potential for introducing new and unidentified hazards, these hazards will be discussed as part of the daily Toolbox Meeting and incorporated into the JHA. If additional planning is needed, work will be stopped to address the issues. If the activities require a work permit, then Fugro's Permit to Work system will identify and manage interfacing hazards. For more details regarding the Task Risk Assessment for project specific risks, refer to the register in APPENDIX B.

12.4.1 Risk Factor

TRAs have two indices, which form the components of risk. The risk is computed based on the indices following the identification and subsequent mitigation of a task's hazard(s). The risk factor is initially determined by identifying the corresponding highest severity score and likelihood score that could reasonably be expected without control measures in place. The severity and likelihood score scales presented in Tables 11-1 and 11-2 below are used for this project.

Table 11-1: Severity Score

Severity	Reputation	Assets	Environment	People
1 – Slight	Slight impact	Slight damage, less than € 25,000	Little or no actual impact or potential for damage	Slight health effect/ injury (First Aid)
2 – Minor	Limited impact	Minor damage € 25,000 – 100,000	Within site boundary, short term impact recoverable by the work site	Minor health effect/ injury (RWC MTO)
3 – Major	Considerable impact	Major damage € 100,000 – 500,000	Impact beyond the site boundary unlikely to last beyond 1 month. Recovery may require external aid	Major health effect/ injury (DAWC)

Severity	Reputation	Assets	Environment	People
4 – Severe	National impact	Severe damage € 500,000 – 1,000,000	Impact beyond the site boundary unlikely to last beyond 12 months. Recovery requires external aid	Permanent total disability or single fatality
5 – Catastrophic	International impact	Extensive damage, greater than € 1,000,000	Massive uncontrolled release with significant impact extending well beyond the site boundary	Multiple serious injuries or fatalities

Table 11-2: Likelihood Score

Likelihood	Description
A – Very unlikely	A freak combination of factors required for incident to result
B – Unlikely	A rare combination of factors would be required for an incident to result
C – Possible	Could happen when additional factors are present but otherwise unlikely to result
D – Likely	Not certain to happen but an additional factor may result in an incident
E – Very Likely	Almost inevitable that an incident would result

12.4.2 Residual Risk Factor

The residual risk is the risk factor after control measures have been recommended or implemented. The recommended or implemented control measures should reduce or have been proven to reduce either one or both severity and likelihood scores respectively. The hierarchy of control measures is as follows:

- Elimination;
- Substitution;
- Barrier / Enclosure e.g. machine guarding;
- Administrative control e.g. procedure;
- Use of Personal Protective Equipment.

The following risk factor tables (Table 11-3 and 1-4) serve as guidance on the tolerance level of risk. Activities with intolerable risk (risk ratings in red) shall have an action plan / control measures to reduce its severity and / or likelihood to a tolerable or as low as reasonably practicable level of residual risk.

Table 11-3: Risk Rating

	Likelihood				
Hazard Severity	A – Very unlikely	B – Unlikely	C – Possible	D – Likely	E – Very Likely
1 – Slight	A1	B1	C1	D1	E1
2 – Minor	A2	B2	C2	D2	E2
3 – Major	A3	B3	C3	D3	E3
4 – Severe	A4	B4	C4	D4	E4
5 – Catastrophic	A5	B5	C5	D5	E5

Table 11-4: Risk Rating Description

Green (Low)	**Manage for continuous improvement.** May be acceptable; however, review task to see if risk can be reduced further.
Yellow (Medium)	**Incorporate Risk Reduction measures.** Task should only proceed with appropriate management authorisation after consultation with specialist personnel and assessment team. Where possible, the task should be redefined to take into account the hazards involved, or the risk should be reduced further prior to task commencement.
Red (High)	**Intolerable.** Task must not proceed. It should be redefined, or further control measures put it place to reduce risk. The controls should be re-assessed for adequacy prior to task commencement.

12.5 JOB HAZARD ANALYSIS (JHA)

A JHA will be prepared prior to the start of any activity requiring hazard management to address any hazards that are present on the jobsite that are not directly related to the task being performed. A JHA shall be completed and reviewed for any task that does not have a Task Risk Assessment. These documents will be reviewed with all applicable personnel prior to start of activity.

12.6 HSSE MEETINGS

HSSE meetings will be held in one of two manners: Daily Toolbox meetings and when Project Management deems an impromptu HSSE meeting is needed. However, project staff may go above and beyond the requirement to hold additional meetings as necessary and as often as deemed appropriate.

Minimum points to be reviewed for the Daily Toolbox Meetings shall include:

- Environmental Conditions (weather conditions, wind strength, and direction)
- Environmental Concerns and/or Hazards (i.e. protected habitat, spill potential)
- Progress and Technical Problems on the Previous Day or Shift
- Expected Activities for the Upcoming Day or Shift
- Completion of JHA
- Accidents, Near Misses or Hazard Observations from the Previous Day or Shift
- Emergency Muster Locations that will be used
- Location of Spill / First Aid / Fire Fighting Equipment

12.7 PERMIT TO WORK

A Permit to Work (PTW) system will be used for all operations. The Field Supervisor is responsible for ensuring that the requirements of the permit system are used. A permit will be raised for:

- Entry into confined spaces
- Working Near Power lines
- Working aloft
- Hot work
- Energy Isolation
- Locate Permits
- Other work considered dangerous

All personnel involved in requesting, preparing and approving permits will be made aware of and understand the PTW system and understand its requirements. Before work can be initiated, two signatures are required. These signatures should come from the Crew Leader / Mentor and the Project HSSE Manager at the time the work is being performed. This step is taken to reduce possibility of conflicts in work processes. Copies of open permits must be kept onsite for review.

* All work within 33 feet (10.1 meters) of overhead power lines (or their components e.g. guy wires, poles, etc.) must be performed under and approved Working Near Overhead Power Lines Permit. No work will be allowed within 10 feet of energized line. All lines must be considered energized unless the authority or utility company owning the lines indicates in writing that they are not energized, and the lines are grounded at the point of operation. Driving a vehicle that does not have the capability of any part of it rising under and overhead power line does not require a permit. A vehicle that does have the capability of any part of it rising under an overhead power line (such as a truck crane or dump truck) “may” require a permit, depending on the driving conditions. This permit shall be signed off on by the client before operations begin.

12.8 SIMULTANEOUS OPERATIONS (SIMOPS)

It is unlikely that several or all activities occur at the same time. If more than one unrelated task is to occur, management of those SIMOPS to avoid any conflict will be achieved by implementing the following:

- Every activity has a dedicated Crew Leader / Mentor for the entire operation;
- The Crew Leader / Mentor report and coordinate their operations daily with the Field Supervisor that is responsible for that scope of work;
- The Fugro Field Supervisor will have overall responsibility for coordinating the various activities on site and for communicating daily with the Field Supervisors in toolbox talks and other associated planning sessions.

The above actions ensure safe operations with minimum delay and disturbance to the different operations.

12.9 MANAGEMENT OF CHANGE (MOC)

All temporary and permanent changes to organization, personnel, systems, procedures, equipment, products, materials or substances will be assessed and managed to ensure that:

- The impact of the change upon the health and safety of personnel, the local community and the environment remain at an acceptable level.
- The health, safety, security, environmental, technical and other impacts of temporary and permanent changes are formally documented and approved and that any necessary revisions are made to project documents.
- All affected project persons are aware of and understand any project changes.
- The effects of change on the workforce/organization, including training requirements, are assessed and managed.
- The original scope and duration of temporary changes are not exceeded without review and approval.

Fugro shall complete and submit a MOC for all operations affecting the project as applicable and as per HS-P15 Management of Change Procedure and HS-F80 Change Management Request Form.

12.9.1 Responsibilities

The on-site Client and Fugro Site Supervisor will have the responsibility for assuring that any changes to the agreed project follow this MOC process. Any company or contract employee has the responsibility of reporting any changes to the project to the on-site Client and Fugro Field Supervisor for their implementation of the MOC process. The Field Supervisor has the responsibility for facilitating the MOC and completing any follow-up according to this procedure.

12.9.2 Documentation

All applicable changes should have a corresponding MOC Change Request and Authorization form. This form can be used for communicating the change and follow the process below.

- All signed original forms and any attachments must be collected and sent to the Fugro Project Manager for the project files upon completion of the project
- Copies of any signed forms and all attachments shall be sent to the QHSSE Department to be included for tracking purposes on the MOC Register.
- When sending in a MOC request all supporting documentation shall be faxed or e-mailed to the appropriate people for review.
- Supporting documentation shall include at a minimum a Task Risk Assessment.

Any changes to the contract, to any procedures or policies, the HSSE Risk Assessments, the HSSE & Operating Plan and/or the HSSE Interface document shall be made by the appropriate document custodian and then re-distributed or made available accordingly. At a minimum, these documents should indicate Revision Number, Latest Revision Date, Print Date, and have a distribution list.

12.9.3 Awareness

All client, Fugro, and other subcontractor supervisory and management affiliated with this project are to be made aware of this procedure, what constitutes a “change” and what project documents could be affected.

12.10 HAZARD COMMUNICATIONS

Fugro and subcontractor will ensure that chemicals that are brought onsite and will have a proper Safety Data Sheet (SDS) available for use in all locations where the chemical will be utilized. The SDS shall be reviewed to determine if any special personal protective equipment is required prior to mobilization to the project site.

12.11 FIRE PREVENTION

To understand fire safety, you must first understand fire chemistry. These four basic elements are needed to produce a fire:

- Fuel - Paper, wood, rags, oil, or grease.
- Oxygen - Air, ventilation, stored oxygen.
- Heat - Ignition sources, hot surfaces, sparks, open flames, electrical arcs.
- Chemical Reaction - A sustained chemical reaction

To eliminate the potential for a fire or to extinguish a fire, you must remove 1 or more of the 4 components of the Fire Tetrahedron.

12.11.1 Four General Classes of Fire

The four general classes of fire are as follows:

- **Class A** fires are those that have paper, wood, trash, and other solid material for fuel.
- **Class B** has a flammable liquid or gas as a fuel; an example of a Class B fire would be gasoline that has ignited
- **Class C** fires are electrical in nature.
- **Class D** fires result from a combustible metal such as magnesium.

12.11.2 FIRE PREVENTION GUIDELINES

The following fire prevention guidelines should be adhered to mitigate the hazards of fire, explosions, and the dangers associated with flammable materials.

- A minimum of one (1) 20-pound ABC rated fire extinguisher must be at each borehole worksites.
- A minimum of one (1) 2.5-pound ABC (1A:10BC) rated fire extinguisher must be available on all non-borehole worksites.
- A fire extinguisher, rated not less than 10B shall be present within 50 feet when 5 gallons of flammable or combustible liquids or 5 pounds of flammable gas are being used on the jobsite.

- The travel distance from any point on the work area to a fire extinguisher shall not exceed 100 feet.
- All fire extinguishers shall have a current annual inspection (tag present).
- All fire extinguishers shall be inspected monthly (tag present and marked for the current month).
- Work locations, vehicles, and the inside and outside of buildings shall always be kept clean and orderly.
- Discarded packing material or scrap should not be accumulated.
- Portable electric heaters must be used with caution, away from ignition sources, furniture and other flammable materials.
- Combustible materials, such as oil-soaked rags, waste, and shavings shall be kept in approved metal containers with metal lids. Containers should be emptied as soon as possible.
- When pouring or pumping gasoline or other flammable liquids from one container to another, metallic contact shall be maintained between the pouring and receiving containers.
- Strict adherence shall be paid to the "No Smoking" and "Stop Your Motor" signs at fuel dispensing locations.
- Change oil-soaked or contaminated clothing. It may cause skin irritation and is a fire hazard. Do NOT place in a dryer!
- Smoking or open flame shall not be permitted in areas where dangerous gases might be present, for example, oil rooms, hydrogen areas, acetylene storage, or similar areas. Neither shall smoking be permitted in storerooms, battery rooms, flammable liquid storage and use locations, or in other areas where quantities of combustible materials are kept. Absence of "No Smoking" signs shall not excuse smoking in dangerous places.
- All containers shall be labelled as to their contents. The SDS for each hazard will be readily available.
- A hot work permit shall be in place for any activity that produces an open flame, welding operations, grinding operations, and other spark producing activities.
- Smoking shall not be permitted in cabin areas
- Personal item such as cell phones and computers shall not be charged within the bunk area or on bedding.
- Battery charging must follow the manufactures recommendations. Battery chargers such a cell phone charger and remote chargers must be compatible with the items specification. Damaged cords must be replaced including cell phone charge cords.

12.12 HOUSEKEEPING

The maintenance of good housekeeping at the worksite is the simplest way to reduce HSSE incidents. The following actions shall be taken to ensure a high standard of housekeeping is maintained:

- Material shall be stored in an orderly and stable fashion and kept clear of work areas and traffic aisles.
- Spills shall be cleaned up immediately.

- Nails/staples shall not be left protruding from boards or boxes.
- Vehicles, offices and other facilities shall be kept neat, clean, and orderly.
- All trash shall be placed in trash containers.
- Tools shall be kept clean and in proper storage areas.
- Pipe and similar materials shall be stacked and choked to prevent spreading.
- Working areas will as far as practical be maintained level and dry
- Hazardous areas shall be barricaded and signed.
- Sufficient access shall be available for the safe passage of vehicles and pedestrians
- Sufficient lighting shall be available where required to maintain safe working conditions
- Flammable and combustible materials shall be stored at least 50 feet from hot work or other sources of ignition.
- Fire extinguishers shall be provided at least 25 feet from, but not more than 75 feet from flammable liquid storage areas.
- Flammable liquids shall be stored in clearly marked containers and labelled as to contents.
- Maintain the smallest possible inventory of chemicals to meet the immediate needs.
- Hazard Observation Cards should be used to identify and correct housekeeping issues.

12.13 MUSCULAOSKELTAL AWARENESS / ERGONOMICS

- Employees should avoid being in a prolonged position for extended periods of time.
- Limit the use of vibrating tools
- Avoid reaching to access work / avoid awkward positions
- Avoid repetitive tasks. Rotate tasks or take rest breaks to break up repetitive tasks.
- Limit as much as practicable working on your knees and twisting your hands and wrists
- Limit lifts to 50 lbs or less
- When you pick up or set down a load, don’t reach more than 10” from your body
- Don’t twist your body
- Lift with your legs, not your back. Keep your back as straight as possible
- Lift the load using a solid two-handed grip.

12.14 WORKPLACE VIOLENCE

The project has a zero-tolerance policy for workplace violence. Consistent with this policy, acts or threats of physical violence, including intimidation, harassment, and/or coercion, which involve or affect the project, or which occur on project property will not be tolerated.

Acts or threats of violence include conduct, which is sufficiently severe, offensive, or intimidating to alter the employment conditions on the project or to create a hostile, abusive, or intimidating work environment for one or several project employees.

12.15 FIREARMS AND EXPLOSIVES

Firearms and explosives will not be permitted on project property. The project reserves the right to search any person and/or property of employees, suppliers, and site visitors for the presence of firearms and explosives.

12.16 TEMPERATURE EXTREME

12.16.1 Hot Environments

Heat-related illnesses are avoidable if training is in place and the right actions are taken before, during, and after working in hot conditions. High temperatures and humidity can stress the body's ability to cool itself, making heat illness a concern during hot weather months. Working outdoors, especially during summer months, exposes personnel to elevated heat conditions, creating the potential for heat illness. The three primary forms of heat illness are heat cramps, heat exhaustion, and heat stroke. Heat stroke can be a life-threatening condition. The Fugro Management Team will evaluate the temperature using the wet bulb globe temperature as shown in OSHA https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_4.html

12.16.1.1 Employee Responsibilities

Learn the signs and symptoms of heat-induced illness and how to respond.

Employee training topics will include:

- The environmental and personal risk factors for heat illness
- Review of this section of the Project HSSE Plan
- The importance of staying hydrated, drinking water frequently throughout the day, at least 4 cups per hour
- Importance of acclimatization (allowing the body to adjust gradually to the work in high heat)
- Types of heat illness and the signs and symptoms
- Necessity of immediately reporting to Fugro, directly or through the Crew Leader / Mentor any signs or symptoms of heat illness
- Procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided if they become necessary
- Procedures for emergency communications. This includes the emergency response procedures such as locating local medical services and communication alternatives
- Procedures for ensuring that, in the event of an emergency, clear and precise directions to the work site can and will be provided, as needed, to emergency responders

12.16.1.2 Crew Leader / Mentor Responsibilities

Prior to assignment to supervision of employees working in the heat, training on the following topics shall be provided:

- The information required for employee training listed above
- The importance of preventing heat illness and how to recognize the symptoms
- The procedures the Crew Leader / Mentor is to follow when an employee exhibits symptom consistent with possible heat illness, including emergency response procedures
- Procedures for acclimatization
- Modifying working hours where necessary/possible to work during cooler hours of the day
- Providing a "buddy system" to allow employees to watch each other closely for signs of heat illness

12.16.1.3 Water

There will be an adequate supply of clean cool potable water available at all job sites. The Crew Leader / Mentor will ensure that an adequate supply of drinking water is available at each location and that employees are encouraged to consume an adequate amount of water. It is recommended that each employee drink 4 8-ounce glasses of water per hour, including at the start of shift.

12.16.1.4 Shade

Shade for recovery periods will be provided when employees need relief from the heat. The direct heat of the sun can add as much as 15 degrees to the heat index. Rest breaks are important to provide time for cooling and provide an opportunity to drink water. Breaks should be taken in cooler, shaded areas. The Field Supervisor will be responsible for ensuring that adequate shade is available at work sites where the temperature is expected to exceed 85 degrees. The location of shade areas and the need to rest and get into the shade if any heat illness symptoms are present will be discussed daily at the tailgate meeting.

12.16.1.5 Acclimatization

People need time for their bodies to adjust to work in the heat. Acclimatization is particularly important for employees returning to work after a prolonged absence or recent illness, recently moving from a cool climate to a hot climate or working during the beginning stages of a heat wave. Monitor employees closely for signs and symptoms of heat illness, particularly when they have not been working in the heat for the last few days or when a heat wave occurs.

12.16.1.6 Work / Rest Regimens

Heat stress is dependent on the activity level and the environment around the employee. Specialized help to assess the risk must be consulted when radiant heat is a major contributor. When no radiant heat is present, the following can be used as guidance for the maximum exposure time to high temperature.
Estimate the activity level with the aid of Table 11.19-1. Read the maximum exposure temperature (wet temperature) in 11.19-2 — this is the maximum exposure temperature at 100 percent humidity. Usually the humidity is lower, more heat can be removed by sweating, and a higher dry temperature is allowed. This dry temperature is the temperature normally referenced and can be derived from the wet temperature and the relative humidity with the aid of 11.19-3. Table 11.19-4 provides the “apparent temperature” for temperatures 64 degrees F (18 degrees C) to 108 degrees F (42 degrees C) — the apparent temperature is the general term for (human) perceived outdoor temperature caused by the combined effects of air temperature, relative humidity, and wind speed.

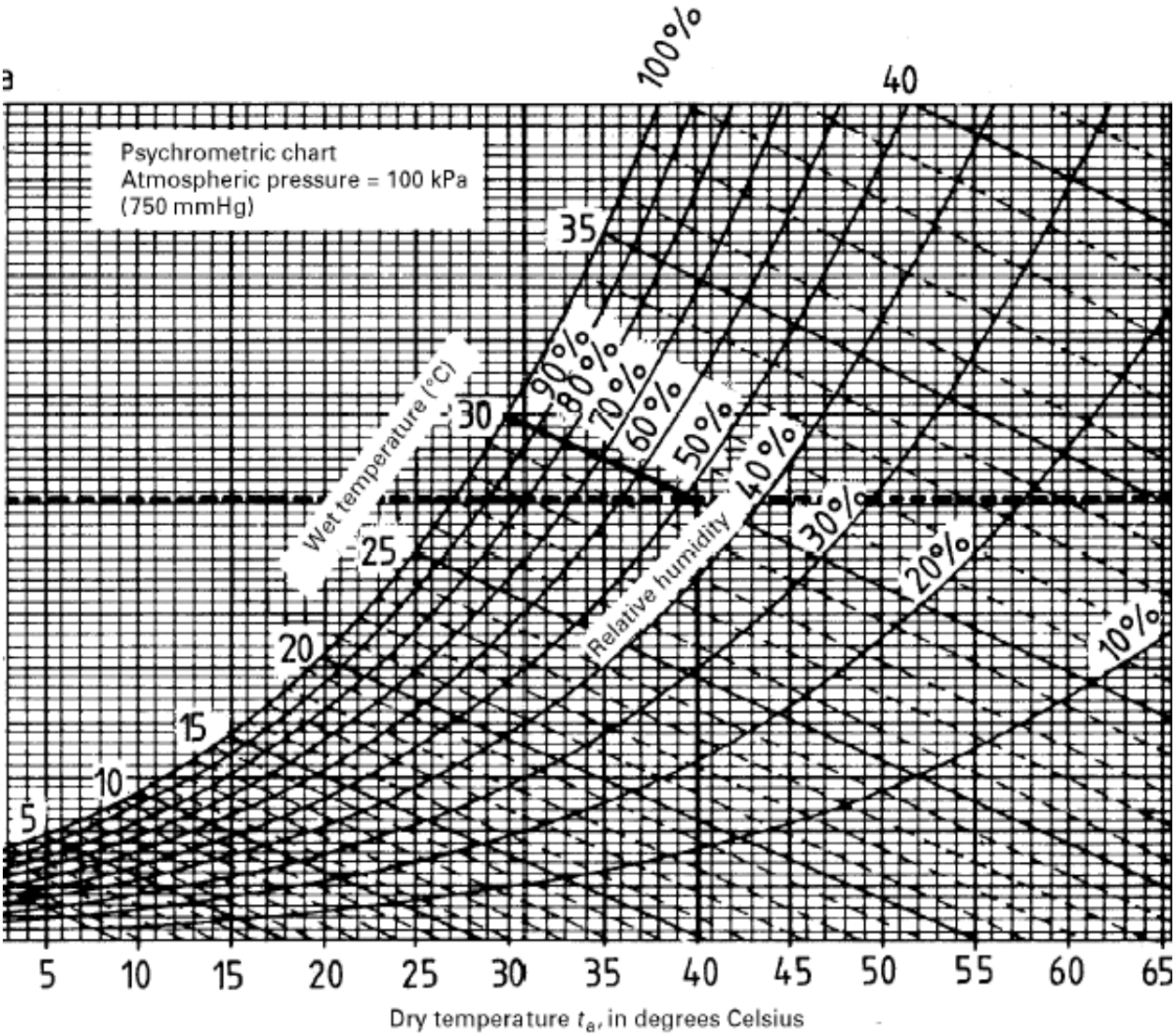
Table 11.19-1 - Activity Level

#	Class Description	Example
0	Resting	Resting
1	Low activity rate	**Sitting at ease:** light manual work (writing, typing, drawing, sewing, book-keeping); hand and arm work (small bench tools, inspection, assembly or sorting of light materials; arm and leg work (driving vehicle in normal conditions, operating foot switch or pedal). **Standing:** drill (small parts); milling machine (small parts); coil winding; small armature winding; machining with low power tools; casual walking (speed up to 2.2 mph [3.5 km/h]
2	Moderate activity rate	Sustained hand and arm work (hammering in nails, filing); arm and leg work (off-road operation of lorries, tractors ,or field execution equipment); arm and trunk work (work with pneumatic hammer, tractor assembly, plastering, intermittent handling of moderately heavy material, weeding, hoeing, picking fruit or vegetables); pushing or pulling light weight carts or wheelbarrows; walking at a speed of 2.2 to 3.4 mph (3.5 to 5.5 km/h) forging
3	High activity rate	Intense arm and trunk work; carrying heavy material; shovelling; sledge hammer work; sawing, planning, or chiselling hard wood; hand mowing; digging; walking at a speed of 3.4 to 4.3 mph (5.5 to 7 km/h) Pushing or pulling heavily loaded handcarts or wheelbarrows; chipping castings; concrete block laying
4	Very high activity rate	Very intense activity at fast to maximum pace; working with an axe; intense shovelling or digging; climbing stairs, running, walking at a speed greater than 4.3 mph (7 km/h)

Table 11.19-2 - Maximum Exposure Temperatures (wet temperature at 100% humidity)

#	Class description	Maximum exposure temperature (°F / °C, wet at 100% humidity)			
		Person acclimatized to heat		Person not acclimatized to heat	
0	Resting	91 °F/33 °C		90 °F/32 °C	
1	Low activity rate	86 °F/30 °C		84 °F/29 °C	
2	Moderate activity rate	82 °F/28 °C		79 °F/26 °C	
3	High activity rate	No sensible air movement 77 °F/25 °C	Sensible air movement 79 °F/26 °C	No sensible air movement 72 °F/22 °C	Sensible air movement 73 °F/23 °C
4	Very high activity rate	73 °F/23 °C	77 °F/25 °C	64 °F/18 °C	68 °F/20 °C

Table 11.19- 3 - Conversion Wet Temperature to Dry Temperature



Example: What is the corresponding dry temperature for 30 ºC (wet) when humidity is at 60 percent?
Look up the top curved line with the indication 100 percent.
Find 30 ºC.
Follow the straight line towards the right-hand bottom corner till curved line indicating 60 percent is met.
Follow the vertical line to the bottom of the table.
Read the temperature (= 37 ºC).
ºC = (ºF x 5/9) –32
ºF = (ºC x 9/5) + 32

Table 11.19-4 - Apparent Temperature Index

Relative Humidity	Apparent temperature(°F/°C)										
0%	**64/18**	**70/21**	**73/23**	**79/26**	**82/28**	**88/31**	**91.4/.33**	**95/35**	**99/37**	**102/39**	**108/42**
10%	64/18	70/21	75/24	81/27	84/29	90/32	95/35	100/38	106/41	111/44	117/47
20%	66/19	77/22	77/25	82/28	88/31	93/34	99/37	106/41	111/44	120/49	129/54
30%	66/19	73/23	79/26	84/29	90/32	97/36	104/40	113/45	124/51	135/57	148/64
40%	68/20	73/23	79/26	86/30	93/34	100/38	109/43	122/50	137/58	151/66	
50%	70/21	75/24	79/27	88/31	97/36	108/42	120/49	135/57	151/66		
60%	70/21	75/24	82/28	90/32	100/38	115/46	133/56	149/65			
70%	70/21	77/25	84/29	93/34	106/41	124/51	144/62				
80%	72/22	79/26	86/30	97/36	113/45	137/58	156/69				
90%	72/22	79/26	88/31	102/39	122/50	151/66	171/77				
100%	72/22	81/27	91/33	108/42	133/56	165/74					

12.16.1.7 Prompt Medical Attention

Recognizing the symptoms of heat illness and providing an effective response requires promptly acting on early warning signs. Symptoms of related illnesses include, headaches, dizziness, light headedness, weakness, mood change, irritability, confusion, upset stomach, vomiting, decreased or dark colored urine, fainting, passing out and pale clammy skin. Any of these symptoms require immediate attention.

All Fugro field personnel are first-aid/CPR trained. However, if workers show any abnormal response to the heat and first-aid trained personnel are not immediately available onsite, call 911 immediately.

12.16.1.7.1 HEAT STRESS DANGERS POSED BY APPARENT TEMPERATURES

90-100 Degrees F (32-39 Degrees C):

Sunstroke, heat cramps, and heat exhaustion are possible with prolonged exposure and physical activities.

105-129 Degrees F (41-54 Degrees C):

Sunstroke, heat cramps, and heat exhaustion likely. Heat stroke is possible with prolonged exposure and physical activities.

129 Degrees F (54 Degrees C) or Higher:

Heat stroke or sunstroke is imminent.

12.17 PERSONAL PROTECTIVE EQUIPMENT (PPE)

All Fugro and subcontractor personnel shall wear appropriate personal protective equipment (PPE). It is the responsibility of everyone to bring and to wear all PPE as required by the specific task being performed, the potential hazards that person will be exposed to, and the specifics of the project. Personnel must adhere to the PPE requirements recommended on the SDSs for materials handled and required on the TRAs produced to assess the risk of that task.

The use of PPE shall comply with federal, state, and local regulations and shall be routinely inspected for any defects that would comprise the intended use. All PPE shall meet ANSI or equivalent international standard.

Personal Floatation Devises (PFD) shall be properly inspected prior to use and meet USCG recommendation for size, use and fitness and must be properly worn.

12.17.1 Project PPE requirements

Minimum PPE requirements for this project include:

- Hard Hat
- Safety Glasses
- Long Pants and a suitable shirt, with no less than 4” or 10cm sleeves
- Long sleeved shirts are recommended but not required
- High Visibility Work Vest (unless hazardous to wear as defined in the applicable TRA)
- Appropriate Gloves. All material handling requires use of gloves
- Protective Work Boots (safety toed)
- Personal Flotation Devices (PFD) during overwater, work or outside of hand railing or in areas captain has designated as requiring PFD’s.

Hard Hat:

This job requires that approved hard hats always be worn in the construction zones.

- Hard hats shall only be allowed to be worn backwards when welding operations are being conducted.
- Company logo or Subcontractor logo shall be displayed on all hard hats.
- Hard hats will only be used in accordance with manufacturer’s recommendation and client requirements

Work Boot:

Safety-toed boots are required (conforming to ANSI Z41-1991). They must be constructed of leather or rubber and be at least 5” high and have a defined heel. Tennis shoes, athletic shoes (including leather), canvas shoes, loafers, sandals or open-toe shoes are not allowed during field operations.

Hand Protection:

Employees are required to use appropriate hand protection when employees’ hands are exposed to hazards such as those from skin absorption of harmful substances; sever cuts or lacerations; severe abrasions;

punctures; chemical burns; thermal burns; and harmful temperature extremes. The selection of glove will be based on the risk assessment performed for the applicable task. Gloves are required for all manual handling activities and when hands/fingers could be in the line of fire.

Eye Protection:

Proper eye protection is mandatory on the Project. Safety Glasses and/or prescription eyeglasses must conform to ANSI standard Z87.1.

- Safety glasses with project approved side-shields are required for all employees.
  - Clear lenses for low light work areas
  - Shaded lenses in outside, natural light work areas
- Prescription glasses must meet ANSI standard Z87.1
- Prescription glasses NOT meeting ANSI standard Z87.1 must be covered with “over glasses”
- The minimum eye protection for the project is the company issued safety glasses which will be worn at all times upon entering the site.

Hearing Protection (as needed):

- When noise levels are above 80 dBa where tools and equipment are in use such as drilling operations or employees are standing within few feet of these type operations employees shall wear hearing protection.
- When noise levels are above 90 dBa double hearing protection will be used.
- All employees will have ear plugs available for use at all times.
- Noise levels will be evaluated and will be available at each rig. Mentor shall not allow unprotected employees to enter the work area (defined as safe based on noise level monitoring) without proper hearing protection.

Respiratory Protection (as needed):

Facial hair, which would make it difficult to achieve a good seal with a respirator, will not be allowed on the project if respiratory protection is required. This includes beards, large sideburns and/or mustaches which could interfere with respirator face seal.

Employees exposed to airborne particulates, toxic fumes, gases, vapors or potential oxygen deficient atmospheres shall wear a respirator applicable for the particulates hazard encountered or expected.
Employees shall be trained (by the Project HSSE Manager), medically evaluated, and fit tested in the use, care and limitations of the respirator they are required to use per OSHA regulations.

Fall Protection (as needed):

Falls are one of the leading causes of construction injuries. Since these injuries are often severe and sometimes fatal, it is critical that all precautions are taken seriously. Failure to take appropriate fall protection precautions could result in termination. 100% Fall Protection is defined as: whenever an employee is exposed to a potential fall, they shall be secured in such a manner to arrest the fall before injury is occurred. Fall protection shall be worn when work requires the employee to be exposed to a fall to the next level of 6 feet. Full body harnesses and lanyards shall be used as follows:

- Shall be inspected daily by the user.
- Shall be secured to an object, structure or lifeline capable of supporting 5,000 pounds.
- Shall be secured as far above the waist level as possible, and the potential fall distance shall never be allowed to exceed 6 feet.
- Shall always be secured in such a manner as to minimize the potential fall distance (such as looping the lanyard around the lifeline and securing the lanyard back to the "D" ring on the belt).
- Shall be used in a manner as to be connected to an anchor point at all times (100% tie-off)
- Shall be used in accordance with the Permit to Work procedure contained in this document.

Clothing:

- High visibility work vest, unless vest creates a hazard.
- No loose clothing allowed.

Personal Flotation Devices (PFDs):

- Employees working over water will wear U.S. Coast Guard approved life jackets

13 ADVERSE WEATHER

Adverse weather is any prevailing weather conditions that can make routine operations more hazardous to perform and where additional safety requirements may be necessary if work is to be continued. The points listed in this section are ONLY GUIDELINES and are designed to be trigger points at which action may be instigated. The vessel Master, in consultation with the Site Manager, has total discretion regarding the safe operations and weather conditions.

13.1 WEATHER MONITORING

The Captains and the Site Supervisor will continually monitor weather forecasts through local VHF marine forecast and local weather broadcasts. Additionally, Fugro weather service will be used for the South Miller Point work. Geotechnical and Vessel/LB operations will be terminated well in advance of the approach of a major change in weather conditions to allow adequate time to jack up legs, safely transfer personnel to crew vessel if required to transit to safe haven before sea conditions become too severe for safe transit.

It is the responsibility of the Master of the vessel to keep abreast of the weather in the general work area, and to know if any impending squalls / storms are headed his way.

The Following forecast and information sources are available onboard the vessel:	
National Marine Weather Services	**VHF Radio Weather Band – 24 hour/day Marine Weather Forecast.**
National Hurricane Center	**Available, as needed, to monitor tropical development.**
Fugro Weather Service	**Weather reports will be emailed twice daily for the South of Miller Point Locations**

13.2 LIMITING CONDITIONS

There are several operations where adverse weather can have a major influence over the ability to safely perform these operations. Listed below are these tasks and the criteria which guide the Master, Party Manager, and those involved in decision-making.

Limiting Perimeters	
Maximum wave height	**Five foot**
Maximum wind velocity	**Wind for of 5 or 20 knot winds**
Marine moves	Maximum wave / swell height 3 feet. Other factors such as visibility, swell and wave shape, swell and wave period, exiting structures, seabed contours, vessel movements also require to be considered.

Personnel Transfer	
Maximum Personnel	Subject to crew vessels carrying capacity, on-site conditions and transfer method.
Maximum wave height	Maximum 3`. Factors to consider - swell and wave direction in relation to the Lift Boat and vessel, shape, swell period and wave crest.
Maximum wind velocity	BF 4 (13-18mph)

**** NO ONE IS ALLOWED ON DECK WHEN CLOUD TO GROUND LIGHTNING IS OBSERVED AND UNTIL 30 MINUTES HAS PASSED AFTER THE LAST OBSERVED STRIKE.**

**** ALL ACTIONS WILL BE TAKEN ON A CASE BY CASE BASIS WHEREBY THE PRECEEDING GUIDELINES MAY NOT BE APPLICABLE TO THE SITUATION AT HAND.**

13.3 HURRICANE AND TROPICAL CYCLONE PREPARATION

All personnel in a storm impact area should be evacuated to safe locations sufficiently in advance of the storm to ensure safe evacuation. The evacuation order is the responsibility of the operations managers in each operating division. Typically, this order will coincide with evacuation orders issued by our clients.

When operating in a known storm area, there should be enough fuel, food and provisions onboard for contingency. Once a Hurricane or Tropical cyclone is known to be active within the work area, the threat posed to the marine vessels must be evaluated and updated as the storm advance carries it either towards or away from the vessel's location.

14 SECURITY MANAGEMENT

Fugro is firmly committed to the protection the security of employees and property. The policy of the Company is to operate within the Geotechnical Investigation Industry in a sensible and conscientious manner, taking due regard of all security issues. Fugro will comply with all applicable regulations in the proposed area of work including IMCA regulation with project taking place in a low-risk area. Provisions will include on-signing procedures and gangway watch to control access to the vessel by the permitted personnel who are chaperoned, as required. While the vessel is in port, a 24-hour gangway watch will be in place. Further security provisions are as follows:

- Control of access to the L/B and support vessels
- Control embarkation of persons and their effects
- Monitoring restricted access areas
- Monitoring deck area & areas surrounding the L/B
- Supervision handling of cargo & stores
- Ensuring communication equipment is always readily available

Additionally, all Fugro team members traveling by air or road will be under the Fugro journey management during travel to and from the project area. Additionally, to reduce risk during ground transportation, every effort will be made to travel during hours of daylight.

To further endorse the Company's commitment to security management Fugro strives to achieve the following:

- Create awareness among all employees and contractors to the security issues that have been identified by the project team.

- Ensure that procedures are implemented to minimize the disturbance and impact of security issues on employees and property.
- To provide the Client with documentary evidence that the Fugro management takes security issues seriously and will take the appropriate measures to protect its employees and property.
- Monitor all field operations and ensure that the project complies with the security standards expected by both the local community and government.

14.1 KEY SECURITY ISSUES

- Project Site Equipment
- Project Facility Security
- Project Vessel Security
- Data / Project Information Security
- Travel Security

14.2 SECURITY MANAGEMENT RESPONSIBILITIES

The Fugro Project Manager has the ultimate responsibility for implementing and maintaining the Fugro Security Policy. This person must provide the necessary resources and training and delegate authority to those persons implementing the policy.

The Field Supervisor is responsible for ensuring that the policy is implemented on each project under his control.

The Crew Leader / Mentor is considered the onsite security monitor. They must ensure that all personnel are aware of their security responsibilities and that all security procedures are adhered to.

14.2.1 Project Data / Information

Project data and information shall be secured to prevent release to non-project personnel. When possible, project information shall not be printed. Project documents that are disseminated to the field shall be retrieved and disposed of at a project facility. Project information that is printed shall be shredded when no longer required.

Electronic media shall be secured with a password and/or access code at all times when not in control / use of project personnel. Data storage devices shall have project data removed prior to allowing non-project personnel use of such devices or disposal.

14.3 SECURITY MONITORING AND REPORTING

Fugro shall monitor the success of the security objectives and targets through:

- Site Inspections
- Incident Reports
- Hazard Observation Cards
- Non-conformance reporting

All security incidents shall be reported in accordance with the Fugro's Incident Reporting Procedure. Specific control and measurement requirements for the project include:

- All Project Personnel to attend Project Induction (which includes security review)
- Toolbox meetings to include security issues during shift change

14.4 TRAVEL SECURITY

As this project is in the United States of America, no project specific travel security issues have been identified. All personnel that travel to the project are to follow the journey management plan as set forth in this Project HSSE Plan.

15 ENVIRONMENTAL PROTECTION MANAGEMENT

Fugro is firmly committed to the protection of the natural environment. The policy of the Company is to operate within the Geotechnical Investigation / Geophysical Survey Industry in a sensible and conscientious manner, taking due regard of all sensitive environmental issues. Fugro will comply with all applicable regulations in the proposed area of work.

To further endorse the Company's commitment to environmental protection Fugro strives to achieve the following:

- Create awareness among all employees and contractors to the sensitive environmental conditions among which we work are that it is highly important and must be maintained.
- Ensure that procedures are implemented to minimize the disturbance and impact on the environment.
- Cultural reviews to be conducted prior to ground disturbance
- To provide the Client with documentary evidence that the Fugro Management does take due regard of its environmental responsibilities and is committed to conducting all work in an environmentally responsible manner.
- Monitor all field operations and ensure that the project complies with the environmental protection standards expected by both the local community and government.

The Environmental Goal for this project is:

- Zero Environmental Incidents

15.1 KEY ENVIRONMENTAL ISSUES

- Damage to the environment, through discharge of waste or oil spill
- Impact to wildlife
- Other impacts on the environment (routine waste)

15.2 ENVIRONMENTAL MANAGEMENT RESPONSIBILITIES

The Fugro Project Manager has the ultimate responsibility for implementing and maintaining the Fugro Environmental Policy. This person must provide the necessary resources and training and delegate authority to those persons implementing the policy.

The Project Manager is responsible for ensuring that the policy is implemented on each project under his control.

The Crew Leader / Mentor is considered the onsite environmental monitor. They must ensure that all personnel are aware of their environmental responsibilities and that all specific environmental procedures are adhered to.

Individual members of the geotechnical team are responsible for carrying out their duties in an environmentally conscious manner and for quickly reporting all environmental incidences including, but not limited to, unauthorized spills and discharges.

15.3 ENVIRONMENTAL MONITORING AND REPORTING

Fugro shall monitor the success of the environmental objectives and targets through:

- Site Inspections
- Incident Reports
- Hazard Observation Cards
- JHA Review
- Non-conformance reporting
- Audits and Inspections

All environmental incidents shall be reported in accordance with the Fugro's Incident Reporting Procedure. Specific control and measurement requirements for the project include:

- All Project Personnel to attend Project Induction (which includes environmental review)
- Toolbox meetings to include environmental issues during shift change
- Safety Meetings conducted on a weekly basis to include discussion of Environmental Issues.

15.4 SPILL PREVENTION AND RESPONSE

Fugro will set forth all necessary precautions to prevent and contain any spills due to leaks, breaks. Regular inspection of all equipment will be instituted as part of the preventative maintenance program, and to minimize the potential of a spill.

The risk of an environmental incident(s) has been closely evaluated by the team and control measures have been put in place that include daily equipment inspections, a fueling plan and proper material handling and storage.

In the case of a spill, and if conditions safely permit, Fugro and subcontractors will attempt to isolate and stop the source. Fugro will then immediately use available measures to contain the spill and prevent further environmental impact. All spills will be reported to the client immediately, once spill control measures are put in place. For larger spills client will be immediately notified.

15.4.1 Project Site Equipment

Site equipment shall be inspected daily for existing leaks and areas where potential leaks may occur (hoses, fitting, and engine blocks). Secondary containment shall be placed below areas where leaks are likely to occur, when possible.

15.5 ROUTINE WASTE

Efforts will be made to reduce the amount of materials that will be used on this project.

15.5.1 Disposal

Domestic garbage will be enclosed in a refuse container and disposed of to the appropriate collection point / disposal facility. Used hydraulic fluids, oil other or other equipment maintenance wastes will be properly stored in closed, labelled containers in a designated area that is properly labelled until sent to the appropriate disposal facility.

15.6 DRILLING WASTE

The borehole will be formed by rotary drilling. A casing will be used to support the borehole walls and to advance the borehole through common ground by wash boring method. The casing sizes to be used will depend on the samples to be taken and the target to be reached. Generally, it is envisaged that an outer casing will be used that acts as a conductor leading the drill cuttings back to the seafloor and preventing the spread of sediment with current flow.

Sea water will be used as the flushing medium in the borehole for the removal of cutting to the surface. Drilling additive (DUOVIZ) may be introduced to enhance viscosity or stabilise the borehole if necessary. The additive will be mixed aboard the L/B in the fully agitated mud batching system.

16 INCIDENT REPORTING

Incident reporting and investigation will be conducted in accordance with Fugro QHSSE-IMS-P002. Incidents involving Fugro employees and subcontractors will be reported to the Field Supervisor, and the QHSSE Representative. Fugro's reporting system will be used to record these events.

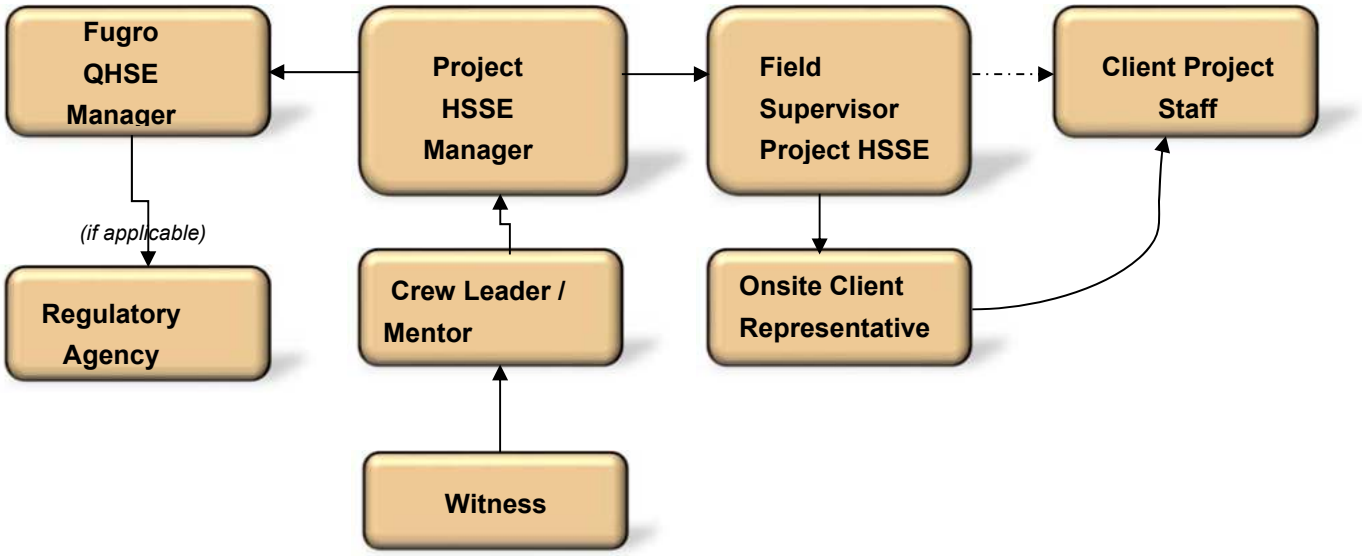
Reporting is divided into the following categories:

- Injury
- Illness
- Property Damage
- Fire / Explosion
- Environmental
- Near Miss
- Transportation

Fugro will assemble an appropriate investigation team and the appropriate subcontractor HSSE team shall promptly investigate and accurately report in writing all on-the-job accidents, all property damage, fires,

injuries, spills, and report them to the proper governmental authorities consistent with local and Country governing laws and regulations applicable to the Contract Area. Fugro will handle reporting in the following manner:

- Report the incident to the Client Project / HSSE Manager immediately once control measure are put in place.
- Secure the scene until released by the client
- Submit the initial Incident Investigation Report to the Client HSSE Manager within 24 hours.
- Submit the final Incident Investigation Report to the Client HSSE Manager within 72 hours.
- All corrective / preventative actions noted on the final Incident Investigation Report will be assigned to a responsible person, given a completion date, and tracked to closure using Fugro's IMPACT database.
- Develop and communicate lessons learned with project staff via Fugro Safety Alert.



16.1 INVESTIGATION AND CLOSE OUT

The following incidents will be investigated:

- High Potential Incidents (HIPO)
- Lost Time Incidents
- Restricted Work Cases
- Medical Treatment Cases
- First Aid Incidents
- Significant Near Misses
- Significant Environmental Events
- Fires and Explosions

Corrective and preventive actions will be documented and assigned close out dates. All actions shall be assigned a standard close out date of thirty (30) days or less in most instances. However longer dates may be assigned if deemed necessary in cases where there is a need to order and receive long lead material,

scheduling contractors, etc.

17 QHSSE MONITORING, AUDIT AND STATISTICS

On completion of the mobilization, the Field Supervisor shall ensure that regular safety audits are conducted. The review is not intended to be a full audit of the crews but rather a confirmation that the safety practices have been followed and that all checks have been made.

The continuous monitoring of the Project and QHSSE Systems is the responsibility of all members of the project team.

The Project Manager is to monitor the daily operations of the work crews via the daily reports and to ensure that all incidents, no matter how minor are properly investigated and corrective action implemented.

Fugro will compile HSSE statistics by collecting information on a daily basis and including them on the Daily Progress Report. Statistics will include (but not limited to) hours worked or exposure hours, leading indicators such as safety meetings, safety drills, near misses, tool box talks, Management of Change and Observations and lagging indicators will include environmental incidents, lost or damage equipment, first aid or medical incidents, non-conformances reports.

APPENDIX A
(HSSE Commitment Registry)

NO	HEALTH & SAFETY COMMITMENT	RESPONSIBILITY	REQUIRED
1	Consultation with Client on health, safety and environment expectations.	Fugro Project Manager	Post Contract Award
2	Drafting and submission of Project Safety Management Plan and Commitment Register.	Fugro Project Manager & HSSE Advisor	Pre- mobilization
3	Preparation of TRAs specific to the scope of work.	Fugro Project Manager & HSSE Advisor	Pre- mobilization
4	Issue of Fugro Project Safety Management Plan and attachments.	Fugro Project Manager	Pre- mobilization
5	Project Induction attended by Fugro personnel, Client Representatives and Sub-Contractor.	Fugro Project Manager & HSSE Advisor	Prior to commencement of mobilization
6	Supervision and monitoring mobilization activities including welding, cutting and working aloft, equipment offload, crane lifts, backing truck/trailers.	Fugro Field Supervisor/Crew Leader / Mentor Senior Drillers	During mobilization
7	Operation of Permit to Work System during welding, cutting, confined space entry and working aloft or outside of hand railing.	Field Supervisor	Throughout project
8	Revise and publish any changes to TRAs resulting from discussions at project meeting and toolbox meeting.	Fugro Field Supervisor/ Crew Leader / Mentor Fugro HSSE Manager	Throughout project
9	Toolbox meetings to be held at the start of each new shift.	Crew Leader / Mentor	Throughout project
10	Monitoring of all Fugro procedures and activities and advice the Project Manager on methods of improvement.	Fugro Field Supervisor/ Crew Leader / Mentor Onsite Fugro Safety Representative	Throughout project
11	Recording of all incidents relevant to Fugro operations.	Fugro Field Supervisors	Throughout project
12	All recorded incidents and near misses to be reported to Client Representative.	Fugro Field Supervisor/ Crew Leader / Mentor	Throughout project
13	Investigation of all reported incidents and near misses.	Fugro Field Supervisor/ Crew Leader / Mentor Fugro Onsite Safety Representative	Throughout project
14	Copies of all HSSE documentation including incident reports, investigation reports, published corrective and preventive actions, minutes of meetings etc. to be sent to Fugro QHSSE Manager and entered into IMPACT.	Field Supervisor/ Crew Leader / Mentor/Onsite Safety Representative	During Demobilization

ENVIRONMENTAL COMMITMENT REGISTER

NO	ENVIRONMENTAL COMMITMENT	RESPONSIBILITY	REQUIRED
1.	Sufficient spill response equipment must be available with equipment.	Field Supervisor	Prior to commencement of work
2.	Strict spill prevention measures will be put in place for over water work	Fugro Project Manager/ HSSE Advisor/ Subconsultant	Prior to commencement of this scope of work
3.	Environmental management, including waste management and disposal, must conform to Client and government requirements.	Field Supervisor	Throughout project
4.	Client must be informed immediately of any incidents involving fuel/oil spill.	Fugro Field Supervisor/ Crew Leader / Mentor /Client Representative	Within 24 hours
5.	All environmental incidents, near misses and hazards must be reported to Client using the incident & hazard report forms.	Fugro Field Supervisor/ Crew Leader / Mentor /Client Representative	Within 24 hours

APPENDIX B
(Task Risk Assessment Registry)

NO	Task
1.	GP-303 Thunder Lightning Storm
2.	GP-310 Vehicle Usage
3.	GP-311 Material Handling/Moving/Stacking Materials
4.	GP- 341 Drill Rig Maintenance
5.	GP-318 Welding
6.	GP-339 Powered Hand Tools
7.	EXPL-201 Hand Sampling
8.	EXPL-203 Retrieval/Transporting Field Samples
9.	EXPL-211 Grouting
10.	EXPL-217 Drilling Operations
11.	NEARSH-203 Small Boat Operations
12.	NEARSH-205 Working Over Water
13.	Fueling of Deck Equipment
14.	Personnel Transfer

APPENDIX C
(Overwater Emergency Response Plan)

APPENDIX D
(HSSE Bridging Document)

1. PURPOSE

The purpose of this plan is to interface plans, with particular emphasis on health, safety and environmental (HSE) focus, among operating companies jointly participating under a common Project HSE Management System.

2. SCOPE

This HSE Interface document applies to all personnel participating in the 2018 AECOM Houston Ship Channel Expansion Improvement project. This HSE Interface document will encompass all planning and operational activities undertaken by operations onboard the Lift Boat Shallow Draft # 17 for the duration of the 2018 Channel Deeping project.

Management System Standards

- **Fugro**
- **Shallow Draft Elevating Boats**
- **Benchmark Ecological Services Inc.**

3. BRIDGING MATRIX

Matrix Legend

X	Indicates Utilized plan
S	Indicates Common/Shared plan
P	Project-Specific Plan Utilized

FUGRO	SHALLOW DRAFT	BENCHMARK	HSE ELEMENT REFERENCE DOCUMENT
X	X	X	CHEMICAL SAFETY
	X		CONFINED SPACE PLAN
P	P	P	CONTACTS LIST
P	P	P	DRUG, ALCOHOL AND WEAPON FREE WORKPLACE PLAN *FUGRO ALCOHOL, DRUG & CONTRABAND POLICY*
	X		ELECTRICAL SAFETY PLAN
P	P	P	EMERGENCY RESPONSE PLAN
X	X	X	ENERGY ISOLATION PLAN
X	X		ENVIRONMENTAL PROTECTION PLAN
X	X	X	FALL PROTECTION PLAN
	X	X	FIRE PREVENTION AND PROTECTION PLAN
P	P	P	FIRST AID PLAN
X	X	X	FIT FOR DUTY PLAN (MEDICAL CERTIFICATES)
P	X		FUEL PROCEDURES

FUGRO	SHALLOW DRAFT	BENCHMARK	HSE ELEMENT REFERENCE DOCUMENT
X	X	X	HEARING CONSERVATION PLAN
X	X	X	HOT WORK PLAN
P	P	P	INCIDENT REPORTING AND INVESTIGATION PLAN
X	X	X	TRA / JSA PLAN
X	X	X	LIFTING OPERATIONS PLAN
P	P	P	MANAGEMENT OF CHANGE PLAN
X	X	X	MANUAL LIFTING PLAN
P	P	P	MEDICAL EVACUATION PLAN
X	X	X	PERSONAL PROTECTIVE EQUIPMENT PLAN
X	X	X	PREVENTATIVE MAINTENANCE PLAN
P	P	P	PROJECT EXECUTION PLAN (PEP)
X	X	X	SMOKING POLICY
X			SUB-CONTRACTOR HSE MANAGEMENT PLAN
X	X	X	VESSEL EMERGENCY RESPONSE MANUAL
	X	X	VESSEL GARBAGE MANAGEMENT PLAN
	X	X	VESSEL ORIENTATION PLAN
	X		VESSEL SECURITY PLAN
X	X	X	WORK PERMIT PLAN

APPENDIX F

QA DOCUMENTATION

Houston Ship Channel Expansion Channel Improvement Project
Refrigerated Trailer Temperature Log

Trailer Description 8' x 10' Refrigerated Trailer

Date	Time	Temperature (F)	Initials	Comments
10/2/2018	7:02	39°	RC	
10/2/2018	15:51	35°	RC	
10/3/2018	7:00	37°	RC	
10/4/2018	6:53	35°	RC	
10/4/2018	15:01	36°	RC	
10/5/2018	7:02	34°	RC	
10/5/2018	14:15	39°	RC	
10/6/2018	7:40	37°	PW	Arrival
10/6/2018	14:28	43°	PW	

APPENDIX G

PROJECT EXECUTION PLAN

AECOM JV

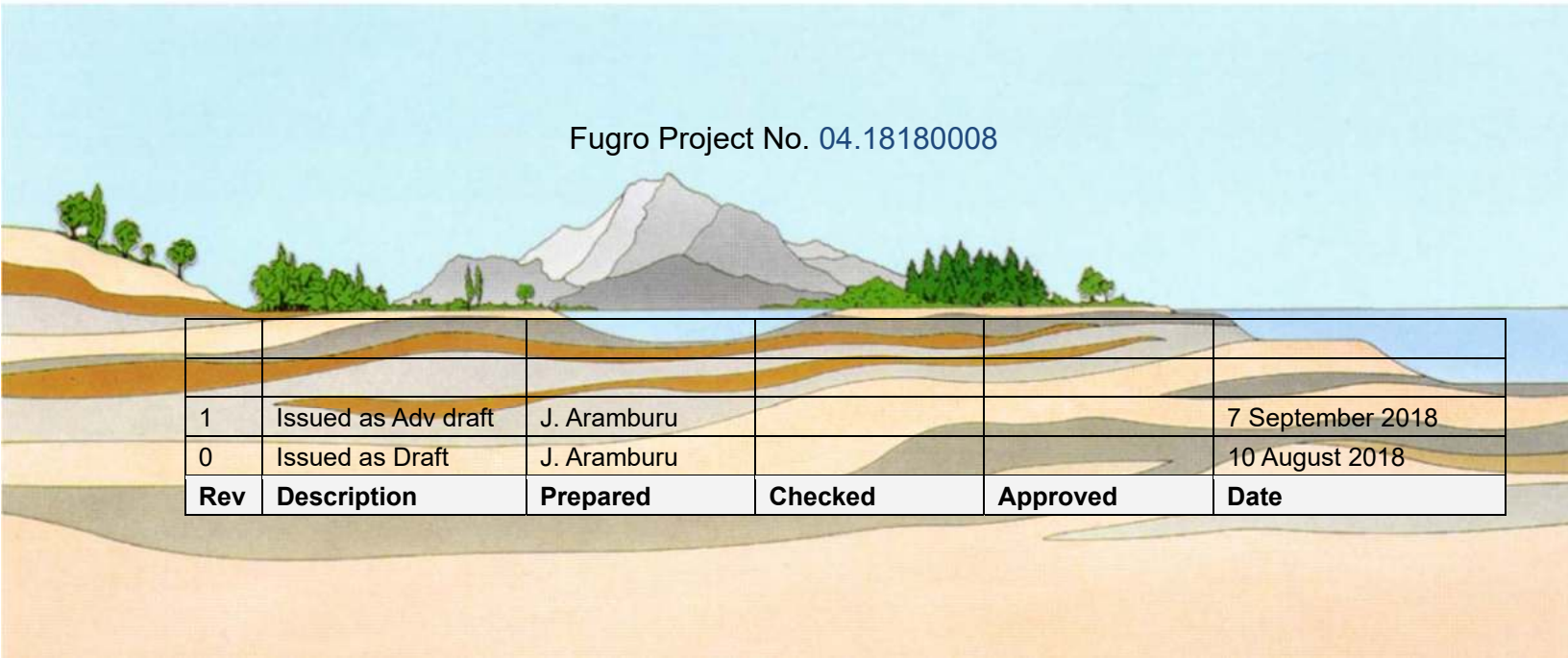
Project Execution Plan

SEDIMENT AND WATER SAMPLING FOR HOUSTON SHIP CHANNEL EXPANSION CHANNEL IMPROVEMENT PROJECT

Fugro Document No.: 04.18180008

Document Issue Date: 10 September 2018

Houston Ship Channel, Houston, Texas



Fugro Project No. 04.18180008

Rev	Description	Prepared	Checked	Approved	Date
1	Issued as Adv draft	J. Aramburu			7 September 2018
0	Issued as Draft	J. Aramburu			10 August 2018

AMENDMENTS

Document Issue	Revision Details
Rev0	Issued to Client as draft
Rev1	Issued to Client as Advanced Draft

CONTENTS

FIGURES

1.0 INTRODUCTION

1.1 PROJECT WORK PLAN

This Project Execution Plan (PEP) communicates to the project team, project-specific information on the Nearshore Scope of Work, based on the contractually agreed objectives between Client here called AECOM JV (JV of Turner Collie and Braden, Inc. (dba AECOM) and Gahagan & Bryant Associate, Inc.) and Fugro USA Land, Inc. (Fugro).

This Project Execution Plan should be read in conjunction with the other three (3) documents that complement this text including:

- Emergency Response Plan;
- Health Safety and Environmental Management Plan; and
- Bridging Document.

All persons identified on the distribution list must ensure that this document is accessible both electronically and in hard copy where required.

1.2 PROJECT DESCRIPTION

AECOM JV awarded Fugro the contract for the Sediment and Water sampling for the Houston Ship Channel Expansion Channel Improvement Project. The scope of work consists on obtaining sediment and water samples for laboratory testing at 20 sampling stations throughout the Houston Ship Channel; specifically:

- 9 stations South of Morgan's Point
- 11 stations North of Morgan's Point

AECOM JV has contracted Fugro to collect sediment and water samples, storage and deliver of samples to the designated analytical USACE ERDC laboratory. Sampling Analysis Plans (SAPs) levelled *Draft Final* and dated May 16, 2018 were provided to Fugro to prepare our cost estimation. SAPs were prepared by USACE ERDC and used to design the field program. The field program will be tailored to adequately drill, sample, and recover soil and water samples in water depths that range from 7 to 50ft and to depths up to 50.5ft below Mean Low Lower Water (MLLW).

1.3 PROJECT OBJECTIVES

The purpose of this investigation is to acquire soil and water samples for environmental testing for the dredging of the Houston Ship Channel.

Fugro has subcontracted Benchmark Ecological Services, Inc. (Benchmark) for the environmental subsampling, handling and shipment of samples and water sampling.

Fugro also subcontracted Shallow Draft Elevating Boats, Inc of Louisiana for lift boat services. The Lift Boat (LB) Shallow Draft #17 and a 32-ft support boat, both owned and operated by Shallow Draft Inc will be used for this work.

Shallow Draft and Benchmark support vessels will be used for this program in conjunction with the L/B to support our daily operations.

Fugro's goal is to provide AECOM JV with the volume of samples required with quality and in a safe and efficient manner. This Project Execution Plan is specific for this overwater sampling program and serves to document the required scope of services and the procedures to be followed to safely conduct the investigation, as related to health, safety and environmental matters.

Following are the key items that Fugro will provide to achieve this objective:

- Provision of project specific documentation and plans related to the overwater work scope.
- Equipment mobilization to site for the overwater field program.
- Supervision and management of field operations.
- Magnetometer on the proposed overwater exploration locations.
- Provision of daily progress reports (DPRs) and relevant communication.
- Preparation of samples, storage and shipment to USACD ERDC laboratory.
- Equipment demobilization from site at the completion of the respective field program.
- Data report documenting our field operations.

1.4 MILESTONES

The following table presents the key milestones as identified by Fugro and informed to AECOM JV. Operations duration in this table are best estimate only and is provided based on the Scope of Work. It does not include any standby time or vessel delays.

Table 1: Project Milestones

Item	Start	Finish	Duration
1. Pre Mobilization	Authorization date	Sep 3, 2018	Finalized
2. Mobilization*	Sep 3, 2018	Sep 10, 2018	8 days
3. Operation**	Sep 11, 2018	Sept 30, 2018	20 days
4. Demobilization	Oct 1, 2018	Oct 8, 2018	7 days
5. Reporting	Oct 1, 2018	TBD	2 Weeks

* & ** These schedules are subject to favorable weather and working conditions.

1.5 HEALTH, SAFETY, AND ENVIRONMENT COMMUNICATIONS AND MEETINGS

The implementation of Fugro's Health, Safety, and Environmental (HSE) program is our highest priority, and the company is firmly committed to full compliance with federal, provincial, and local laws and ordinances. All decisions on policies and procedures are made within the framework of the applicable laws.

It is recognized that the policy of a safe-work culture is essential knowledge for all participants and that review of the project HSE and pre-project orientation alone may be insufficient. To bolster the safe-work culture and project documentation, Hazard Identification (HAZID) meeting was conducted on Sep 7 before operations start. Additionally, daily safety meetings will be conducted prior to the start of operations and at other necessary intervals when working conditions change or simultaneous operations are anticipated. This will be achieved by:

- JSA documents prepared for each activity of the project a required and reviewed by involved personnel prior to commencement of work;
- Daily toolbox/safety meetings held prior to commencement of daily activities;
- Conducting equipment pre-start inspections;
- Submission of Daily Progress Reports (DPRs), which will include HSE and incident documentation; and
- Conducting emergency drills.

1.5.1 Hazard Identification

In order to identify potential hazards and subsequent controls for the scope of work detailed herein, HAZID workshop was held before operations starts and attended by subcontractor supervisors, field crews and the Site Manager, Fugro and other contractors associated with the project. The information obtained during the HAZID is used to reinforce the JSAs prepared for the project and apply, and document, any additional engineering controls and mitigation measures.

1.5.2 Daily Safety Meetings

In an effort to disseminate and reiterate safe-work policies, a toolbox/safety meeting will be held at the beginning of each day of operations; when a new procedure or piece of equipment is introduced; or in the case of a near-miss, incident, or injury. The majority of the toolbox meetings are anticipated to be held at pier, LB, sampling vessel or in the yard while mobilizing/demobilizing equipment.

All toolbox meetings will be documented and will include, at a minimum, the following information:

- Environmental conditions, concerns, and/or hazards;
- Progress and technical problems from the previous day or shift;
- Expected activities and coordination between various subcontractors and Fugro employees for the upcoming day or shift;
- Coordination of work scopes by various subcontractors;
- Review of applicable TRAs; and
- Accidents, near misses, or hazard observations from the previous day.

All toolbox meeting records shall be kept in the Project HSE binder. The Project HSE binder shall be provided to the Project Manager at the completion of operations. In addition to the daily toolbox documentation, the following records and reporting will be required for the project:

- Daily Progress Reports (DPRs)
- HOCs (per occurrence)
- Near Miss Reports (per occurrence)
- Accident Report (per occurrence)
- Injury/Illness Report (per occurrence)

1.5.3 HSE Reporting Requirements

Serious incidents such as those listed below shall be verbally reported immediately to the Project Manager and QHSSE Manager and confirmed in writing within twenty-four (24) hours of occurrence:

- Incidents resulting in fatalities or serious injuries to Fugro employees, third party personnel, or members of the public that require evacuation/hospitalization (for purposes other than observation);
- Incidents resulting in property damage exceeding the equivalent of two thousand U.S. dollars (USD $2,000);
- Spills or accidental releases of oil, refined products, chemicals, or other hazardous substances; and
- Near-miss incidents with high injury or property damage consequences.

In addition, Fugro shall evaluate and accurately report in writing all on-the-job accidents, property damage, fires, injuries, spills, and accidental releases to authorities consistent with local and country governing laws and regulations applicable to the area of operations. The reports on such incidents shall include information on the course of action taken or planned to mitigate or clean up the incident site, if applicable, and to prevent recurrence.

Fugro shall maintain and make available incident/accident records required by, or in general accordance with, local and federal governing laws and regulations applicable to the area of operations. These records shall include, as a minimum, a register of all first-aid treatments and a record of occupational injuries and days lost due to injuries.

The Site Manager will report the status of HSE on the project via the project DPR which is submitted to the Project Manager.

2.0 PROJECT REFERENCES

2.1 PROJECT ORGANISATION AND MANAGEMENT

Led by the Fugro Project Manager, the project team is responsible for execution of the project according to the scope of work described; this includes execution of the agreed changes to the scope of work.

2.2 PROJECT TEAM ORGANISATION

Figure 1 details the project team organisation.

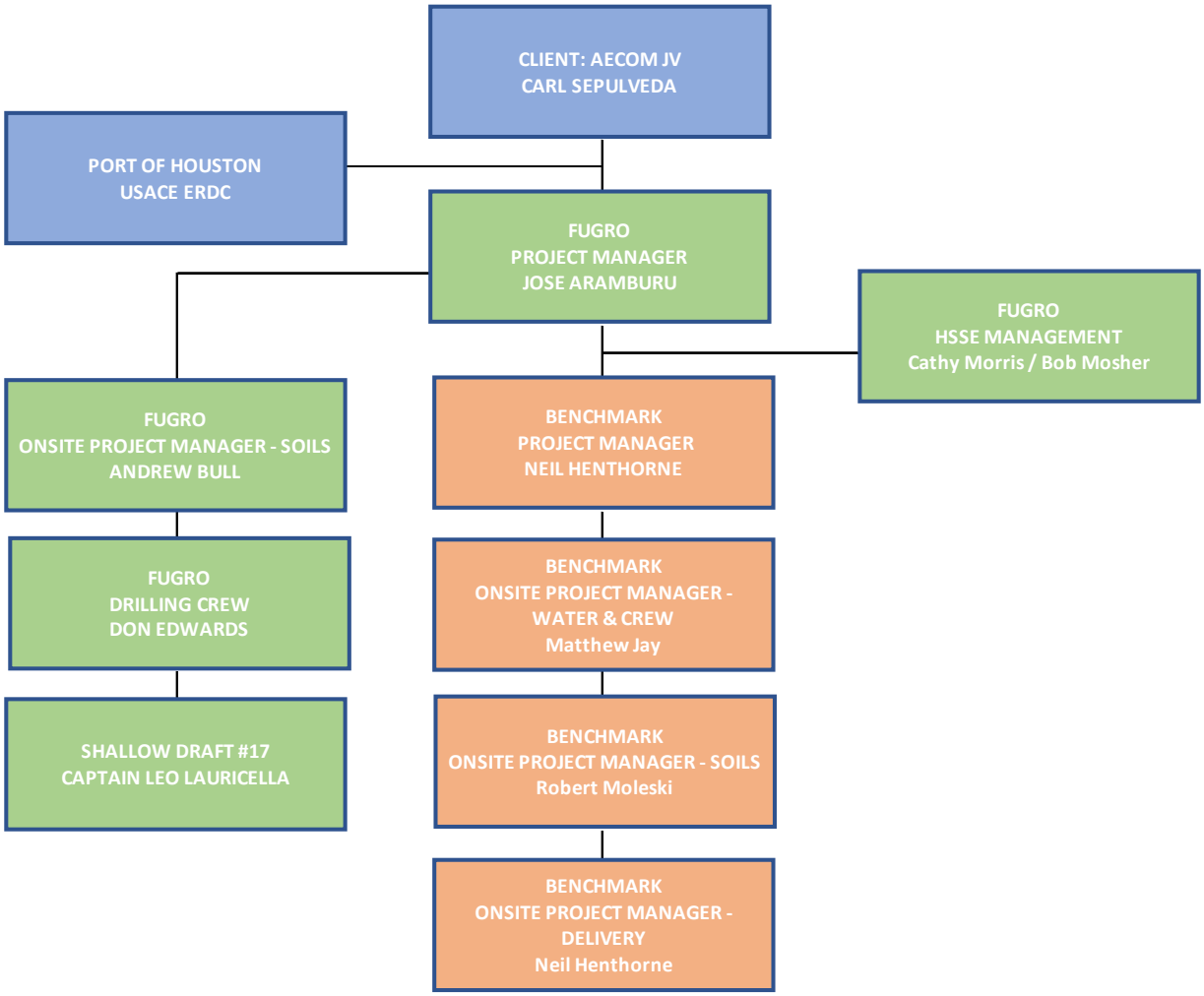


Figure 1: Project Team

2.3 CONTACTS

Contact telephone numbers for key Project Team personnel are summarized below on Table 2.

Table 2: Key Project Team Contact Information

Contact List and Phone numbers				
NEARSHORE				
Title	**Name**	**Direct (Office)**	**Mobile**	**Email**
Lift Boat Captain (LB SD#17)	Leo Lauricella	N/A	504 570-7727	N/A
Project Manager (Nearshore)	Andrew Bull	N/A	337-804-2130	abull@fugro.com
Drilling Supervisor (Nearshore)	Don Edwards	N/A	832-331-0051	dedwards@fugro.com
SD Support Boat Captain (32 ft)	Emett Burtchaell	N/A	504 912-3996	N/A
Benchmark Support Boat – Water Sampling	Matthew Jay	N/A	832-904-1153	mjay@benchmarkeco.com
Benchmark Sediment Field Supervisor – Lift Barge	Robert Moleski	N/A	850-228-6922	rmoleski@benchmarkeco.com
USACE Senior Project Manager	Cheryl Montgomery	N/A	781-530-8317	Cheryl.R.Montgomery@usace.army.mil
USACE Field Representative - SMP	Justin Wilkens	N/A	662-312-1691	Justin.L.Wilkens@usace.army.mil
USACE – Field Representative - NMP	Andrew McQueen	N/A	832-407-2628	Andrew.D.McQueen@usace.army.mil
Chief Operations Officer - Houston Pilots	JJ Plunket	281-476-8230	281-409-6119	jplunkett@houston-pilots.com
ONSHORE				
Fugro Senior Project Manager	Jose Aramburu	713-369-5427	713-775-7302	jaramburu@fugro.com
Shallow Draft (Lift Boat)	Jim Difatta	504-682-2100	985-852-0225	jdifatta@shallowdraft.com
Fugro HSE Manager Americas	Cathy Morris	713-346-4016	805-432-3115	cmmoris@fugro.com
Fugro Project HSE Manager	Bob Mosher	360-592-1178	281-658-9841	bmosher@fugro.com
Benchmark President	Neil Henthorne	281 934-3403	281 703-0257	nhenthorne@benchmarkeco.com

AECOM Senior Project Manager	Carl Sepulveda	713 278-4620	832-860-4958	carl.sepulveda@aecom.com
Port of Houston	Richard Ruchhoeft	(713) 670-2471	(713) 301-0897	rruchhoeft@poha.com
Port of Houston - City Docks Operations	Joanna Kemper	(713) 670-2675		jkemper@poha.com
US COAST GUARD VESSEL TRAFFIC SERVICE				
VTS Watch Supervisor 24/7	N/A	281-464-4837	N/A	houstontraffic@uscg.mil
Operations Officer	LT Aaron Davis	281-464-4829	281-464-4837 (24/7)	Aaron.J.Davis@uscg.mil
VTSA Category II Channel Obstruction Request	N/A	N/A	N/A	http://txgulf.org/services/vt channel-obstruction-requests
Director, VTS Houston/Galveston	Steven W. Nerheim	281.464.4826	713.818.4405 713.578.0841	snerheim@gmail.com
Waterways Management	N/A	N/A	N/A	houstonwwm@uscg.mil

3.0 FIELD EXPLORATION PROJECT EXECUTION

3.1 GENERAL

The Nearshore field operations will be conducted on top of the Lift Boat (LB) Shallow Draft #17 on a 10 to 12-hour basis (day-shift only), until the drilling program is completed. Drilling and sampling personnel will stay overnight on nearby hotels while the vessel's crew will stay onboard the LB. Personnel will be transfer on daily bases from a Land Point to LB and vice versa at about 0630hrs and 1700hrs using a support boat. The support boat will stay with the LB 24hrs (TBD). The Site Manager and Captain of LB will make sure that these transfers are done safely, during day-light hours only.

3.2 COORDINATE SYSTEMS AND POSITIONING

The coordinate system for reporting of the sampling program is NAD 83 State Plane. All coordinates and dimensions will be in feet. A Trimble Geo xH 6000 (sub-meter GPS) will be used to navigate to the channel sample locations and field coordinates will be recorded at each sample location.

3.3 VESSELS AND SAMPLE STORAGE

3.3.1 Lift Barge 70-foot Class Shallow Draft #17

The Lift Barge (LB) is a 70ft Jack Up type vessel, with a twin 671 diesel engine, length 64ft, beam 24ft and draft of 4.4ft. The LB has a 10-ton crane. Facilities aboard the Lift Boat (LB) Shallow Draft #17 consist of a work deck, small tea/mess room, portable potty, and drilling and ancillary equipment. Accommodations onboard the LB is mainly for captain and one crew member. The maximum working depth is 45 to 50ft which will allow for a 5 to 10ft air gap. Limiting sea (weather) conditions (swell and wave period, existing structures, seabed contours, vessel movements also require to be considered when moving and positioning the LB. The LB is self-propelled with average speed of 3 knots.

The LB operability is summarized on the following table. At all times, the decision of the LB Captain and/or Site Manager is final in determining the suitability of the conditions for the safety of personnel and equipment. The LB Captain and Site Manager will log the observations of conditions on a daily basis which will be presented in a Daily Progress Report (DPR) for Client's approval.

Item No.	Description	Sea State Hmax	Max Wind Strength
1	Crew Evacuation	5ft	Wind Force 5
2	Crew Changes	3ft	Wind Force 4
3	Moving Between Locations	3 ft	Wind Force 4
4	Fog	Visibility less than 1500 ft	
5	Current	1 knot	

Navigation and Communications. The LB will be fitted with the following communication methods:

- Cellular phone;
- VHF multi-channel marine radio;
- In compliance with USCG. Participates in the VTS systems when conducted;
- Equipped with onboard GPS.

3.3.2 Benchmark 24 Foot Sediment and Water Sample Vessel

Sediment grab samples will be collected and processed using the Benchmark 24-foot sample vessel. Samples from the offshore Reference sample station will be collected using this boat. When collecting sediment grab samples, the sample vessel will be equipped with an A-frame and winch to raise and lower the Van Veen grab sampler. Water samples from all sample stations will also be collected using Benchmark's sample vessel. For all sampling events, the sample vessel will be equipped (at a minimum) with a sub-meter Trimble Geo XH 6000 GPS unit, appropriate sample containers, coolers with ice to store processed samples, field data sheets, and drink cooler.

3.3.3 Shallow Draft 32 Foot Support Vessel

Shallow Draft will operate a 32-foot support vessel powered by dependable Yamaha outboards with 7,000 lb deck payload capacity. The boat will be used to transport personnel from/to the land points and the sampling vessel. The vessel will standby during operations tide all times to the LB. The support vessel will include all safety features to accommodate crew transfers and will be in constant contact with the LB captain. Samples will also be transported to shore via this vessel.

3.3.4 16 Foot Refrigerated Box Truck with Liftgate

Sediment and water samples will be stored in a sixteen-foot refrigerated insulated aluminum box truck powered by a Thermo King T-600 cooling unit with thermostat. The truck has on automatic transmission with diesel-powered engine, a tuck under liftgate, power locks and windows, and cruise and tilt controls. In addition to sample storage, the refrigerated truck will be used to transport all sediment and water samples to the ERDC laboratory in Vicksburg, Mississippi.

3.4 SITE FACILITIES – SOUTH OF MORGANS POINT

3.4.1 Galveston Yacht Club

The Galveston Yacht Club located at **715 N Holiday Dr., Galveston, Texas** will be the base location when sediment and water samples are collected and processed from the offshore Reference and ODMDS sites. If weather conditions cooperate, the sediment and water field sampling associated with Reference and ODMDS sites will be conducted in one to two days. The following daily tasks will be conducted at the boat ramp:

- Launching and retrieval of the Benchmark 24 ft. sediment and water sampling vessel.
- Loading and unloading of field sampling and processing personnel.
- Loading and unloading of sampling and processing equipment (e.g. Van Veen grab sampler, sample buckets, water pump, cubitainers, water sample jars, GPS, etc.).
- A refrigerated truck will be parked at the boat ramp when conducting field sample collection and processing for the two sample stations listed above. Sediment and water samples will be offloaded at the end of each day and stored in the refrigerated truck until they are delivered to the analytical laboratory.

3.4.2 Texas City Dike Boat Ramp

The Texas City Dike Boat Ramp located along **Dike Rd, Texas City, Texas** will be the base location when sediment and water samples are collected and processed from sample stations SMP-01 and SMP-02. If weather conditions cooperate, sediment field sampling and processing will be completed in three (3) sample days and the water sampling will be completed in one (1) day for sample stations SMP-01 and SMP-02. The following daily tasks will be conducted at the boat ramp;

- Loading and unloading of field sampling and processing personnel.
- Loading and unloading of sampling and processing equipment (e.g. sediment sample buckets, water pump, cubitainers, water sample jars, GPS, etc.).
- A refrigerated truck will be parked at the boat ramp when conducting field sample collection and processing for the two sample stations listed above. Sediment and water samples will be offloaded at the end of each day and stored in the refrigerated truck until they are delivered to the analytical laboratory.

3.4.3 Sylvan Beach Boat Ramp

The Sylvan Beach Boat Ramp located on **N. Bayshore Dr., La Porte, Texas** will be the base location when sediment and water samples are collected and processed from sample stations SMP-03 through SMP-07. If weather conditions cooperate, sediment field sampling and processing will be completed in eight (8) sample days and the water sampling will be completed in two days;

- Launching and retrieval of the Benchmark 24 ft. water sampling vessel.
- Loading and unloading of field sampling and processing personnel.
- Launching and retrieval of Fugro support boat to deliver personnel to and from the sediment sample barge.
- Loading and unloading of sampling and processing equipment (e.g. sediment sample buckets, water pump, cubitainers, water sample jars, GPS, etc.).
- A refrigerated truck will be parked at the boat ramp when conducting field sample collection and processing for the two sample stations listed above. Sediment and water samples will be offloaded at the end of each day and stored in the refrigerated truck until they are delivered to the analytical laboratory.

3.5 SITE FACILITIES – NORTH OF MORGANS POINT

3.5.1 Channelview Market Street Public Boat Ramp

The Channelview Boat Ramp located at **16581 Market Street, Channelview, TX 77530** will be the base location when sediment and water samples are collected and processed from sample stations NMP-01 through NMP-05. If weather conditions cooperate, sediment field sampling and processing will be completed in three (3) sample days and the water sampling will be completed in one (1) day for sample stations NMP-01 through NMP-05. The following daily tasks will be conducted at the boat ramp;

- Loading and unloading of field sampling and processing personnel.
- Loading and unloading of sampling and processing equipment (e.g. sediment sample buckets, water pump, cubitainers, water sample jars, GPS, etc.).

A refrigerated truck will be parked at the boat ramp when conducting field sample collection and processing for the two sample stations listed above. Sediment and water samples will be offloaded at the end of each day and stored in the refrigerated truck until they are delivered to the analytical laboratory.

3.5.2 Houston Mooring Company Ramp (TBC)

This company was contacted to help us load and unload field crews and samples. This privately-owned boat ramp is located at **709 S. 80th Street in Houston 77012**. The ramp will be the base location when sediment samples are collected and processed from sample stations NMP-06 through NMP-11. If weather conditions cooperate, sediment field sampling and processing will be completed in three (3) sample days.

Water samples will be collected using Benchmark support boat that which will be using the Channelview ramp. The water sampling will be completed in one (1) day for sample stations NMP-06 through NMP-11. The following daily tasks will be conducted at the boat ramp;

- Loading and unloading of field sampling and processing personnel.
- Loading and unloading of sampling and processing equipment (e.g. sediment sample buckets, water pump, cubitainers, water sample jars, GPS, etc.).

A refrigerated truck will be parked at the boat ramp when conducting field sample collection and processing for the two sample stations listed above. Sediment and water samples will be offloaded at the end of each day and stored in the refrigerated truck until they are delivered to the analytical laboratory.

4.0 FIELD OPERATONS

4.1 PRE-MOBILIZATION

Fugro HSSE representative and Senior Project Manager will be onsite during mobilization and beginning of work to ensure equipment and personnel are fit for the project and Fugro and Contractors are properly coached on the daily processes and role and responsibilities to successfully meet the AECOM JV and Fugro project Goals and Objectives. Communication need to be establish with the USCG in Houston and Harbor Master regarding the planned scope and work area along with being provided the project work schedule and contact information. All equipment will be checked prior to shipping to site along with critical spares appropriate for the project duration.

The Project Manager and other senior members of the team are responsible for planning all aspects of the proposed work scope; this work shall include:

- Review of final Client requirements;
- Review of Fugro proposed equipment;
- Preparation of project briefing for all field-going and relevant shore-based personnel; and
- Preparation of Project HSSE Management Plan, Emergency Response Plan and Project Procedures.

4.2 MOBILIZATION

The LB will be mobilized at Gulf Coppers dock in Pelican Island, Galveston, Texas where equipment and consumables for the project will be loaded. All deck items will be sea-fastened, and the Barge Master will complete an inspection form. Once all systems have been proved operationally satisfactory, they will be sea fastened for the transit to the working location at the ship channel. A meeting with the Port of Houston Authority, VTS Houston Galveston, Houston Pilots and Aecom was conducted on September 6 at the US Coast Guard offices ahead of the mobilization. At this meeting we were informed the project communication Plan consisting on:

- Each operation will be proceeded by a VTSA Category II Channel Obstruction Request. Please submit 72 hours in advance to ensure the word gets out to all port partners. If no objections, these will be approved by VTS the day prior to the operation. The link to the channel obstruction requests is below.

  http://txgulf.org/services/vtsa-channel-obstruction-requests

- 15 minutes prior to movement/operation of the jack up barge contact VTS on VHF Channel 05A where you will be shifted to the respective VTS frequency where you are working (11/12/21A). Monitor the designated VTS frequency and VHF Channel 13.

- The VTS watch supervisor is available by phone/email 24/7 at 281-464-4837 and houstontraffic@uscg.mil.

The drilling and technical crew will join the LB once in location using the support vessel. The support vessel will travel with the LB.

4.3 PROGRAMMING OF WORKS

The work scope currently comprises 9 sampling stations South of Morgan's Point (SMP) and 11 sampling stations North of Morgan's Point (NMP). The sediment sampling depths are planned to reach 50.5ft below MLLW with crew to support a 10-12 hr operation. LB crew will stay onboard 24-hrs.

- Operations will commence on locations SMP. Fugro, Benchmark and AECOM JV will Plan the sequence of locations with the Port Authorities.
- Borehole locations NMP will start once SMP locations are finalized and samples have been taken out of the LB. Tentative final locations were provided on Sep 6, 2018.
- Consideration will be given to the weather forecast when working, to facilitate the decision making with respect to the feasibility of moving the LB to and from the locations and to do crew transfers.
- Besides the weather conditions, seas, wind speed and direction and currents should also be taken into consideration to establish the presence of a safe window of operation. The decision of the LB Master and/or Site Manager is final in determining the suitability of the conditions for the safety of personnel and equipment.
- The LB Master is responsible for coordinating positioning of the LB.
- Communication with the POH pre and during LB moves on locations will be as per the Project Communication Plan.
- All moves of location will be started allowing time to complete the move and jack-up before end of shift. The time to perform moves will be assessed once on site and the decision on whether to make a move or not towards the end of a shift, will be taken by the Barge Master after consultation with the field team.
- Crew transfers will be coordinated in close proximity with AECOM JV personnel.

Once on location the LB will be jacked above the water level to allow a safe working operation. The LB will be elevated above seabed to an elevation equal to at least water depth plus the maximum tidal variation plus the maximum expected wave height (Hmax).

4.4 CREW TRANSFERS

Crew transfer will be conducted by support vessel. The support boat will pick up personnel on land point and transit them to LB. Once onsite, support vessel will approach the LB and communicate with the LB personnel. The boat will approach the LB access ladder and passengers will transfer onto the LB. Crew will also ensure life jackets properly ware and secured, hand and feet are position correctly, personnel are properly positioned.

4.5 EMERGENCY SPILL ARRENGMENTS

Equipment observations will be performed during mobilization and daily during the work scope to help reduce most typical environmental emergency response scenarios resulting from damaged hydraulic lines and hoses etc. Engineering controls will be in place including impermeable liners and spill response kits located on the LB for immediate deployment.

Equipment lubricants and fuels will be containerized appropriately with sealed lids and held on site at designated locations approved containers. Lubricants will be placed in safe areas outside of pathways to minimize contact. Flammable materials will be stored separately in approved containment. MSDS sheets will be available on site for all lubricants and operations fluids (e.g., fuel).

In case of a spill of hydraulic oil, a broken hose or fuel spill, there is an emergency spill kit located on the deck of the LB. In the event any of the fluids make it into the water then oil dispersants will be used and the oil boom deployed from the bow of the jack-up.

- The Barge Master or supervisor to stop all works and assess the situation. All trained and competent personnel to muster to their stations as per the roles and responsibilities schedule in appendices.
- Ensure suitable PPE is donned including eye wear, gloves and suitable overalls as required. If in doubt then refer to the COSHH register with the relevant material safety data sheet(s). If handling fuels, then ensure the correct protective gloves are being used to stop Diesel or Petrol being absorbed by skin.
- Using the absorbent pads all spill fluid must be contained on deck and dealt with using the spill equipment provided.
- If fluids have made it into the water then dispersants must be used immediately. The RIB will be manned with 2 crew members trained in its use and assist with the deployment of the spill boom(s).
- The project manager must be contacted via phone or radio immediately and notified of the incident. Either project manager or site manager will make the call to the emergency services as required.

Additional details for emergency spill response procedures for the nearshore drilling are provided for in the nearshore HSEMP.

4.6 DEMOBILIZATION

Following the completion of the Overwater Program, the LB will return to the Mobilization Point TBD to demobilize equipment and sail back to Louisiana.

5.0 SOIL SAMPLE AND WATER COLLECTION LOCATIONS

5.1 GENERAL

AECOM JV is conducting field investigations consisting of sediment and water sampling, environmental coordination and sediment storage and sample transport to the USACE ERDC laboratories as part of the USACE and Port of Houston Ship Channel Expansion Improvement Project (HSC ECIP). Samples will be taken at stations indicated on Figure 1 and 2 following the HSC ECIP Sampling Analysis Plans (SAPs) draft version presented to Fugro during the bidding phase and dated May 16, 2018. Our interpretation and involvement of the SAPs is presented in the following sections. Sampling stations have been divided as:

- South of Morgan's Point – 9 stations, and
- North of Morgan's Point – 11 stations.

Each sediment station consists of one to three sub-sampling locations (A through C). Samples will be collected in the field by Fugro/Benchmark and composited by ERDC. The coordinates, water depth, depth to sampling at specific location are presented on Table 3 for locations South of Morgan's Point. Table 4 presents similar information for locations North of Morgan's Point. Tables 3 and 4 also summarize Sampling Method, Sample Matrix, Type of Analyses and Bioassays. Each water sample point will consist of a single sample point at each location.

Table 3: Summary of Sample Collection and Testing – South of Morgan's Point

Sample Station	Sample Location/Sample ID	Coordinates (NAD83 State Plane, US Feet)		Proposed Dredge/Sample Depth (-MLLW ft)	Sediment Elevation (-MLLW ft)	Sample Method	Sample Matrix	Analyses	Bioassays
		Easting	Northing						
SMP-01	HSCNew-SMP-01-A	3305685.64	13706250.68	50.5	10.1	Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS	Tox, Spp, Bioaccum
SMP-02	HSCNew-SMP-02-A	3285443.10	13747557.95	50.5	12.5	Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS	Tox, Spp, Bioaccum
	HSCNew-SMP-02-C	3284353.05	13747030.40	50.5	15	Drill Rig	Sediment		
SMP-03	HSCNew-SMP-03-A	3267949.90	13772612.28	50.5	10	Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS	Tox, Spp, Bioaccum
	HSCNew-SMP-03-C	3267056.59	13771965.29	50.5	11.6	Drill Rig	Sediment		
SMP-04	HSCNew-SMP-04-A	3255880.10	13789306.00	50.5	8.4	Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS	Tox, Spp, Bioaccum
	HSCNew-SMP-04-C	3254976.27	13788651.38	50.5	12.7	Drill Rig	Sediment		
SMP-05	HSCNew-SMP-05-A	3248704.67	13806977.74	50.5	10.1	Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS	Tox, Spp, Bioaccum
	HSCNew-SMP-05-C	3247662.33	13806593.22	50.5	12.6	Drill Rig	Sediment		
SMP-06	HSCNew-SMP-06-BSC	3243278.43	13792108.74	50.5	7.9	Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS	Tox, Spp, Bioaccum
SMP-07	HSCNew-SMP-07-A	3242735.124	13819138.93	50.5	11.4	Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS	Tox, Spp, Bioaccum
SMP-Ref	HSCNew-SMP-Ref-A[1]	NA	NA	<9"	NA	Grab Sampler, Geosub Pump	Sediment, Water	SD, SW, E, GS	Tox, Bioaccum
	HSCNew-SMP-Ref-B	3353825.81	13672148.97	<9"	NA	Grab Sampler	Sediment		
	HSCNew-SMP-Ref-C[2]	NA	NA	<9"	NA	Grab Sampler	Sediment		
SMP-ODMDS	HSCNew-SMP-ODMDS-A	3364006.93	13694121.02	Mid-Column	NA	Geosub Pump	Water	SW	NA

SW = Analysis of a Surface Water Sample, SD = Analysis of a Sediment Sample, E = Analysis of an Elutriate, GS = Grain-size Analysis.

[1] Sample station will be located 100 ft. North of Location B

[2] Sample station will be located 100 ft. South of Location B

Table 4: Summary of Sample Collection and Testing – North of Morgan's Point (to be updated)

Sample Station	Sample Location/Sample ID	Coordinates (NAD83 State Plane, US Feet)		Proposed Dredge/Sample Depth (-MLLW ft)	Sediment Elevation (-MLLW ft)	Sediment Elevation where Sample Begins	Sample Method	Sample Matrix	Analyses
		Easting	Northing						
NMP-01	HSCNew-NMP-01-A	3,209,849.82	13,844,693.72	41.5	20	20	Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS
NMP-02	HSCNew-NMP-02-A	3,190,724.85	13,835,593.58				Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS
	HSCNew-NMP-02-C	3,190,667.90	13,835,066.25				Drill Rig	Sediment	
NMP-03	HSCNew-NMP-03-A	3,185,288.27	13,838,753.15				Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS
	HSCNew-NMP-03-C	3,185,081.16	13,838,279.59				Drill Rig	Sediment	
NMP-04	HSCNew-NMP-04-A	3,177,189.71	13,837,617.03				Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS
	HSCNew-NMP-04-C	3,176,953.78	13,838,168.70				Drill Rig	Sediment	
NMP-05	HSCNew-NMP-05-A	3,171,845.35	13,832,158.52				Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS
	HSCNew-NMP-05-C	3,171,314.50	13,832,438.16				Drill Rig	Sediment	
NMP-06	HSCNew-NMP-06-A	3,157,353.36	13,830,614.75				Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS
	HSCNew-NMP-06-C	3,157,165.64	13,830,261.54				Drill Rig	Sediment	
NMP-07	HSCNew-NMP-07-A	3,152,185.65	13,829,734.95				Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS
	HSCNew-NMP-07-C	3,153,829.41	13,830,445.67				Drill Rig	Sediment	
NMP-08	HSCNew-NMP-08-A	3,150,325.05	13,831,780.07				Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS
	HSCNew-NMP-08-C	3,149,956.07	13,831,625.64				Drill Rig	Sediment	
NMP-09	HSCNew-NMP-09-A	3,149,139.27	13,833,968.17	44.5	33	40.5	Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS
	HSCNew-NMP-09-C	3,149,502.39	13,834,135.92	44.5	38	40.5	Drill Rig	Sediment	
NMP-10	HSCNew-NMP-10-A	3,147,553.13	13,836,442.15	44.5	32	40.5	Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS
	HSCNew-NMP-10-C	3,147,866.90	13,836,690.25	44.5	32.5	40.5	Drill Rig	Sediment	
NMP-11	HSCNew-NMP-11-A	3,145,713.20	13,839,584.69				Drill Rig, Geosub Pump	Sediment, Water	SD, SW, E, GS
	HSCNew-NMP-11-C	3,145,273.23	13,838,501.88				Drill Rig	Sediment	

SW = Analysis of a Surface Water Sample, SD = Analysis of a Sediment Sample, E = Analysis of an Elutriate, GS = Grain-size Analysis.

5.2 DRILLING METHODOLOGY AND SOIL SAMPLE COLLECTION

5.2.1 Drilling - General

The following summarizes the general drilling methodology.

- Drilling is performed through the center of the moon pool in the LB deck using a top drive CME 75 drill rig.
- All water depths will be measured and corrected to the nearest NOAA tide gauge station. It is preferable that a tape measure with weight at the end be used for this, in addition to careful measurement of the casing string length.
- Drilling CME hollow stem augers (4.5 in) will be used for obtaining the soil samples together with CME 4" bearing head Continuous Sample tube system.
- Mud rotary drilling will be accomplished only if we encounter difficulties drilling with Augers
- Sampling will be performed within soil materials (if encountered) using grab, pushed, or driven sampling techniques as appropriate.

- Bedrock materials are not expected.
- Drilling sampling tools and pipe will be deconned between sampling stations.

5.2.2 Procedure for Advancing the Borehole

The borehole will be advance using drill auger technique. Sediment samples will be taken with either a CME 4" bearing head Continuous Sample tube system, 3" Shelby tube or split spoon sampler. .

5.2.3 Sampling Procedures and Samples Handling-SMP

Driller and logger on shift will keep accurate logs of all activities performed and all recovered materials. Sediment samples will be collected from seven (7) channel sample stations South of Morgan's Point. One (1) to two (2) sample locations will be located at each sample station as listed in **Table 3**. Fugro personnel will collect sediment cores from each of the two sample locations at each channel station. Sediment cores will be collected from the sediment surface down to the proposed dredge depth. Based on AECOM JV provided cross sections, the number of borings needed to achieve the required volume of 35 gallons are summarized in **Table 5** below. An additional 40 gallons of sediment will be collected and processed from one of the channel sample stations for QA/QC analysis. This location has not been determined so far. Sediment and water samples from the two offshore stations (one for each type of collection) will be collected using Benchmark Support Boat and Grab sampler at the Reference Stations.

Table 5: Estimated Number of Borings for Sample Recovery – South of Morgan's Point

Sample Station	Sample Location/Sample ID	Proposed Dredge/Sample Depth (-MLLW ft)	Current Sediment Elevation (-MLLW ft)	Projected Number of Borings to Provide Sufficient Volume of Sediment
SMP-01	HSCNew-SMP-01-A	50.5	10.1	3
SMP-02	HSCNew-SMP-02-A	50.5	12.5	2
	HSCNew-SMP-02-C	50.5	15	2
SMP-03	HSCNew-SMP-03-A	50.5	10	2
	HSCNew-SMP-03-C	50.5	11.6	2
SMP-04	HSCNew-SMP-04-A	50.5	8.4	2
	HSCNew-SMP-04-C	50.5	12.7	2
SMP-05	HSCNew-SMP-05-A	50.5	10.1	2
	HSCNew-SMP-05-C	50.5	12.6	2
SMP-06	HSCNew-SMP-06-BSC	50.5	7.9	3
SMP-07	HSCNew-SMP-07-A	50.5	11.4	3

The sampling program for cohesive materials will involve pushing a CME 4" bearing head Continuous Sample tube system (soft sediments), and a thin-walled 7.62-cm (3-inch) Shelby tubes for firm to stiff sediments. Sampling in granular materials will be attended with a 3-in split spoon.

Benchmark personnel will process the sediment samples from all of the channel stations. Sediment samples will be processed on the LB. Fugro personnel will collect the sediment samples and provide Benchmark personnel with extruded sediment cores in either 2 or 5 foot sections. Sediment core sections will be placed in PVC troughs lined with clean aluminum foil. Prior to sample processing, each sediment core section will be photographed and a Fugro logger will record sediment characteristics in a bore log. Once each core section has been photographed and logged, pre-cleaned stainless steel spoons and spatulas will be used to cut the core into 5 to 6 inch sections that will be placed immediately into five (5) gallon buckets. All sample containers will be labeled with the station ID, collection date, time, and any additional information required by the analytical laboratory. Chain of Custody (COC) forms will be completed for all samples collected and processed. The total volume of sediment to be collected from each channel sample station is 35 gallons. An additional 40 gallons of sediment will be collected and processed from one of the channel sample stations for QA/QC analysis.

Prior to sample collection, all containers and sampling equipment will be cleaned according to protocols described in Plumb (1981). Any equipment that comes into contact with the sediment samples will be deconned between channel sample stations. Care will be taken to avoid contamination to sampling devices from the barge deck or other surfaces. Powderless latex or nitrile gloves will be worn during sample collection and sample handling.

One (1) sediment sample equipment blank will be prepared using deionized water (provided by the laboratory) and the pre-cleaned equipment that will come in contact with the sediment samples (i.e., stainless steel spoon, core tube, nitrile glove). The equipment rinsate blank will be collected to evaluate field sampling and decontamination procedures by pouring deionized water over the decontaminated sampling equipment used for sample collection.

Immediately after the sediment samples have been collected and processed, the five-gallon buckets will be placed in insulated coolers with ice and transported to shore. Once on shore the five-gallon buckets will be transferred to the refrigerated truck where they will be stored and delivered to the analytical laboratory.

5.2.4 Sampling Procedures and Samples Handling-NMP

Sediment samples will be collected from eleven (11) channel sample stations North of Morgan's Point. Two (2) sample locations will be located at each sample station as listed in **Table 4**. Fugro personnel will collect sediment cores from each of the two sample locations at each channel station. Sediment cores will be collected from the specified depth down to the proposed dredge depth. NOTICE that the starting sampling depth is not the seabed. Based on AECOM JV provided cross sections, the number of borings needed to achieve the required volume of 5 gallons are summarized in **Table 6** below (number not defined so far since cross sections have not been provided).

Table 6: Estimated Number of Borings for Sample Recovery – NMP of Morgan's Point

TO BE INCLUDED (need cross sections)

5.2.5 Drill Cuttings and Fluids

All drilling fluid used in the program will be based on seawater (channel water). If necessary, the seawater will be augmented with drilling additives which are non-hazardous and environmentally friendly. During drilling cuttings recirculated aboard the LB will be discarded to the channel water.

5.2.6 Borehole Backfill

Boring holes will not be backfilled following the drilling activities at each location. Boreholes will be allowed to cave naturally upon removal of the rods and drill pipe.

5.3 WATER SAMPLING

Water samples for all nine (9) sample stations will be collected over a two-day period starting on the final day of sediment sampling and completed the day after sediment sampling has been completed. The sample schedule has been requested by the analytical laboratory in order receive all project samples within specified analytical hold time limits. Water samples will be collected from a 24 ft aluminum boat equipped to collect clean water samples. A Trimble Geo xH 6000 (submeter GPS) will be used to navigate to water sample stations and field coordinates will be recorded where water samples are collected.

A single water sample will be collected at all nine (9) sample stations. The water sample locations for each sample station are listed in **Table 3**. Water depth to the top of the sediment will be determined using a lead line and measuring tape. Water samples will be collected from mid depth at all sample locations where the water depth is equal to or greater than six (6) feet deep. If the water depth is less than six (6) feet, then water samples will be collected three (3) feet from the sediment surface. Sufficient water will be collected from all seven (7) channel sample stations and the Reference sample station for chemical analysis, the preparation of an elutriate sample, and bioassays. The water sample collected from the ODMDS will be collected and processed for chemical analysis only.

Water samples will be collected using a Geotech Stainless Steel Geosub Pump and clean tubing. To flush the tubing at each sample station, a volume of water at least five times the volume of the sample tubing will be pumped through the tubing. The flushing water will be discarded back into the ship channel after the sample is collected. Water samples will then be collected in laboratory supplied pre-cleaned bottles appropriate for the analyses to be conducted. Bulk water samples for elutriate preparation and bioassays will be placed in five (5) gallon cubitainers. A total volume of 30 gallons of water will be collected from the Reference and channel stations and 2 gallons of water will be collected from the ODMDS sample station. An additional 35 gallons of water will be collected and processed from one of the channel sample stations for QA/QC analysis. All sample containers will be labeled with the station ID, collection date, time, and any additional information required by the analytical laboratory. COCs will be completed for all sample collected and processed. Sample jars and cubitainers will be placed immediately in insulated coolers with ice on the sample vessel and transported to shore where they will be placed in the refrigerated truck. Water samples will be held at 2-4° C in the refrigerated truck until they are delivered to the lab.

Field parameters including dissolved oxygen (DO), pH, salinity, conductivity, and water temperature will be recorded using a YSI 556 meter at each water sample station. Field data will be recorded on field data sheets and will include but will not be limited to: date, time, water depth, sample depth, station (or sample) name, water parameters, and GPS coordinates.

WATER SAMPLING NMP TO BE INCLUDED

5.4 SEDIMENT COLLECTION AT THE REFERENCE STATION

Sediment samples from the offshore Reference sample station (HSCNew-SMP-REF) will be collected using a clean Van Veen Grab sampler. The stainless steel Van Veen Grab sampler consists of two opposable bucket halfs which open and close as a clam shell style grab sampler. The Benchmark 24-ft sample vessel will be used to collect and process the grab samples. Sediment samples will be collected from sample location listed in **Table 3**. A Trimble Geo xH 6000 (submeter GPS) will be used to navigate to the Reference sample locations and field coordinates will be recorded at each of the three sample locations. The sample vessel will be equipped with an A-frame and winch to lower and raise the grab sampler.

Grab samples will collect sediment from the surface to 7.5 inches or resistance (whichever is achieved first). Sample depths will be measured from the surface of the sediment contained in the grab to the lowest depth obtained by the device. An equal volume of sediment will be collected from each of the three sample locations and placed into five (5) gallon buckets. Photographs will be taken of each sample before it is processed. Sample station information, water depth, and all other pertinent observations made during the study will be recorded on field data sheets. All sample containers will be labeled with the station ID, collection date, time, and any additional information required by the analytical laboratory. COCs will be completed for all sample collected and processed. The total volume of sediment to be collected from the Reference station is 35 gallons.

Prior to sample collection, all containers and sampling equipment will be cleaned according to protocols described in Plumb (1981). Care will be taken to avoid contamination to sampling devices from the boat deck or other surfaces. Powderless latex or nitrile gloves will be worn during sample collection and sample handling.

Immediately after the sediment samples have been collected and processed, the five-gallon buckets will be placed in insulated coolers with ice and transported to shore. Once on shore the five-gallon buckets will be transferred to the refrigerated truck where they will be stored and delivered to the analytical laboratory.

5.5 SAMPLE STORAGE AND SHIPMENT PROTOCOLS

Sediment and water samples will be stored in insulated coolers with ice when they are located on the sample boats or barge. An alternative method of a refrigerated trailer onboard the LB is being evaluated during mobilization. At a minimum, sediment and water samples will be transferred to shore and placed in a refrigerated truck at the end of each day. Multiple trips to shore to drop off sediment and water samples may be conducted as needed. The refrigerated truck will be locked at all times when it is left unattended. The internal temperature of the refrigerated truck will be kept at 2-4 ˚C and temperatures will recorded at least twice a day on field data sheets.

Once all south sediment and water samples have been collected, the refrigerated truck will be driven to the analytical laboratory in Vicksburg, Mississippi. The southern sediment and water sampling study is expected to take ten (10) to twelve (12) days and it will take an additional day to travel from Houston, Texas to Vicksburg, Mississippi. If the field sampling event starts on September 11, 2018, the tentative expected delivery date of all southern sediment and water samples is September 24, 2018.

SAMPLE STORAGE AND SHIPMENT NMP TO BE INCLUDED.

U.S. Army Corps of Engineers

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Engineer Research and Development Center

Sampling, Chemical Analysis, and Bioassessment in Accordance with CWA Section 404

Houston Ship Channel Expansion Channel Improvement Project, North of Morgan's Point Houston Ship Channel, Texas

(Part 4 of 6: Appendices 3-6, Chain of Custody, Particle Size Distribution Report, Full Analytical Data Tables, & Analytical Lab Reports)

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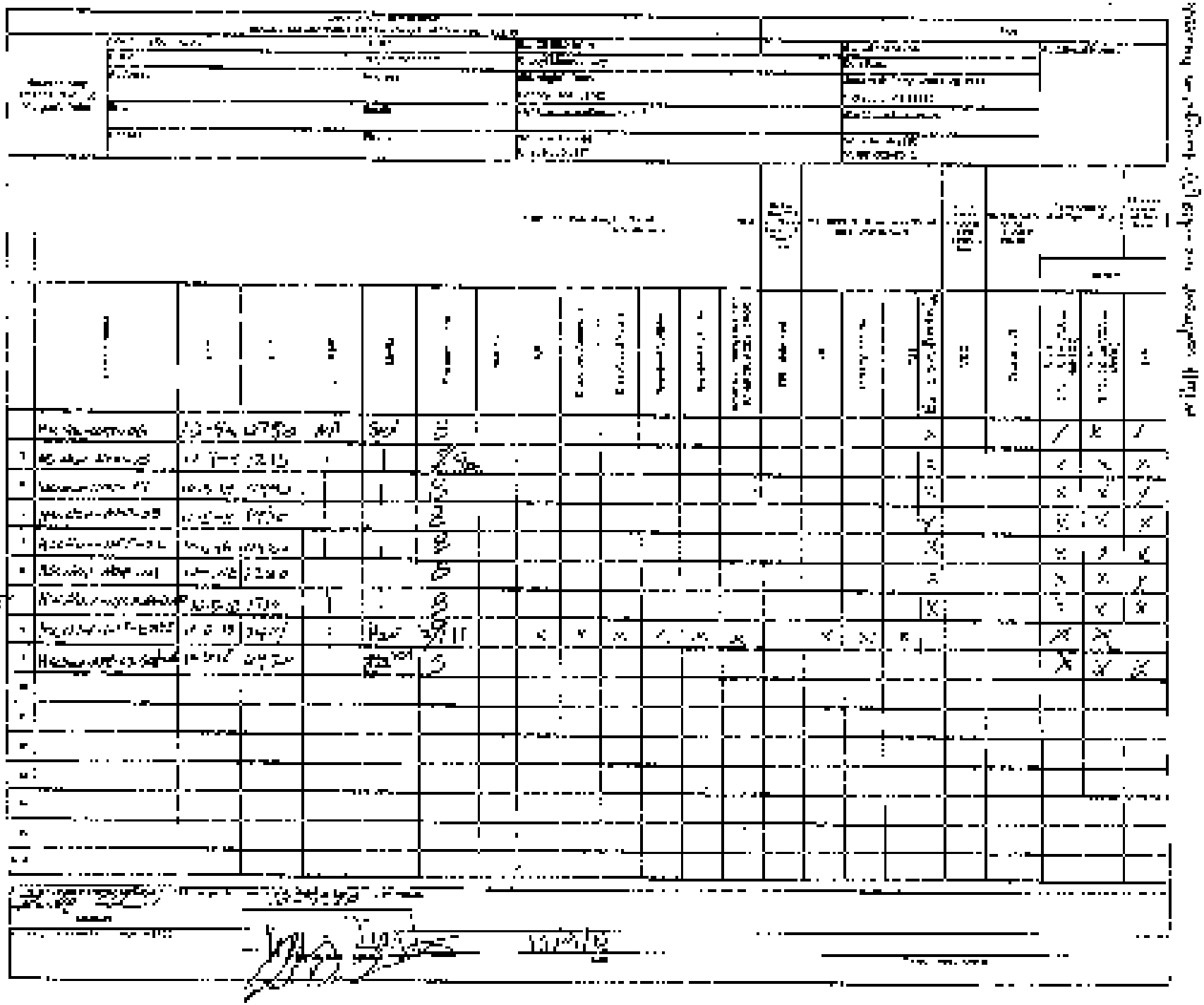
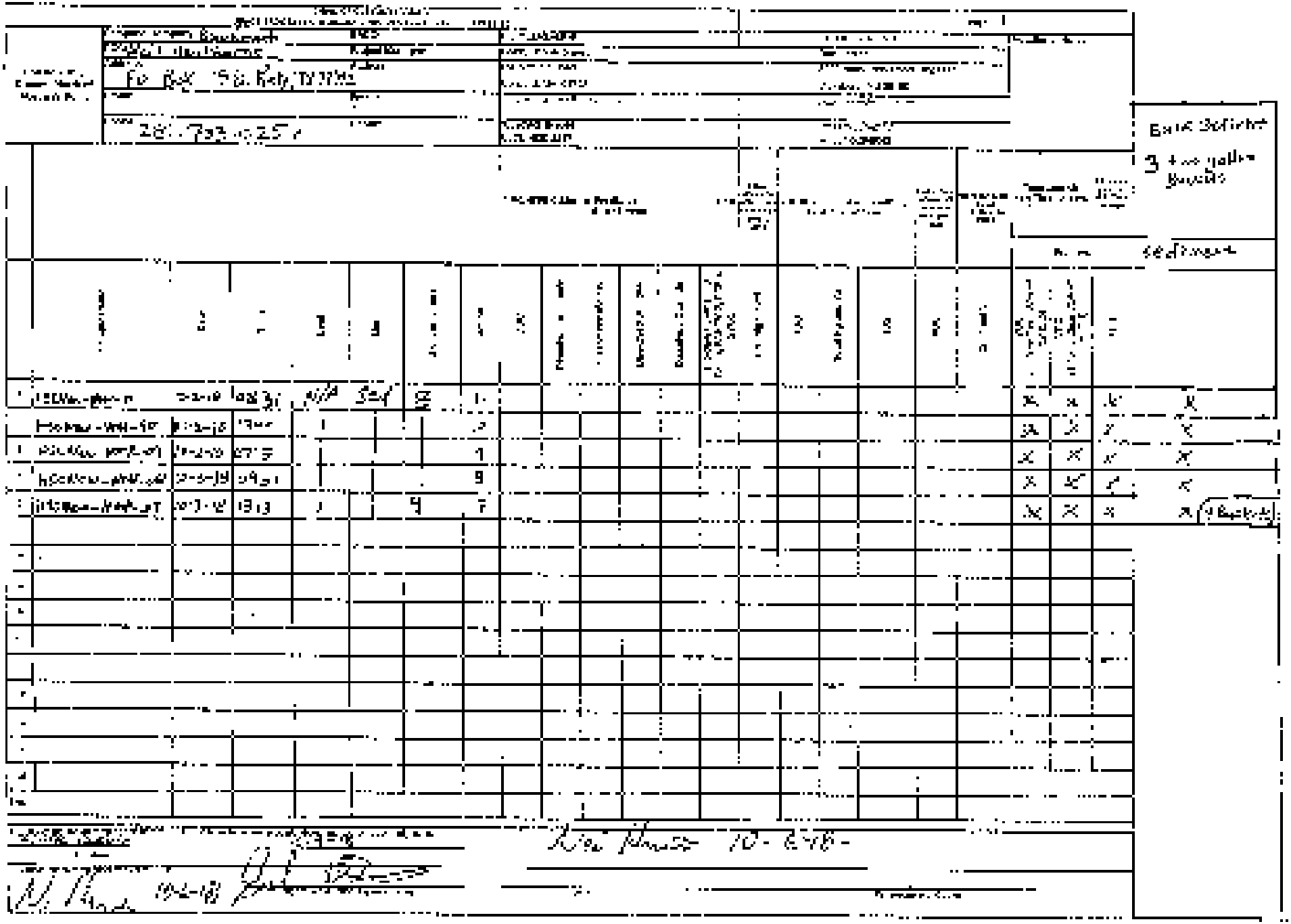
FINAL

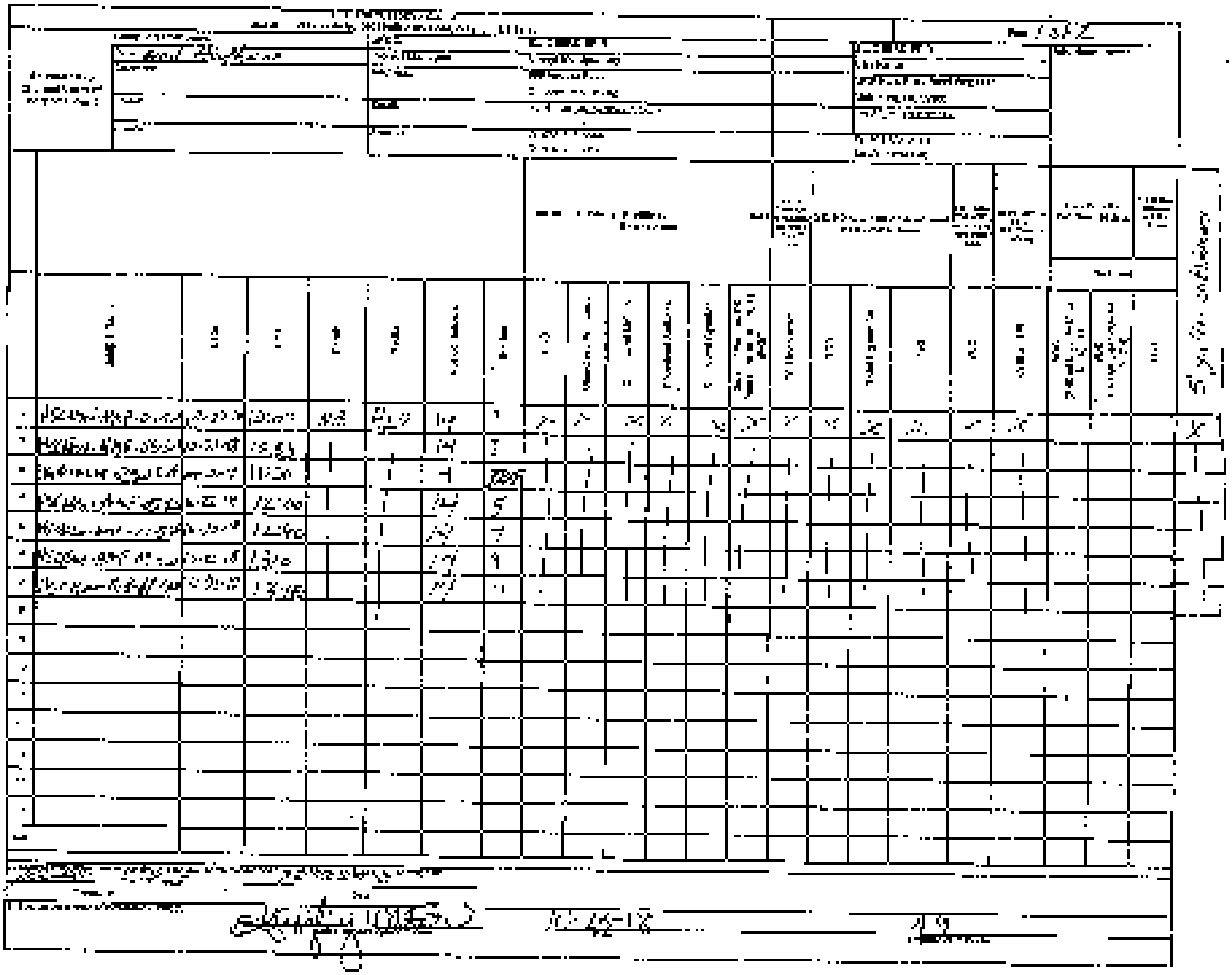
14 June 2023*

*Supersedes all previous versions. Only coversheet revised; no change to content.

Appendix 3: Chain of Custody







Appendix 4: Partical Size Distribution Report

SPECIFIC GRAVITY OF SOILS - ASTM D854-14 Method B

Client: Air Water & Soil Laboratories, Inc.
Client Project: 18J0402
Project No.: 40901

Lab Sample No.	Boring	Depth	Sample	Replicate No.	Material Used	Passing #4 Sieve	Pycnometer Id.	Pre-test Pycnometer Check Weight	Weight Pycnometer +Soil+Water	Test Temp.	Tare No.	Weight Tare+ Dry Soil	Tare Weight	Weight Dry Soil	Test Water Density	Weight Pycnometer +Water at Test Temp	Average Calibrated Pycnometer Dry Weight	Average Calibrated Volume of Pycnometer	Specific Gravity of Soil at Test Temp	Conversion Factor For Temp	Specific Gravity of Soil at 20*C
								gm	gm	°C		gm	gm	gm	gm/ml	gm	gm	ml	g/cc		g/cc
					Sieve	%		Mp	Mpws,t	Tt				Mds	ρw,t	Mpw,t	Mp	Vp	Gt	Tb-K	G20*C
				TEST PARAMETERS													CALIBRATION PARAMETERS		SPECIFIC GRAVITY		
40901001	18J0402-01	NA	HSCNew-NMP-01-SD	1	- #4	100	A	159.91	689.97	22.7	209	226.57	176.21	50.36	0.9976	658.42	159.90	499.72	2.677	0.9994	2.68
40901002	18J0402-02	NA	HSCNew-NMP-02-SD	1	- #4	100	C	161.1	691.23	22.6	208	230.82	179.91	50.91	0.9976	659.37	161.11	499.44	2.672	0.9994	2.67
40901003	18J0402-03	NA	HSCNew-NMP-03-SD	1	- #4	98.7	D	163.45	694.51	22.6	207	226.38	174.04	52.34	0.9976	662.00	163.44	499.74	2.640	0.9994	2.64
40901004	18J0402-04	NA	HSCNew-NMP-04-SD	2	- #4	99.7	R	164.26	693.86	20.9	205	228.99	179.19	49.8	0.9980	662.85	164.29	499.56	2.650	0.9998	2.65
40901005	18J0402-05	NA	HSCNew-NMP-05-SD	1	- #4	99.7	G	163.57	693.82	21.1	813	152.7	101.68	51.02	0.9980	661.88	163.54	499.35	2.674	0.9998	2.67
40901006	18J0402-06	NA	HSCNew-NMP-06-SD	2	- #4	98.5	T	185.16	714.48	21.2	217	229.37	179.68	49.69	0.9980	683.51	185.15	499.38	2.654	0.9997	2.65
40901007	18J0402-07	NA	HSCNew-NMP-07-SD	2	- #4	100	W	193.16	722.31	21	200	233.58	184.21	49.37	0.9980	691.49	193.13	499.36	2.661	0.9998	2.66
40901008	18J0402-08	NA	HSCNew-NMP-08-SD	2	- #4	100	F	162.2	692.24	21.1	201	232.36	181.56	50.8	0.9980	660.65	162.20	499.46	2.645	0.9998	2.64
40901009	18J0402-09	NA	HSCNew-NMP-09-SD	2	- #4	100	J	159.87	690.21	21.3	751	231.52	180.84	50.68	0.9979	658.62	159.84	499.81	2.655	0.9997	2.65
40901010	18J0402-10	NA	HSCNew-NMP-10-SD	1	- #4	100	E	164.7	695.04	20.8	208	230.75	179.71	51.04	0.9980	662.97	164.70	499.24	2.691	0.9998	2.69
40901011	18J0402-11	NA	HSCNew-NMP-11-SD	1	- #4	100	N	183.46	713.15	21.1	807	151.9	101.69	50.21	0.9980	681.78	183.43	499.36	2.665	0.9998	2.66
40901012	18J0402-12	NA	HSCNew-NMP-03-DUP	2	- #4	100	G	163.59	693.28	21	510	152.21	102.21	50	0.9980	661.89	163.54	499.35	2.687	0.9998	2.69

Performed By: AR Input Validation: AR Reviewed By: ALO Date: 10/17/2018

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-01
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-01-SD
		Lab Sample	40901001

Sample Color: **VERY DARK GREENISH GRAY**
USCS Group Name: **FAT CLAY WITH SAND**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (44)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1086
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1086
Dry Wt. Passing Split, gm	538
Total Sample Dry Wt, gm	538

Split Sample - Passing No. 4	
Tare No.	74
Tare + WS., gm	555.52
Tare + DS., gm	348.65
Tare, gm	145.92
Water Content of Split Sample	**102.0%**
Wt. of DS., gm	202.73
Wt. of +#200 Sample, gm	40.94

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.86	0.4%	99.6%	
No. 20	0.85	0.32	0.2%	99.4%	
No. 40	0.425	0.63	0.3%	99.1%	
No. 60	0.25	2.41	1.2%	97.9%	
No. 140	0.106	24.75	12.2%	85.7%	
No. 200	0.075	11.97	5.9%	79.8%	

HYDROMETER (-#200)

Tare No.	503	Wt. Dispers., gm	5	Specific Gravity	2.68
Wt. Tare + DS., gm	142.04	Wt. Dry Soil, gm (*-#200*)	34.75		Tested
Wt. Tare, gm	102.29	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9933*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	39	21.2	5.7	33.3	0.0134	95.2	0.0296	76.0%
5	37	21.2	5.7	31.3	0.0134	89.5	0.0190	71.4%
15	35.5	21.3	5.7	29.8	0.0133	85.2	0.0111	68.0%
30	34.5	21.4	5.6	28.9	0.0133	82.6	0.0079	65.9%
60	32	21.5	5.6	26.4	0.0133	75.5	0.0057	60.2%
250	29	22.5	5.3	23.7	0.0132	67.7	0.0028	54.1%
1440	26	22	5.5	20.5	0.0132	58.6	0.0012	46.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=20.7% Clay=59.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**20.2**	D30, mm	NA
Coarse=0.4; Medium=0.5; Fine=19.3		D10, mm	NA
% Fines (-#200)	**79.8**	Cc	NA
% Plus #200 (-3")	**20.2**	Cu	NA

USCS Description
FAT CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	21.4	21.5
0.05	78.1			
		Silt	27.0	27.1
0.002	51.1			
		Clay	51.1	51.3

USDA Classification
CLAY

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-01
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-01-SD
		Lab Sample	40901001

Soil Description: VERY DARK GREENISH GRAY FAT CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	74
Wt. Tare & WS, gm	555.52
Wt. Tare & DS, gm	348.65
Wt. Tare, gm	145.92
Water Content, %	102.0

SAMPLE SUMMARY

Liquid Limit (LL), %	**74**
Plastic Limit (PL), %	**21**
Plasticity Index (PI)	**53**
USCS Group Symbol (*-#40 Fraction*)	**CH**
USCS Group Name (*-#40 Fraction*)	**FAT CLAY**
Sample Color:	**VERY DARK GREENISH GRAY**

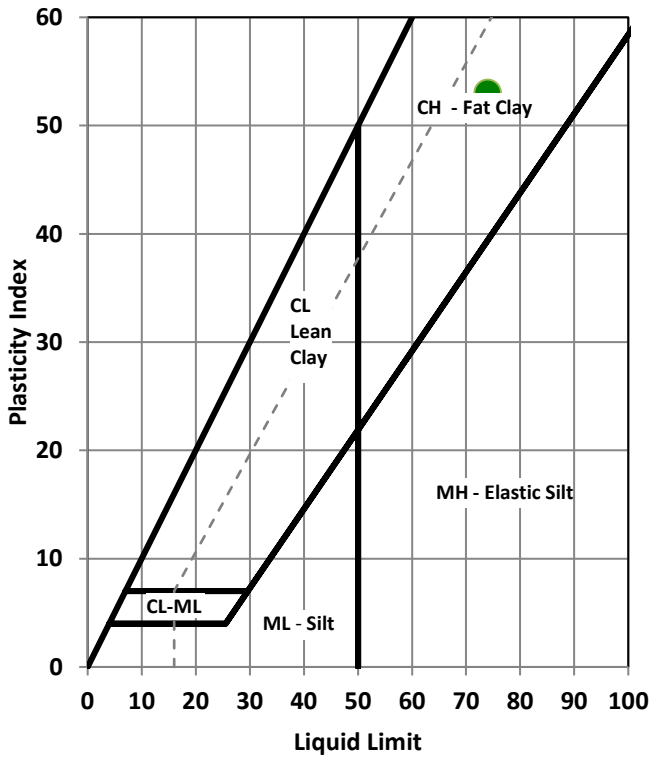
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	712	474	489
Wt. Tare & WS, gm	18.15	18.04	17.30
Wt. Tare & DS, gm	17.15	16.74	16.15
Wt. Tare, gm	12.50	10.77	10.55
Water Content, %	21.5	21.8	20.5

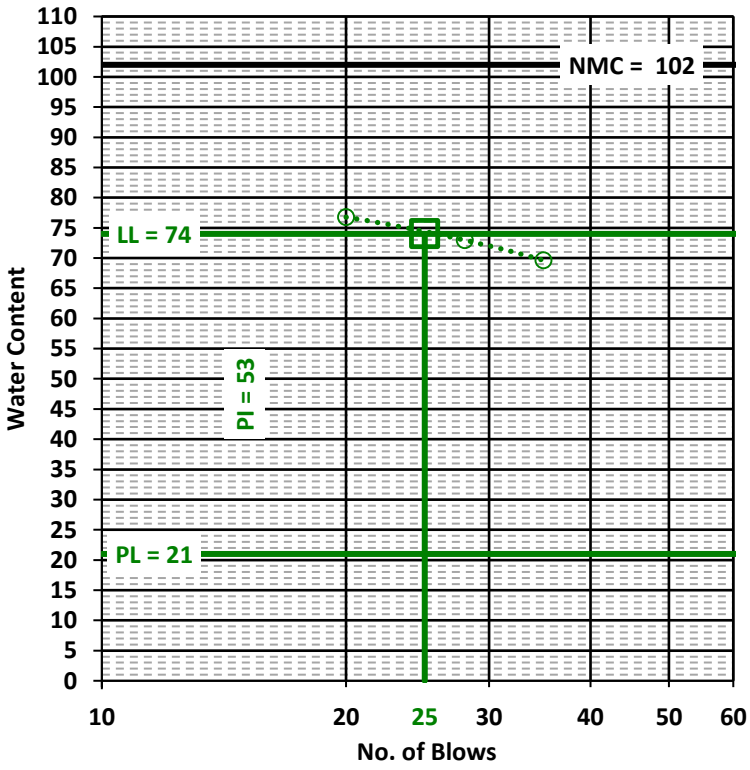
LIQUID LIMIT

	3 Points		
	472	471	409
	17.49	19.85	19.97
	14.58	16.02	16.16
	10.79	10.77	10.69
	76.8	73.0	69.7
# of Blows	20	28	35

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

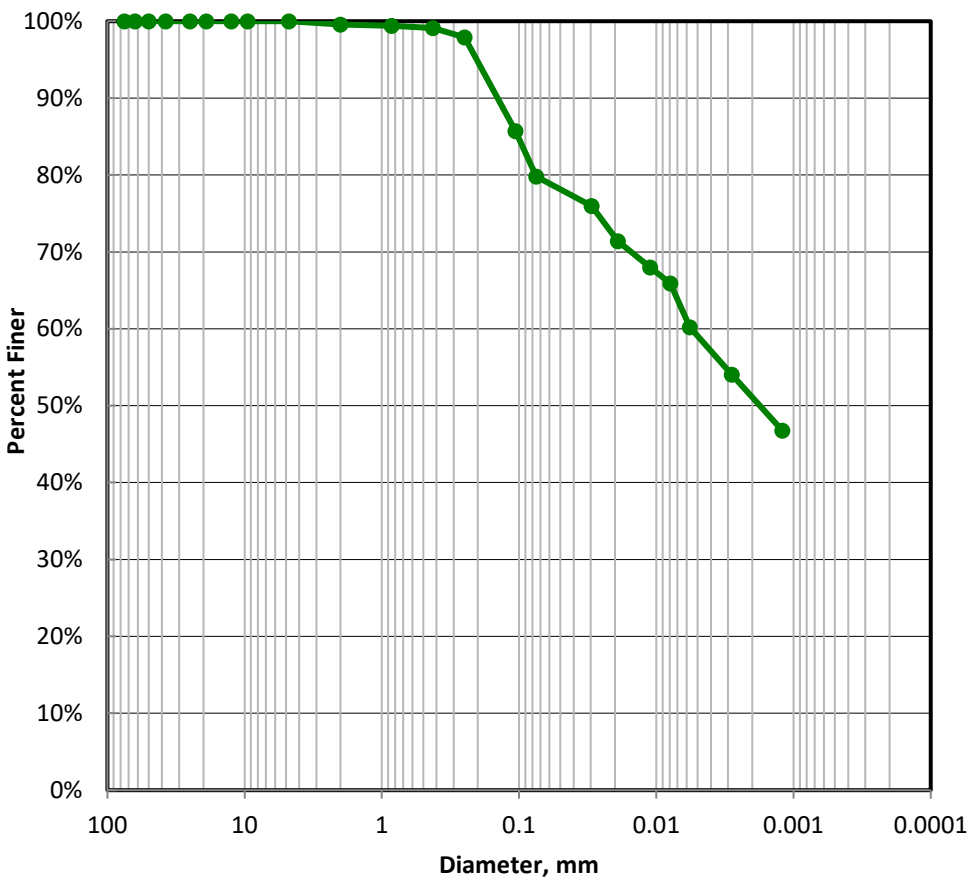
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-01
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-01-SD
		Lab Sample	40901001

Sample Color: **VERY DARK GREENISH GRAY**

USCS Group Name: **FAT CLAY WITH SAND**

USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (44)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.6%
No. 20	0.85	99.4%
No. 40	0.425	99.1%
No. 60	0.25	97.9%
No. 140	0.106	85.7%
No. 200	0.075	79.8%
NA	0.0296	76.0%
NA	0.0190	71.4%
NA	0.0111	68.0%
NA	0.0079	65.9%
NA	0.0057	60.2%
NA	0.0028	54.1%
NA	0.0012	46.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=20.7% Clay=59.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**20.2**	D30, mm	NA
Coarse=0.4; Medium=0.5; Fine=19.3		D10, mm	NA
% Fines (-#200)	**79.8**	Cc	NA
% Plus #200 (-3")	**20.2**	Cu	NA

USCS Description

FAT CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	99.6
0.05	78.1
0.002	51.1

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.4	0
Sand	21.4	21.5
Silt	27.0	27.1
Clay	51.1	51.3

USDA Classification

CLAY

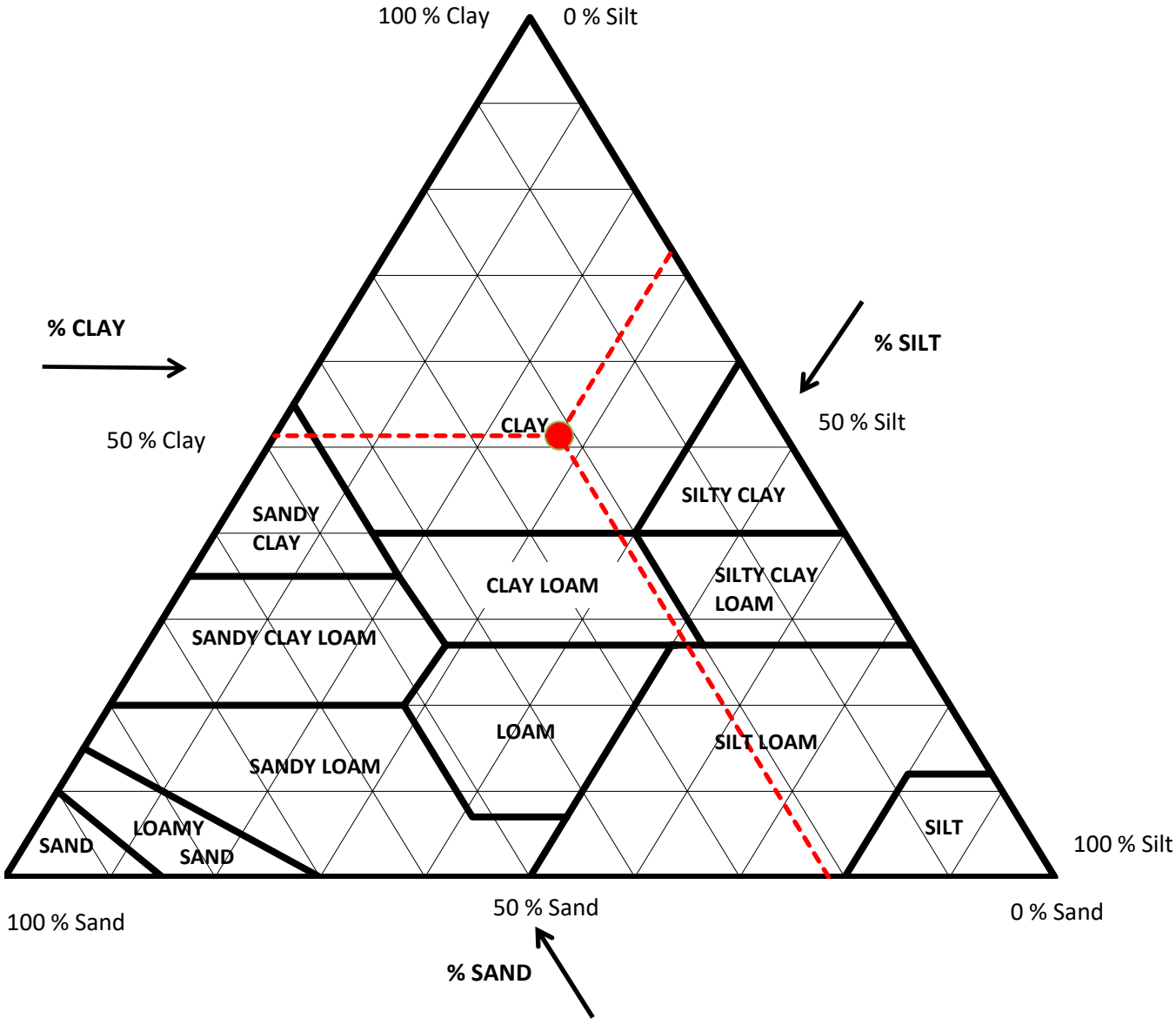
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-01
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-01-SD
		Lab Sample	40901001

Sample Color: **VERY DARK GREENISH GRAY**
USCS Group Name: **FAT CLAY WITH SAND**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (44)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	21.5
Percent Silt, %	27.1
Percent Clay, %	51.3

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.1
Coarse Sand; 1-0.5	0.3
Medium Sand; 0.5-0.25	1.3
Fine Sand; 0.25-0.1	13.3
Very Fine Sand; 0.1-0.05	6.6
Total	**21.5**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-02
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-02-SD
		Lab Sample	40901002

Sample Color: **VERY DARK GRAY**
USCS Group Name: **LEAN CLAY WITH SAND**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (20)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1012
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1012
Dry Wt. Passing Split, gm	704
Total Sample Dry Wt, gm	704

Split Sample - Passing No. 4	
Tare No.	73
Tare + WS., gm	608.39
Tare + DS., gm	467.71
Tare, gm	146.7
Water Content of Split Sample	**43.8%**
Wt. of DS., gm	321.01
Wt. of +#200 Sample, gm	68.87

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	1.25	0.4%	99.6%	
No. 20	0.85	2.36	0.7%	98.9%	
No. 40	0.425	2.17	0.7%	98.2%	
No. 60	0.25	2.16	0.7%	97.5%	
No. 140	0.106	30.01	9.3%	88.2%	
No. 200	0.075	30.92	9.6%	78.5%	

HYDROMETER (-#200)

Tare No.	513	Wt. Dispers., gm	5	Specific Gravity	2.67
Wt. Tare + DS., gm	155.56	Wt. Dry Soil, gm (*-#200*)	46.88		Tested
Wt. Tare, gm	103.68	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9955*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	41.5	21.2	5.7	35.8	0.0134	76.0	0.0291	59.7%
5	37	21.3	5.7	31.3	0.0134	66.5	0.0191	52.2%
15	34	21.4	5.6	28.4	0.0134	60.3	0.0113	47.4%
30	32.5	21.4	5.6	26.9	0.0134	57.1	0.0081	44.9%
60	30	21.6	5.6	24.4	0.0133	51.8	0.0058	40.7%
250	27	22.5	5.3	21.7	0.0132	46.1	0.0029	36.2%
1440	23	21.8	5.5	17.5	0.0133	37.2	0.0012	29.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=38.7% Clay=39.8%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**21.5**	D30, mm	NA
Coarse=0.4; Medium=1.4; Fine=19.7		D10, mm	NA
% Fines (-#200)	**78.5**	Cc	NA
% Plus #200 (-3")	**21.5**	Cu	NA

USCS Description
LEAN CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	29.1	29.2
0.05	70.5			
		Silt	37.3	37.4
0.002	33.2			
		Clay	33.2	33.3

USDA Classification
CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-02
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-02-SD
		Lab Sample	40901002

Soil Description: VERY DARK GRAY LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	73
Wt. Tare & WS, gm	608.39
Wt. Tare & DS, gm	467.71
Wt. Tare, gm	146.70
Water Content, %	43.8

SAMPLE SUMMARY

Liquid Limit (LL), %	**44**
Plastic Limit (PL), %	**17**
Plasticity Index (PI)	**27**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**VERY DARK GRAY**

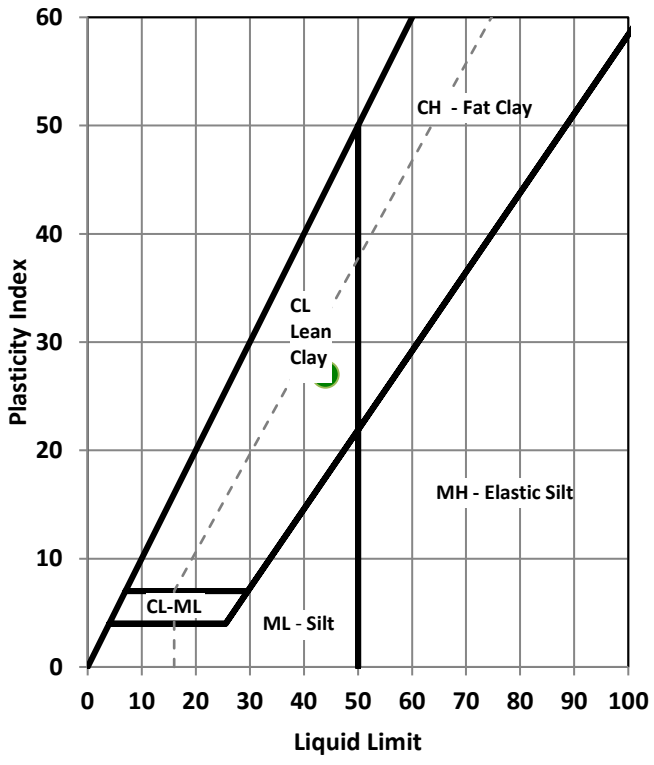
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	216	222	234
Wt. Tare & WS, gm	23.44	24.21	23.72
Wt. Tare & DS, gm	22.38	23.07	22.69
Wt. Tare, gm	16.13	16.24	16.40
Water Content, %	17.0	16.7	16.4

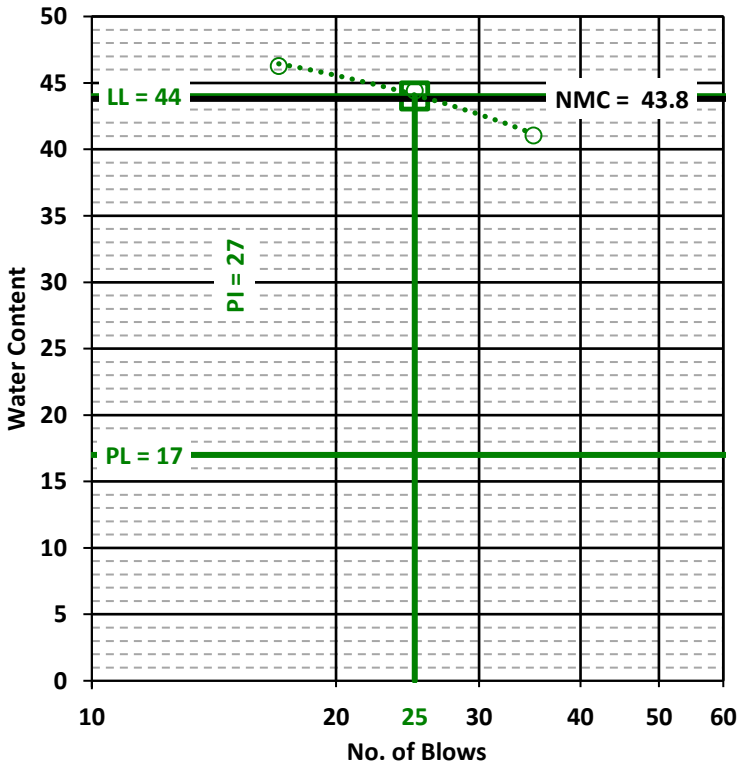
LIQUID LIMIT

	3 Points		
	215	221	202
	24.33	24.70	25.69
	21.85	22.12	22.99
	16.49	16.31	16.41
	46.3	44.4	41.0
# of Blows	17	25	35

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

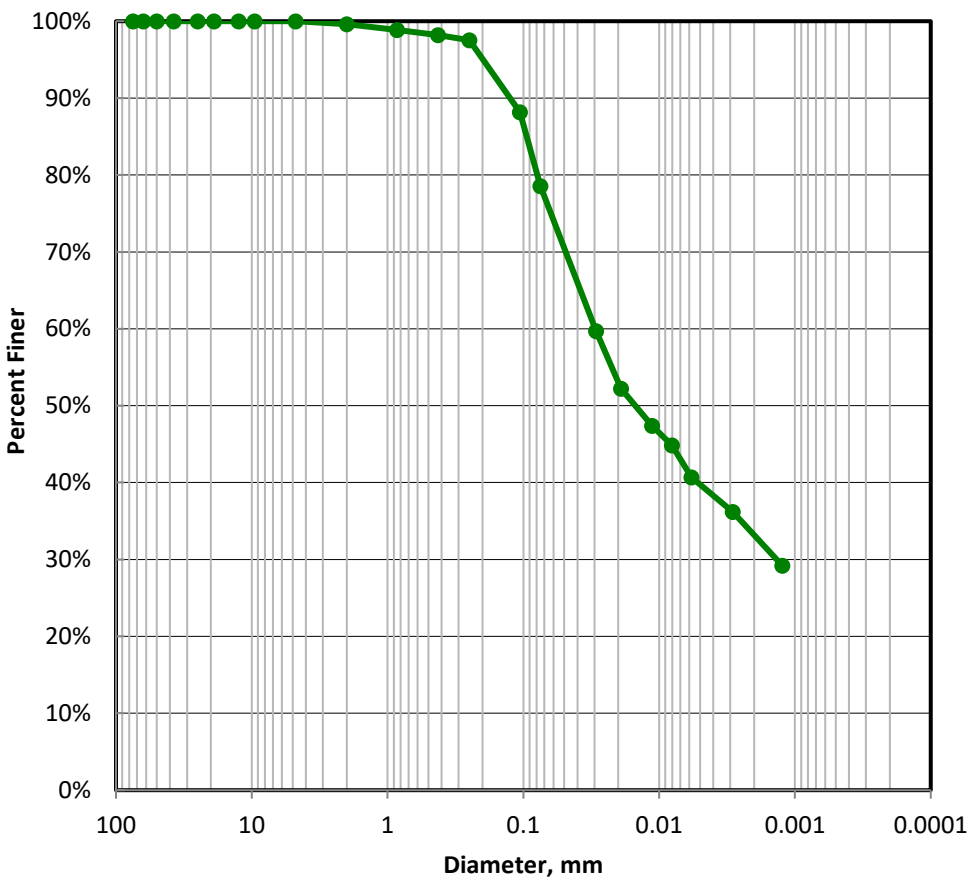
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-02
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-02-SD
		Lab Sample	40901002

Sample Color: **VERY DARK GRAY**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (20)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.6%
No. 20	0.85	98.9%
No. 40	0.425	98.2%
No. 60	0.25	97.5%
No. 140	0.106	88.2%
No. 200	0.075	78.5%
NA	0.0291	59.7%
NA	0.0191	52.2%
NA	0.0113	47.4%
NA	0.0081	44.9%
NA	0.0058	40.7%
NA	0.0029	36.2%
NA	0.0012	29.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=38.7% Clay=39.8%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**21.5**	D30, mm	NA
Coarse=0.4; Medium=1.4; Fine=19.7		D10, mm	NA
% Fines (-#200)	**78.5**	Cc	NA
% Plus #200 (-3")	**21.5**	Cu	NA

USCS Description

LEAN CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	29.1	29.2
0.05	70.5			
		Silt	37.3	37.4
0.002	33.2			
		Clay	33.2	33.3

USDA Classification

CLAY LOAM

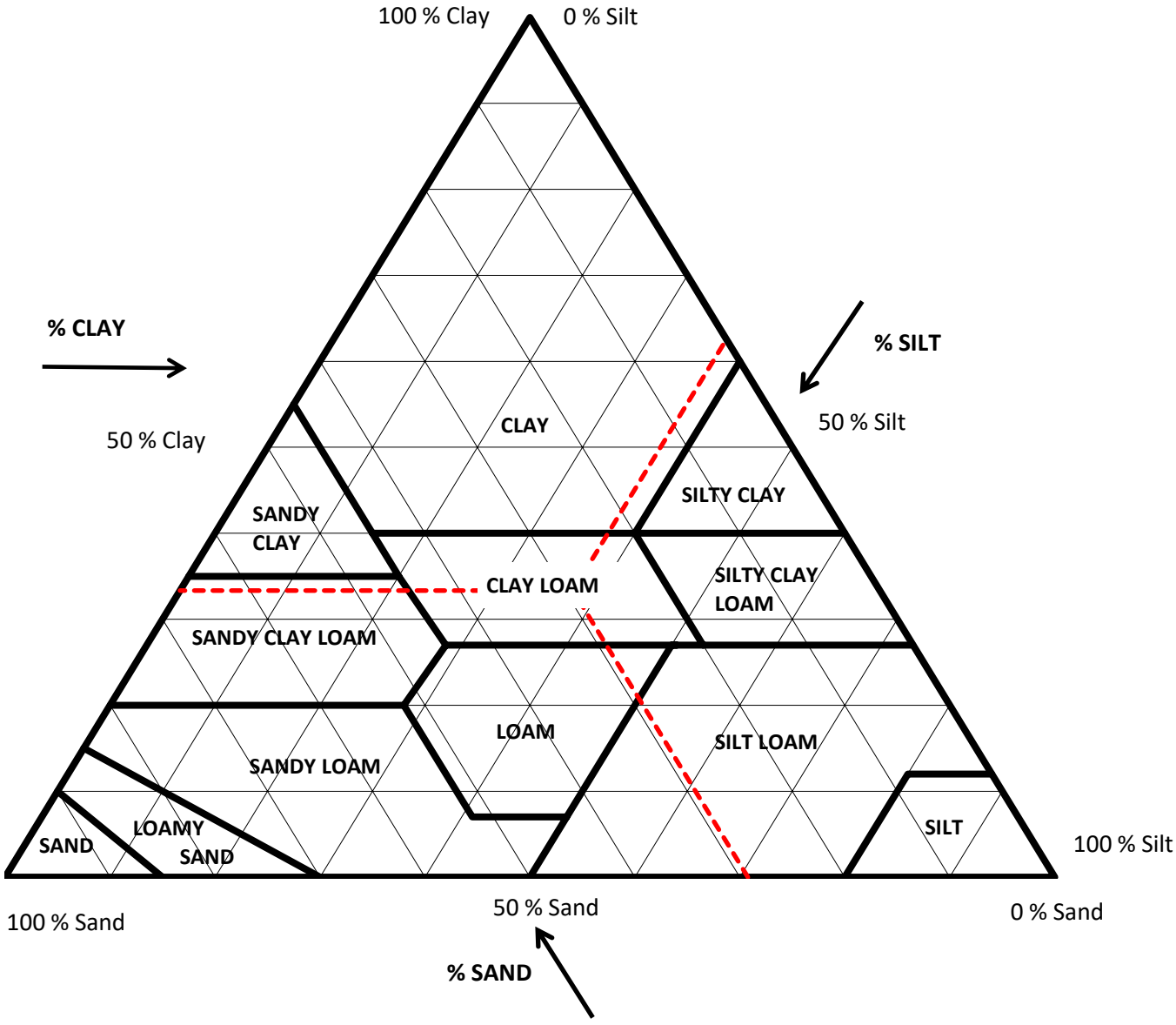
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-02
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-02-SD
		Lab Sample	40901002

Sample Color: **VERY DARK GRAY**
USCS Group Name: **LEAN CLAY WITH SAND**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (20)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	29.2
Percent Silt, %	37.4
Percent Clay, %	33.3

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.6
Coarse Sand; 1-0.5	0.7
Medium Sand; 0.5-0.25	0.8
Fine Sand; 0.25-0.1	11.0
Very Fine Sand; 0.1-0.05	16.1
Total	**29.2**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-03
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-SD
		Lab Sample	40901003

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1053
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	11
Wet Wt Passing Split, gm	1041
Dry Wt. Passing Split, gm	847
Total Sample Dry Wt, gm	859

Split Sample - Passing No. 4	
Tare No.	72
Tare + WS., gm	552.77
Tare + DS., gm	477.35
Tare, gm	147.62
Water Content of Split Sample	**22.9%**
Wt. of DS., gm	329.73
Wt. of +#200 Sample, gm	137.34

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	6.06	0.7%	99.3%	
3/8"	9.5	4.63	0.5%	98.8%	
No. 4	4.75	0.78	0.1%	98.7%	
No. 10	2	2.4	0.7%	97.9%	
No. 20	0.85	1.2	0.4%	97.6%	
No. 40	0.425	1.53	0.5%	97.1%	
No. 60	0.25	10.14	3.0%	94.1%	
No. 140	0.106	90.12	27.0%	67.1%	
No. 200	0.075	31.95	9.6%	57.6%	

HYDROMETER (-#200)

Tare No.	550	Wt. Dispers., gm	5	Specific Gravity	2.64
Wt. Tare + DS., gm	240.57	Wt. Dry Soil, gm (*-#200*)	41.12		Tested
Wt. Tare, gm	194.45	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*1.0023*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	35.5	21.5	5.6	29.9	0.0135	72.9	0.0307	42.0%
5	32	21.5	5.6	26.4	0.0135	64.4	0.0200	37.0%
15	29	21.6	5.6	23.4	0.0135	57.0	0.0118	32.8%
30	28	21.6	5.6	22.4	0.0135	54.6	0.0084	31.4%
60	26	21.7	5.6	20.4	0.0134	49.7	0.0060	28.6%
250	24	22.3	5.4	18.6	0.0133	45.3	0.0030	26.1%
1440	21	22.1	5.4	15.6	0.0134	38.0	0.0013	21.9%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**1.3**	Silt=29.6% Clay=28%	
Coarse=0; Fine=1.3		D60, mm	NA
% Sand (-#4 & +#200)	**41.1**	D30, mm	NA
Coarse=0.7; Medium=0.8; Fine=39.6		D10, mm	NA
% Fines (-#200)	**57.6**	Cc	NA
% Plus #200 (-3")	**42.4**	Cu	NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	2.1	0
2	97.9			
		Sand	47.5	48.5
0.05	50.5			
		Silt	26.3	26.9
0.002	24.2			
		Clay	24.2	24.7

USDA Classification
SANDY CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-03
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-SD
		Lab Sample	40901003

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	72
Wt. Tare & WS, gm	552.77
Wt. Tare & DS, gm	477.35
Wt. Tare, gm	147.62
Water Content, %	22.9

SAMPLE SUMMARY

Liquid Limit (LL), %	**23**
Plastic Limit (PL), %	**12**
Plasticity Index (PI)	**11**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

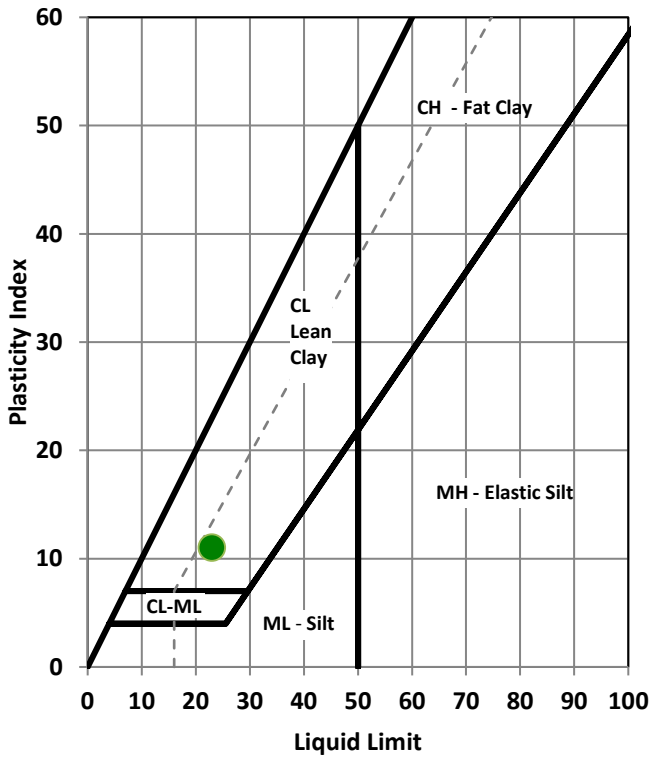
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	447	488	403
Wt. Tare & WS, gm	18.09	17.14	18.69
Wt. Tare & DS, gm	17.33	16.49	17.87
Wt. Tare, gm	10.74	10.86	10.75
Water Content, %	11.5	11.5	11.5

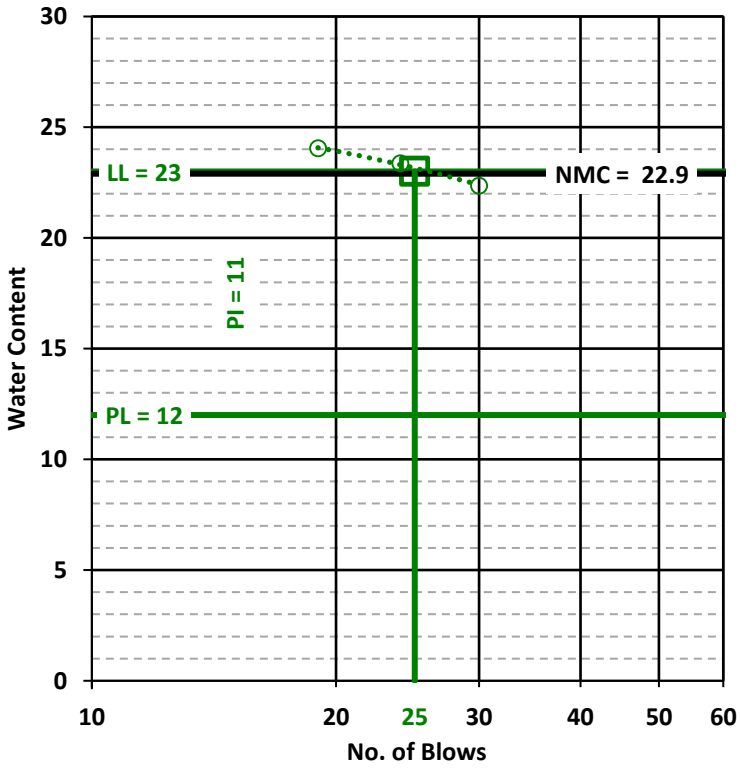
LIQUID LIMIT

	3 Points		
	470	704	410
	21.08	19.95	17.62
	19.07	18.31	16.37
	10.71	11.29	10.78
	24.0	23.4	22.4
# of Blows	19	24	30

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

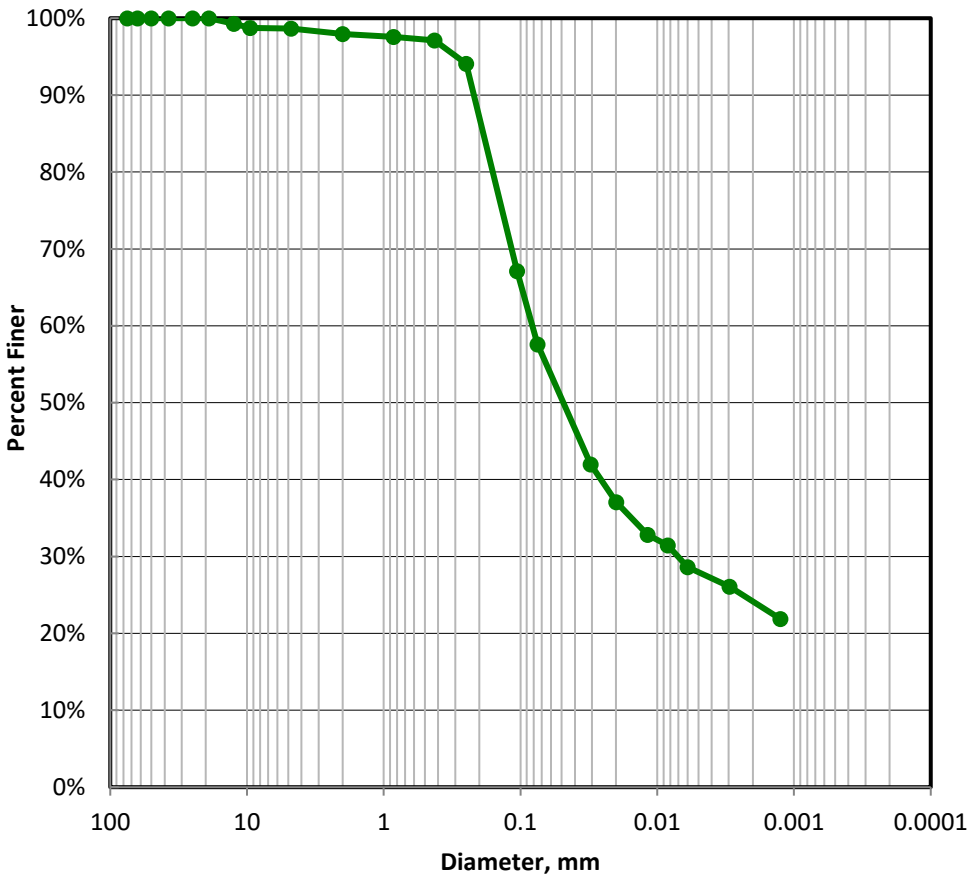
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-03
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-SD
		Lab Sample	40901003

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	99.3%
3/8"	9.5	98.8%
No. 4	4.75	98.7%
No. 10	2	97.9%
No. 20	0.85	97.6%
No. 40	0.425	97.1%
No. 60	0.25	94.1%
No. 140	0.106	67.1%
No. 200	0.075	57.6%
NA	0.0307	42.0%
NA	0.0200	37.0%
NA	0.0118	32.8%
NA	0.0084	31.4%
NA	0.0060	28.6%
NA	0.0030	26.1%
NA	0.0013	21.9%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**1.3**	Silt=29.6% Clay=28%	
Coarse=0; Fine=1.3		D60, mm	NA
% Sand (-#4 & +#200)	**41.1**	D30, mm	NA
Coarse=0.7; Medium=0.8; Fine=39.6		D10, mm	NA
% Fines (-#200)	**57.6**	Cc	NA
% Plus #200 (-3")	**42.4**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol		
CL	**CL - LEAN CLAY**		
Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	2.1	0
2	97.9			
		Sand	47.5	48.5
0.05	50.5			
		Silt	26.3	26.9
0.002	24.2			
		Clay	24.2	24.7

USDA Classification

SANDY CLAY LOAM

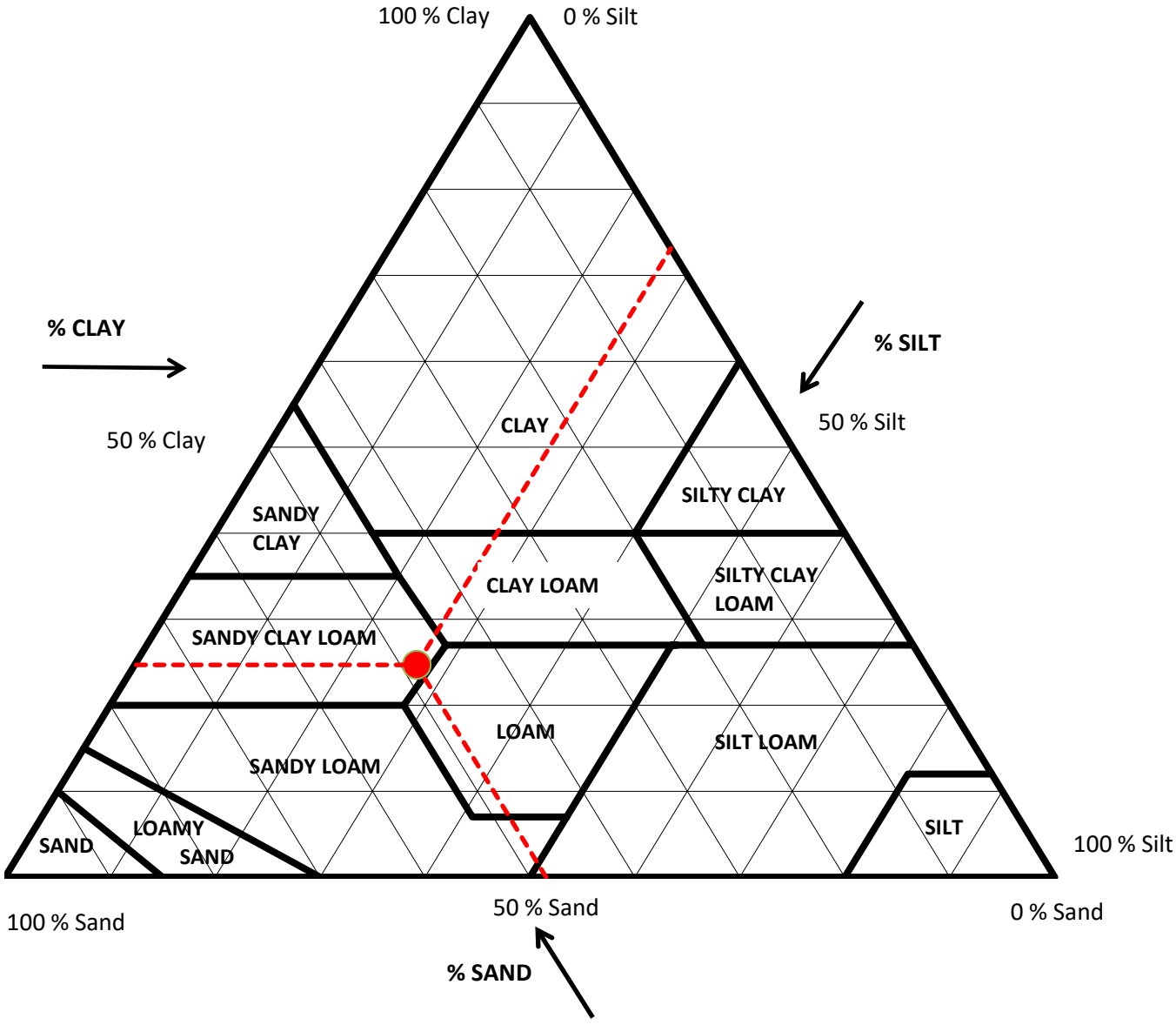
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-03
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-SD
		Lab Sample	40901003

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	48.5
Percent Silt, %	26.9
Percent Clay, %	24.7

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.3
Coarse Sand; 1-0.5	0.4
Medium Sand; 0.5-0.25	3.2
Fine Sand; 0.25-0.1	29.2
Very Fine Sand; 0.1-0.05	15.4
Total	**48.5**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-04
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-04-SD
		Lab Sample	40901004

Sample Color: **VERY DARK GRAY**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (45)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1092
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	2
Wet Wt Passing Split, gm	1091
Dry Wt. Passing Split, gm	623
Total Sample Dry Wt, gm	624

Split Sample - Passing No. 4	
Tare No.	2066
Tare + WS., gm	575.58
Tare + DS., gm	394.07
Tare, gm	152.59
Water Content of Split Sample	**75.2%**
Wt. of DS., gm	241.48
Wt. of +#200 Sample, gm	31.00

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	1.7	0.3%	99.7%	
No. 4	4.75	0	0.0%	99.7%	
No. 10	2	0.92	0.4%	99.3%	
No. 20	0.85	1.21	0.5%	98.8%	
No. 40	0.425	0.89	0.4%	98.5%	
No. 60	0.25	1.28	0.5%	98.0%	
No. 140	0.106	15.66	6.5%	91.5%	
No. 200	0.075	11.04	4.6%	86.9%	

HYDROMETER (-#200)

Tare No.	523	Wt. Dispers., gm	5	Specific Gravity	2.65
Wt. Tare + DS., gm	154.08	Wt. Dry Soil, gm (*-#200*)	46.13		Tested
Wt. Tare, gm	102.95	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*1.0000*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	48	22	5.5	42.5	0.0134	92.1	0.0273	80.1%
5	46	22	5.5	40.5	0.0134	87.8	0.0176	76.3%
15	43	22.1	5.4	37.6	0.0133	81.5	0.0104	70.9%
30	40.5	22.1	5.4	35.1	0.0133	76.1	0.0075	66.1%
60	37	22.2	5.4	31.6	0.0133	68.5	0.0055	59.5%
250	31.5	23.1	5.2	26.3	0.0132	57.0	0.0028	49.6%
1440	26.5	21.6	5.6	20.9	0.0134	45.3	0.0012	39.4%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.3**	Silt=28.7% Clay=58.2%	
Coarse=0; Fine=0.3		D60, mm	NA
% Sand (-#4 & +#200)	**12.8**	D30, mm	NA
Coarse=0.4; Medium=0.9; Fine=11.6		D10, mm	NA
% Fines (-#200)	**86.9**	Cc	NA
% Plus #200 (-3")	**13.1**	Cu	NA

USCS Description
FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.7	0
2	99.3			
		Sand	15.2	15.3
0.05	84.2			
		Silt	38.7	38.9
0.002	45.5			
		Clay	45.5	45.8

USDA Classification
CLAY

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-04
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-04-SD
		Lab Sample	40901004

Soil Description: VERY DARK GRAY FAT CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	2066
Wt. Tare & WS, gm	575.58
Wt. Tare & DS, gm	394.07
Wt. Tare, gm	152.59
Water Content, %	75.2

SAMPLE SUMMARY

Liquid Limit (LL), %	**70**
Plastic Limit (PL), %	**23**
Plasticity Index (PI)	**47**
USCS Group Symbol (*-#40 Fraction*)	**CH**
USCS Group Name (*-#40 Fraction*)	**FAT CLAY**
Sample Color:	**VERY DARK GRAY**

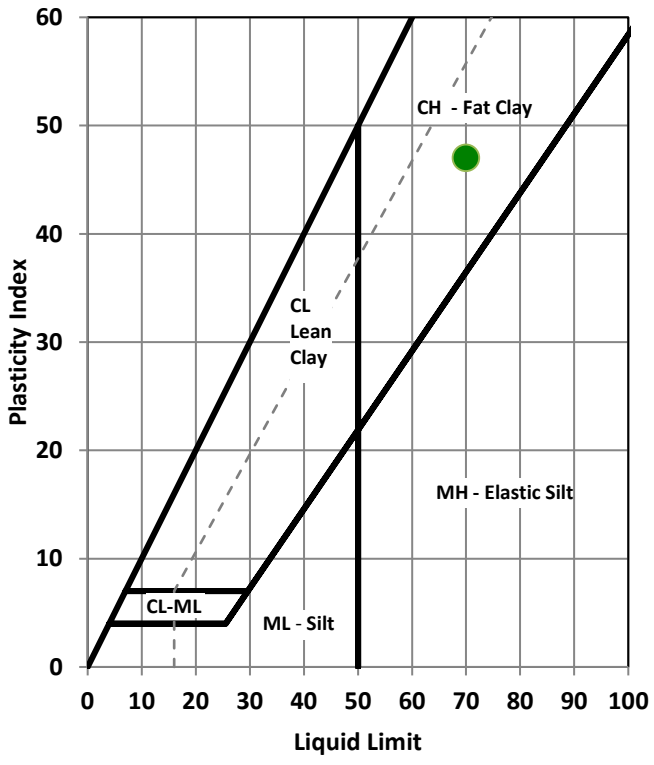
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	444	486	463
Wt. Tare & WS, gm	17.42	17.70	16.90
Wt. Tare & DS, gm	16.16	16.39	15.72
Wt. Tare, gm	10.71	10.79	10.72
Water Content, %	23.1	23.4	23.6

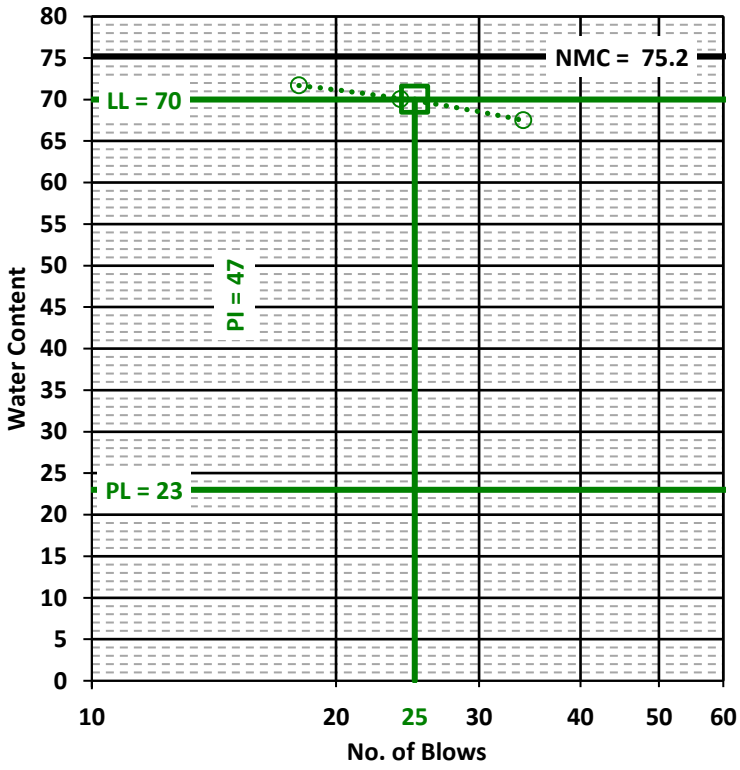
LIQUID LIMIT

	3 Points		
	405	459	424
	18.14	19.49	19.38
	14.97	15.91	15.91
	10.55	10.80	10.77
	71.7	70.1	67.5
# of Blows	18	24	34

PLASTICITY CHART



FLOW CURVE



Performed By: ZH Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

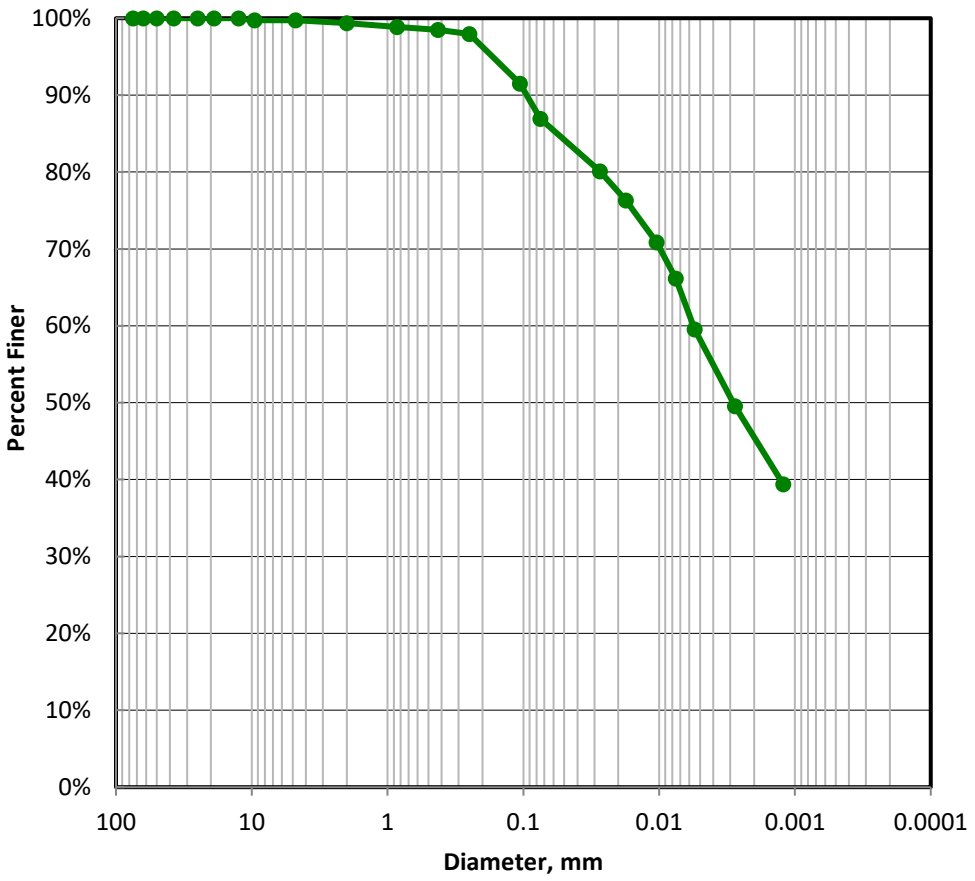
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-04
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-04-SD
		Lab Sample	40901004

Sample Color: **VERY DARK GRAY**

USCS Group Name: **FAT CLAY**

USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (45)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	99.7%
No. 4	4.75	99.7%
No. 10	2	99.3%
No. 20	0.85	98.8%
No. 40	0.425	98.5%
No. 60	0.25	98.0%
No. 140	0.106	91.5%
No. 200	0.075	86.9%
NA	0.0273	80.1%
NA	0.0176	76.3%
NA	0.0104	70.9%
NA	0.0075	66.1%
NA	0.0055	59.5%
NA	0.0028	49.6%
NA	0.0012	39.4%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.3**	Silt=28.7% Clay=58.2%	
Coarse=0; Fine=0.3		D60, mm	NA
% Sand (-#4 & +#200)	**12.8**	D30, mm	NA
Coarse=0.4; Medium=0.9; Fine=11.6		D10, mm	NA
% Fines (-#200)	**86.9**	Cc	NA
% Plus #200 (-3")	**13.1**	Cu	NA

USCS Description

FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	99.3
0.05	84.2
0.002	45.5

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.7	0
Sand	15.2	15.3
Silt	38.7	38.9
Clay	45.5	45.8

USDA Classification

CLAY

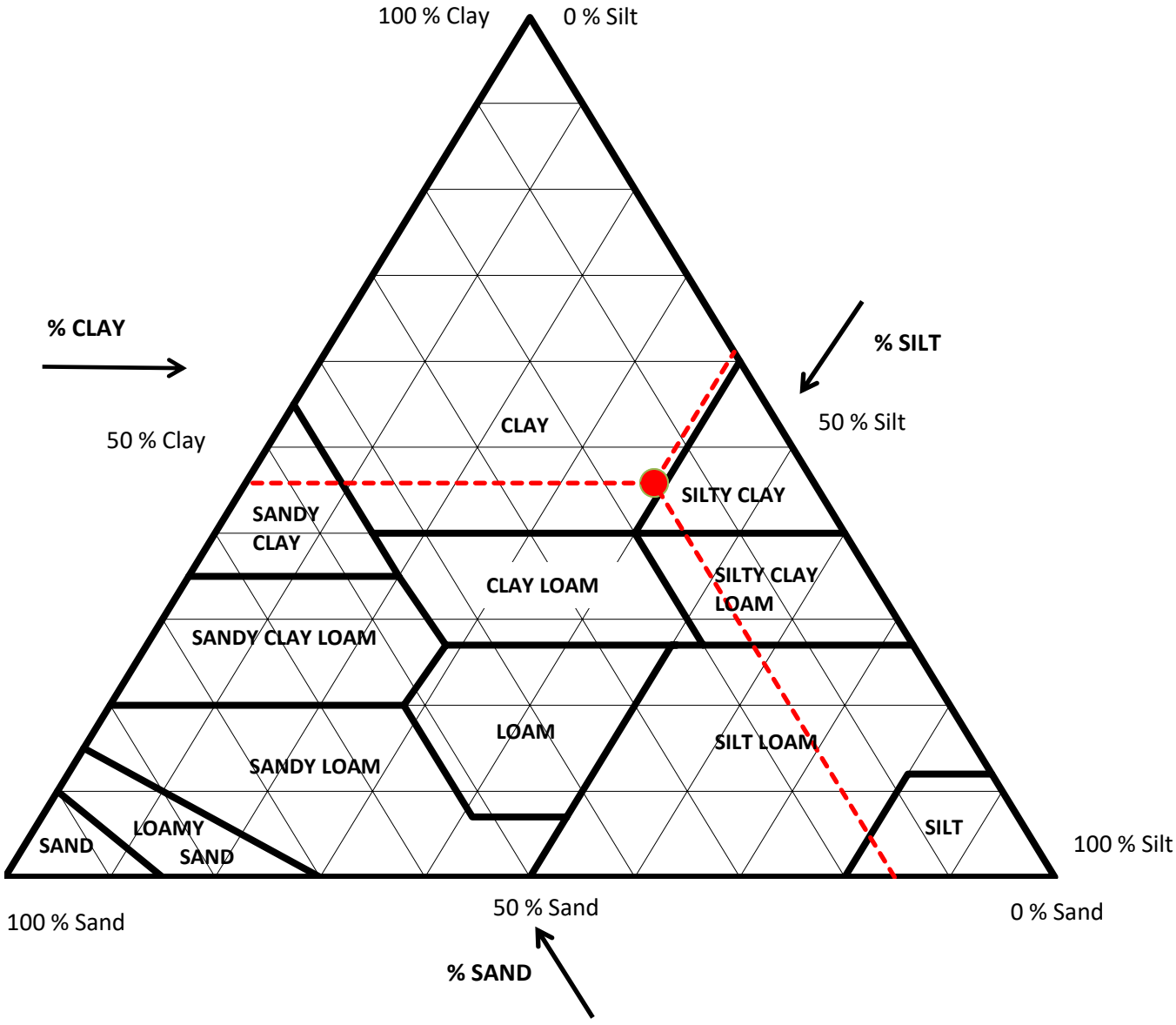
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-04
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-04-SD
		Lab Sample	40901004

Sample Color: **VERY DARK GRAY**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (45)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	15.3
Percent Silt, %	38.9
Percent Clay, %	45.8

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.4
Coarse Sand; 1-0.5	0.4
Medium Sand; 0.5-0.25	0.6
Fine Sand; 0.25-0.1	7.3
Very Fine Sand; 0.1-0.05	6.6
Total	**15.3**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-05
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-05-SD
		Lab Sample	40901005

Sample Color: **DARK GRAY**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1248
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	2
Wet Wt Passing Split, gm	1246
Dry Wt. Passing Split, gm	811
Total Sample Dry Wt, gm	813

Split Sample - Passing No. 4	
Tare No.	2009
Tare + WS., gm	674.68
Tare + DS., gm	491.61
Tare, gm	150.33
Water Content of Split Sample	**53.6%**
Wt. of DS., gm	341.28
Wt. of +#200 Sample, gm	117.76

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	1.06	0.1%	99.9%	
No. 4	4.75	1.43	0.2%	99.7%	
No. 10	2	9.72	2.8%	96.9%	
No. 20	0.85	6.84	2.0%	94.9%	
No. 40	0.425	4.41	1.3%	93.6%	
No. 60	0.25	6.52	1.9%	91.7%	
No. 140	0.106	51.98	15.2%	76.5%	
No. 200	0.075	38.29	11.2%	65.3%	

HYDROMETER (-#200)

Tare No.	543	Wt. Dispers., gm	5	Specific Gravity	2.67
Wt. Tare + DS., gm	233.81	Wt. Dry Soil, gm (*-#200*)	32.63		Tested
Wt. Tare, gm	196.18	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9955*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	32.5	21.5	5.6	26.9	0.0134	82.1	0.0311	53.6%
5	30	21.5	5.6	24.4	0.0134	74.4	0.0201	48.6%
15	28.5	21.7	5.6	22.9	0.0133	69.9	0.0117	45.6%
30	27.5	21.8	5.5	22.0	0.0133	67.1	0.0083	43.8%
60	26	21.9	5.5	20.5	0.0133	62.5	0.0059	40.8%
250	23	23	5.2	17.8	0.0131	54.3	0.0029	35.5%
1440	20.5	21.5	5.6	14.9	0.0134	45.5	0.0013	29.7%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.3**	Silt=25.8% Clay=39.5%	
Coarse=0; Fine=0.3		D60, mm	NA
% Sand (-#4 & +#200)	**34.4**	D30, mm	NA
Coarse=2.8; Medium=3.3; Fine=28.3		D10, mm	NA
% Fines (-#200)	**65.3**	Cc	NA
% Plus #200 (-3")	**34.7**	Cu	NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	3.1	0
2	96.9			
		Sand	37.0	38.2
0.05	59.9			
		Silt	27.0	27.9
0.002	32.8			
		Clay	32.8	33.9

USDA Classification
CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-05
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-05-SD
		Lab Sample	40901005

Soil Description: DARK GRAY LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	2009
Wt. Tare & WS, gm	674.68
Wt. Tare & DS, gm	491.61
Wt. Tare, gm	150.33
Water Content, %	53.6

SAMPLE SUMMARY

Liquid Limit (LL), %	**47**
Plastic Limit (PL), %	**16**
Plasticity Index (PI)	**31**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**DARK GRAY**

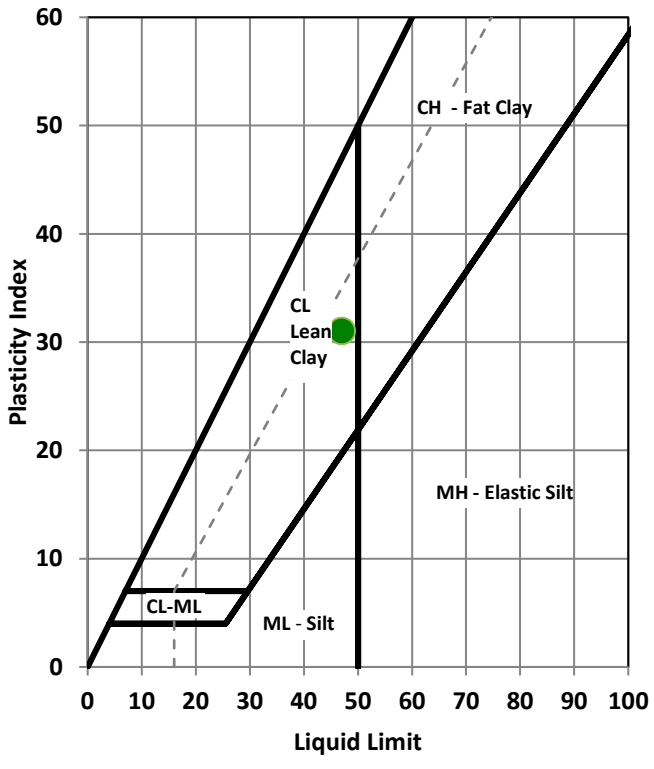
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	508	461	433
Wt. Tare & WS, gm	18.27	16.85	17.70
Wt. Tare & DS, gm	17.20	16.03	16.76
Wt. Tare, gm	10.79	10.68	10.72
Water Content, %	16.7	15.3	15.6

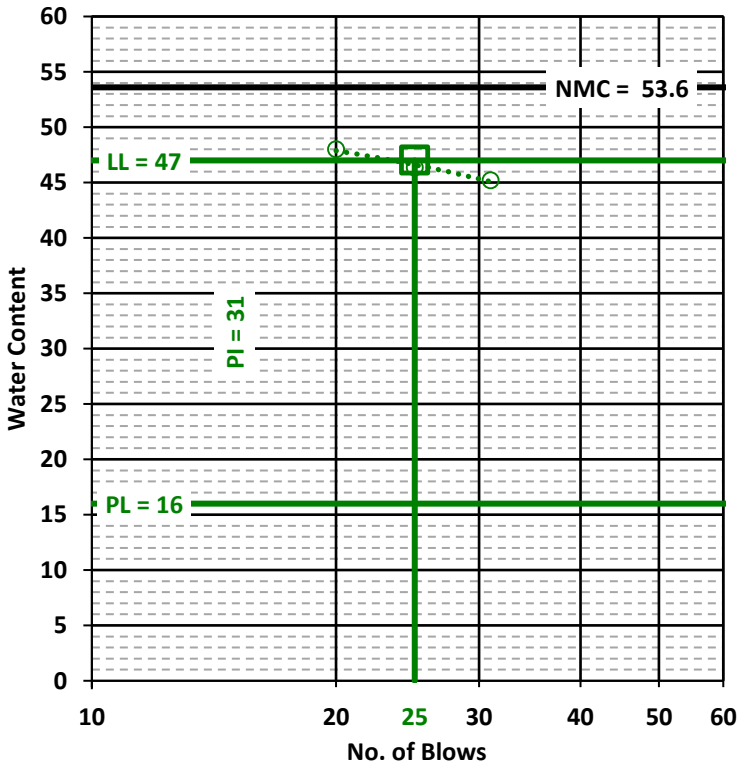
LIQUID LIMIT

	3 Points		
	469	485	500
	19.24	20.11	18.92
	16.48	17.17	16.38
	10.73	10.83	10.76
	48.0	46.4	45.2
# of Blows	20	25	31

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

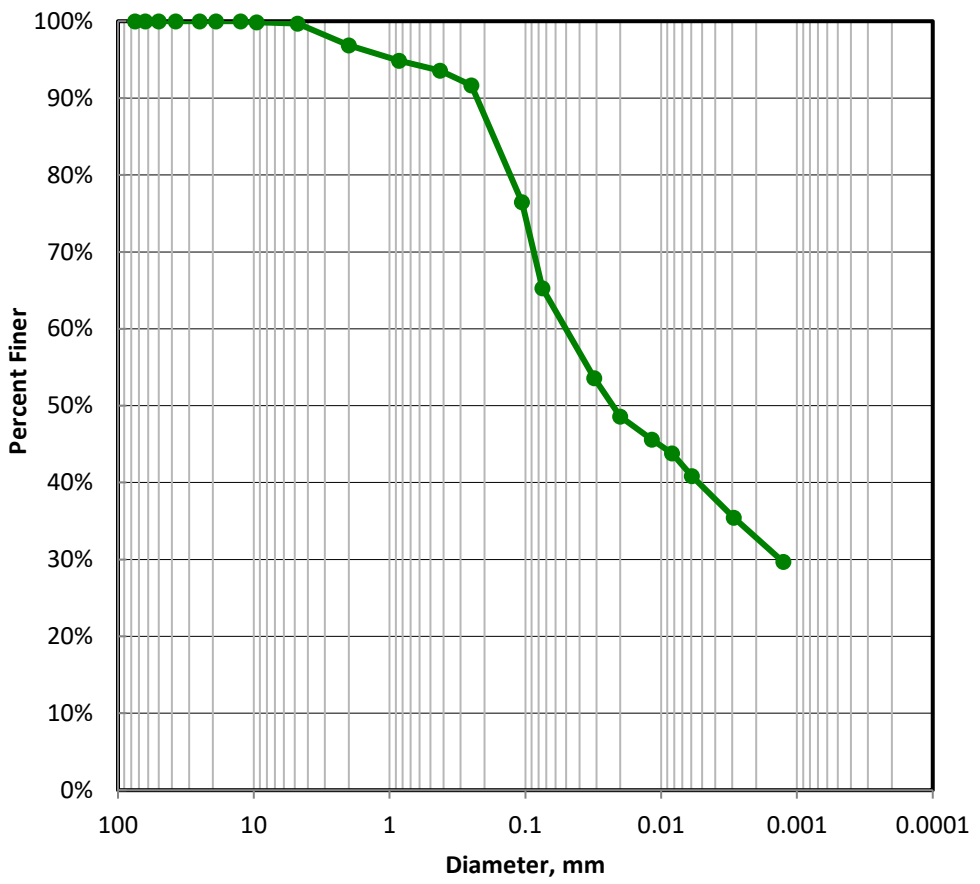
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-05
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-05-SD
		Lab Sample	40901005

Sample Color: **DARK GRAY**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	99.9%
No. 4	4.75	99.7%
No. 10	2	96.9%
No. 20	0.85	94.9%
No. 40	0.425	93.6%
No. 60	0.25	91.7%
No. 140	0.106	76.5%
No. 200	0.075	65.3%
NA	0.0311	53.6%
NA	0.0201	48.6%
NA	0.0117	45.6%
NA	0.0083	43.8%
NA	0.0059	40.8%
NA	0.0029	35.5%
NA	0.0013	29.7%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.3**	Silt=25.8% Clay=39.5%	
Coarse=0; Fine=0.3		D60, mm	NA
% Sand (-#4 & +#200)	**34.4**	D30, mm	NA
Coarse=2.8; Medium=3.3; Fine=28.3		D10, mm	NA
% Fines (-#200)	**65.3**	Cc	NA
% Plus #200 (-3")	**34.7**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	96.9
0.05	59.9
0.002	32.8

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	3.1	0
Sand	37.0	38.2
Silt	27.0	27.9
Clay	32.8	33.9

USDA Classification

CLAY LOAM

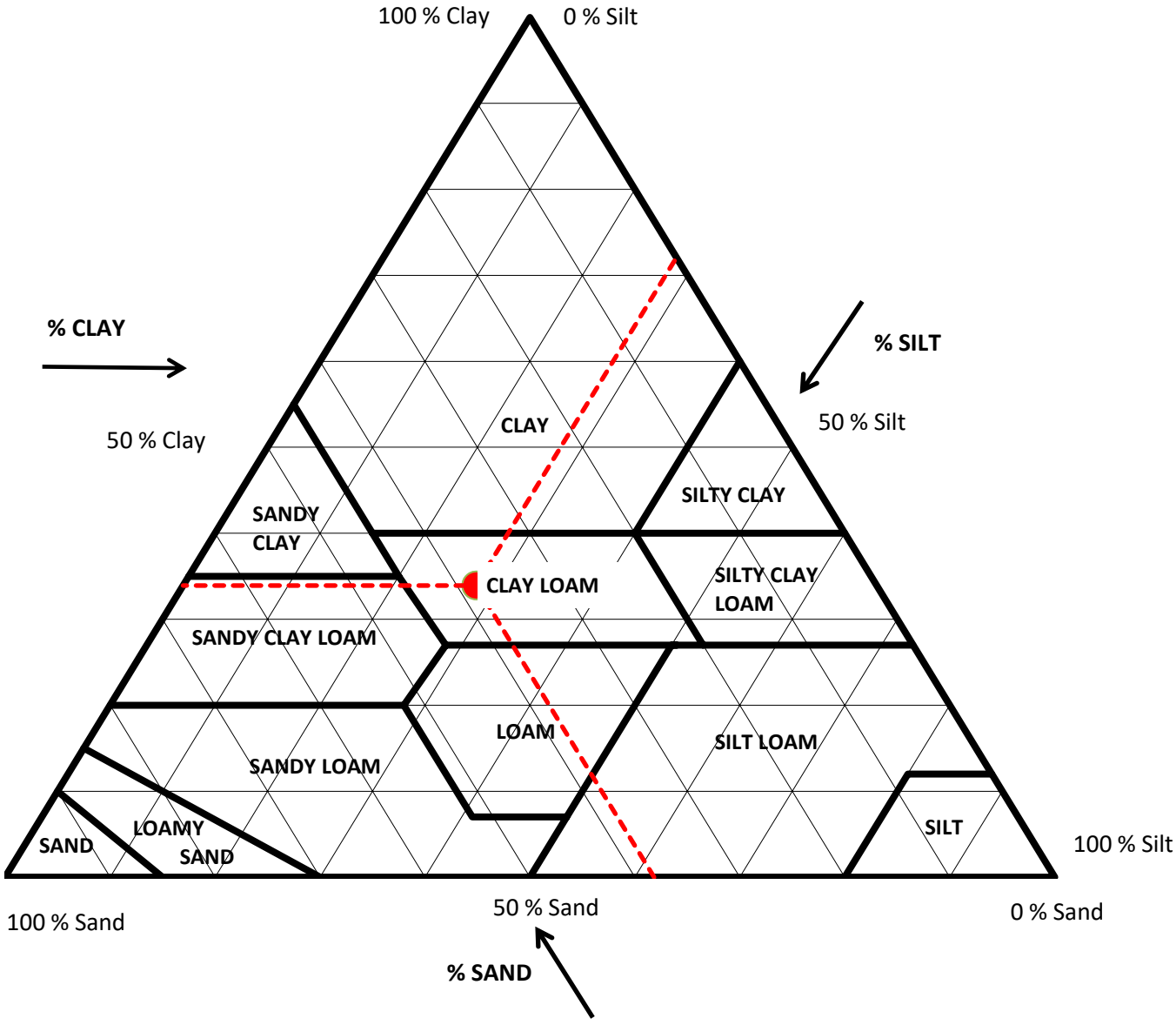
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-05
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-05-SD
		Lab Sample	40901005

Sample Color: **DARK GRAY**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	38.2
Percent Silt, %	27.9
Percent Clay, %	33.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	1.7
Coarse Sand; 1-0.5	1.4
Medium Sand; 0.5-0.25	2.3
Fine Sand; 0.25-0.1	17.6
Very Fine Sand; 0.1-0.05	15.2
Total	**38.2**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-06
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-06-SD
		Lab Sample	40901006

Sample Color: **BROWN**
USCS Group Name: **LEAN CLAY WITH SAND**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (19)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1070
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	11
Wet Wt Passing Split, gm	1059
Dry Wt. Passing Split, gm	721
Total Sample Dry Wt, gm	732

Split Sample - Passing No. 4	
Tare No.	2074
Tare + WS., gm	612.61
Tare + DS., gm	465.95
Tare, gm	153.25
Water Content of Split Sample	**46.9%**
Wt. of DS., gm	312.70
Wt. of +#200 Sample, gm	57.46

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	2.86	0.4%	99.6%	
3/8"	9.5	7.77	1.1%	98.5%	
No. 4	4.75	0.5	0.1%	98.5%	
No. 10	2	0.26	0.1%	98.4%	
No. 20	0.85	1.71	0.5%	97.9%	
No. 40	0.425	2.35	0.7%	97.1%	
No. 60	0.25	2.81	0.9%	96.2%	
No. 140	0.106	22.29	7.0%	89.2%	
No. 200	0.075	28.04	8.8%	80.4%	

HYDROMETER (-#200)

Tare No.	Q53	Wt. Dispers., gm	5	Specific Gravity	2.65
Wt. Tare + DS., gm	242.5	Wt. Dry Soil, gm (*-#200*)	45.1		Tested
Wt. Tare, gm	192.4	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*1.0000*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	42	21.4	5.6	36.4	0.0135	80.7	0.0290	64.9%
5	38	21.4	5.6	32.4	0.0135	71.8	0.0190	57.7%
15	34.5	21.5	5.6	28.9	0.0134	64.1	0.0113	51.5%
30	32	21.7	5.6	26.4	0.0134	58.5	0.0081	47.1%
60	30	21.8	5.5	24.5	0.0134	54.3	0.0058	43.7%
250	26	22.9	5.2	20.8	0.0132	46.1	0.0029	37.1%
1440	22.5	21.5	5.6	16.9	0.0134	37.5	0.0013	30.1%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**1.5**	Silt=38.1% Clay=42.3%	
Coarse=0; Fine=1.5		D60, mm	NA
% Sand (-#4 & +#200)	**18.1**	D30, mm	NA
Coarse=0.1; Medium=1.3; Fine=16.7		D10, mm	NA
% Fines (-#200)	**80.4**	Cc	NA
% Plus #200 (-3")	**19.6**	Cu	NA

USCS Description
LEAN CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	1.6	0
2	98.4			
		Sand	24.6	25.0
0.05	73.8			
		Silt	39.7	40.4
0.002	34.0			
		Clay	34.0	34.6

USDA Classification
CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-06
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-06-SD
		Lab Sample	40901006

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	2074
Wt. Tare & WS, gm	612.61
Wt. Tare & DS, gm	465.95
Wt. Tare, gm	153.25
Water Content, %	46.9

SAMPLE SUMMARY

Liquid Limit (LL), %	**42**
Plastic Limit (PL), %	**17**
Plasticity Index (PI)	**25**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

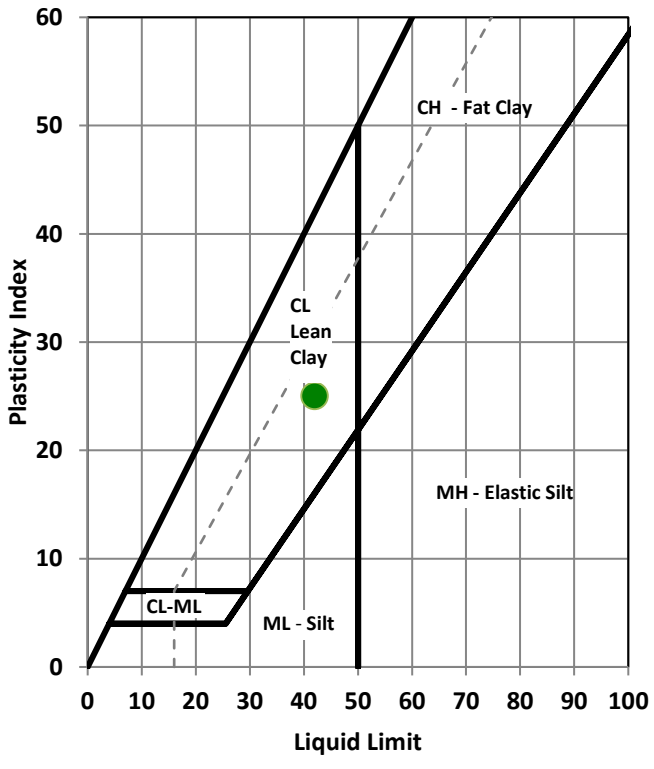
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	434	702	423
Wt. Tare & WS, gm	17.55	17.54	17.11
Wt. Tare & DS, gm	16.57	16.81	16.19
Wt. Tare, gm	10.78	12.47	10.73
Water Content, %	16.9	16.8	16.8

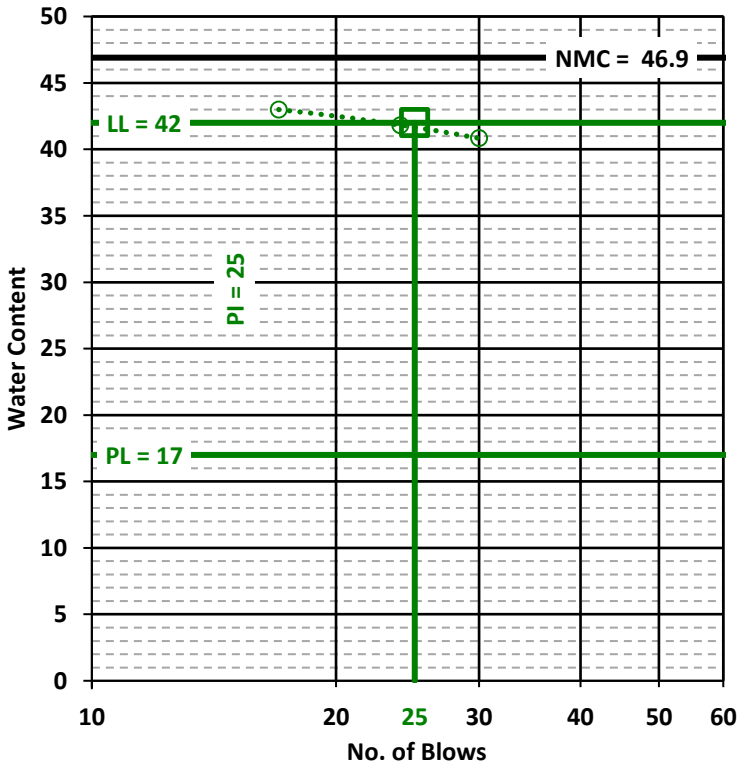
LIQUID LIMIT

	3 Points		
	422	450	404
	19.39	19.90	19.76
	16.81	17.22	17.15
	10.81	10.81	10.76
	43.0	41.8	40.8
# of Blows	17	24	30

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

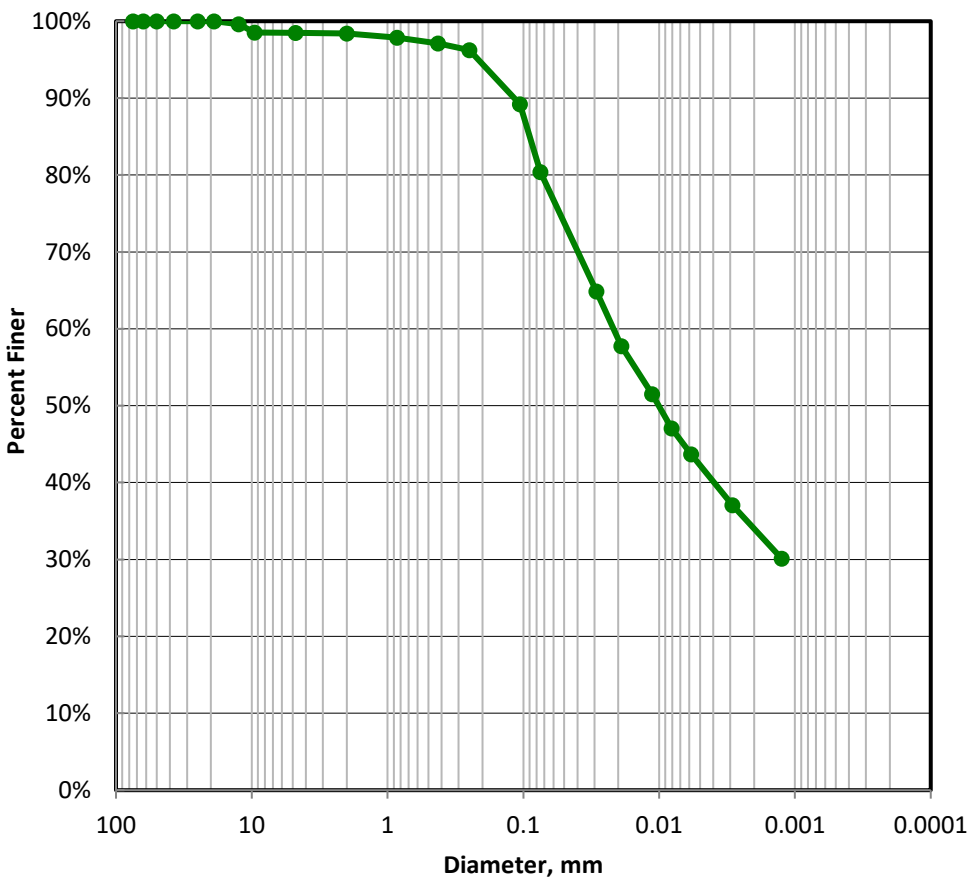
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-06
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-06-SD
		Lab Sample	40901006

Sample Color: **BROWN**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (19)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	99.6%
3/8"	9.5	98.5%
No. 4	4.75	98.5%
No. 10	2	98.4%
No. 20	0.85	97.9%
No. 40	0.425	97.1%
No. 60	0.25	96.2%
No. 140	0.106	89.2%
No. 200	0.075	80.4%
NA	0.0290	64.9%
NA	0.0190	57.7%
NA	0.0113	51.5%
NA	0.0081	47.1%
NA	0.0058	43.7%
NA	0.0029	37.1%
NA	0.0013	30.1%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**1.5**	Silt=38.1% Clay=42.3%	
Coarse=0; Fine=1.5		D60, mm	NA
% Sand (-#4 & +#200)	**18.1**	D30, mm	NA
Coarse=0.1; Medium=1.3; Fine=16.7		D10, mm	NA
% Fines (-#200)	**80.4**	Cc	NA
% Plus #200 (-3")	**19.6**	Cu	NA

USCS Description

LEAN CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	98.4
0.05	73.8
0.002	34.0

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	1.6	0
Sand	24.6	25.0
Silt	39.7	40.4
Clay	34.0	34.6

USDA Classification

CLAY LOAM

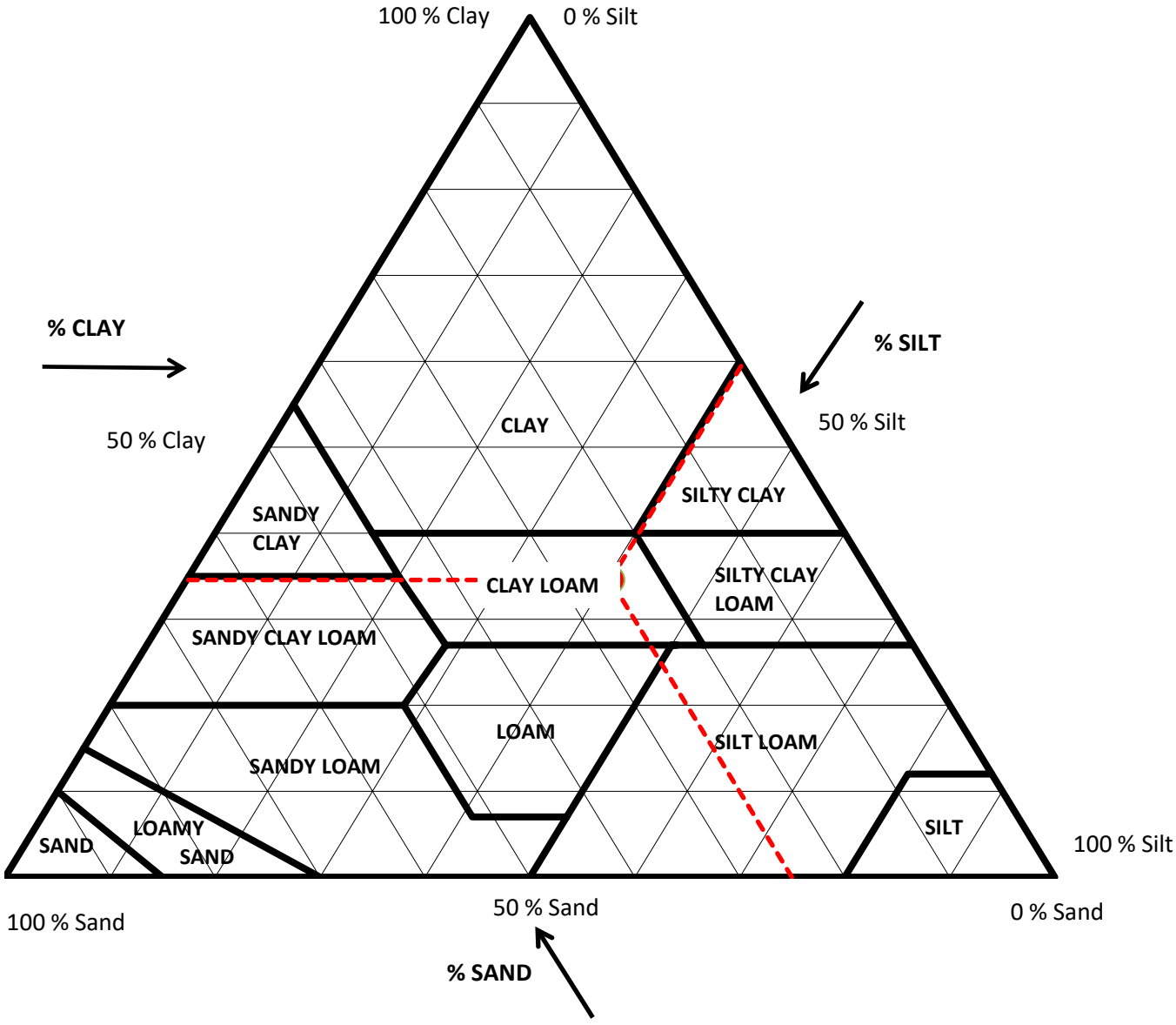
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-06
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-06-SD
		Lab Sample	40901006

Sample Color: **BROWN**
USCS Group Name: **LEAN CLAY WITH SAND**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (19)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	25.0
Percent Silt, %	40.4
Percent Clay, %	34.6

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.4
Coarse Sand; 1-0.5	0.7
Medium Sand; 0.5-0.25	1.1
Fine Sand; 0.25-0.1	8.6
Very Fine Sand; 0.1-0.05	14.2
Total	**25.0**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-07
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-07-SD
		Lab Sample	40901007

Sample Color: **BLACK**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1066
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1066
Dry Wt. Passing Split, gm	713
Total Sample Dry Wt, gm	713

Split Sample - Passing No. 4	
Tare No.	88
Tare + WS., gm	584.02
Tare + DS., gm	438.95
Tare, gm	145.87
Water Content of Split Sample	**49.5%**
Wt. of DS., gm	293.08
Wt. of +#200 Sample, gm	88.83

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.48	0.2%	99.8%	
No. 20	0.85	1.93	0.7%	99.2%	
No. 40	0.425	3.06	1.0%	98.1%	
No. 60	0.25	7.22	2.5%	95.7%	
No. 140	0.106	46.31	15.8%	79.9%	
No. 200	0.075	29.83	10.2%	69.7%	

HYDROMETER (-#200)

Tare No.	520	Wt. Dispers., gm	5	Specific Gravity	2.66
Wt. Tare + DS., gm	144.19	Wt. Dry Soil, gm (*-#200*)	37.06		Tested
Wt. Tare, gm	102.13	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9977*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	35.5	21.4	5.6	29.9	0.0134	80.5	0.0306	56.1%
5	32.5	21.4	5.6	26.9	0.0134	72.4	0.0198	50.5%
15	30	21.5	5.6	24.4	0.0134	65.7	0.0116	45.8%
30	29	21.7	5.6	23.4	0.0134	63.0	0.0083	43.9%
60	27	21.8	5.5	21.5	0.0133	57.9	0.0059	40.3%
250	24	22.9	5.2	18.8	0.0132	50.6	0.0029	35.3%
1440	22	21.4	5.6	16.4	0.0134	44.2	0.0013	30.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=30.6% Clay=39.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**30.3**	D30, mm	NA
Coarse=0.2; Medium=1.7; Fine=28.4		D10, mm	NA
% Fines (-#200)	**69.7**	Cc	NA
% Plus #200 (-3")	**30.3**	Cu	NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.2	0
2	99.8			
		Sand	36.3	36.3
0.05	63.6			
		Silt	30.3	30.3
0.002	33.3			
		Clay	33.3	33.3

USDA Classification
CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-07
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-07-SD
		Lab Sample	40901007

Soil Description: BLACK LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	88
Wt. Tare & WS, gm	584.02
Wt. Tare & DS, gm	438.95
Wt. Tare, gm	145.87
Water Content, %	49.5

SAMPLE SUMMARY

Liquid Limit (LL), %	**45**
Plastic Limit (PL), %	**16**
Plasticity Index (PI)	**29**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BLACK**

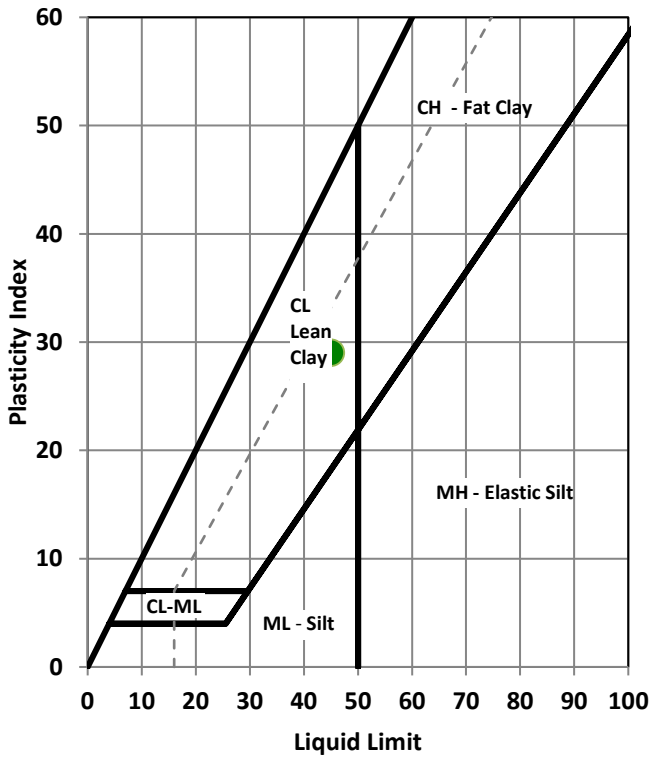
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	449	503	419
Wt. Tare & WS, gm	17.09	18.21	18.66
Wt. Tare & DS, gm	16.20	17.18	17.60
Wt. Tare, gm	10.71	10.63	10.72
Water Content, %	16.2	15.7	15.4

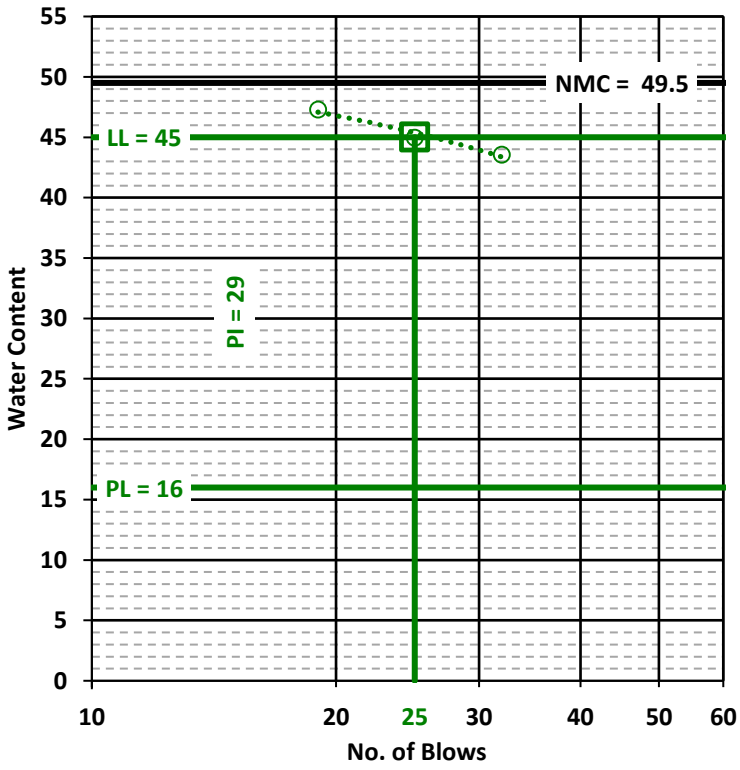
LIQUID LIMIT

	3 Points		
	467	499	460
	19.22	18.67	17.67
	16.50	16.22	15.57
	10.75	10.77	10.75
	47.3	45.0	43.6
# of Blows	19	25	32

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

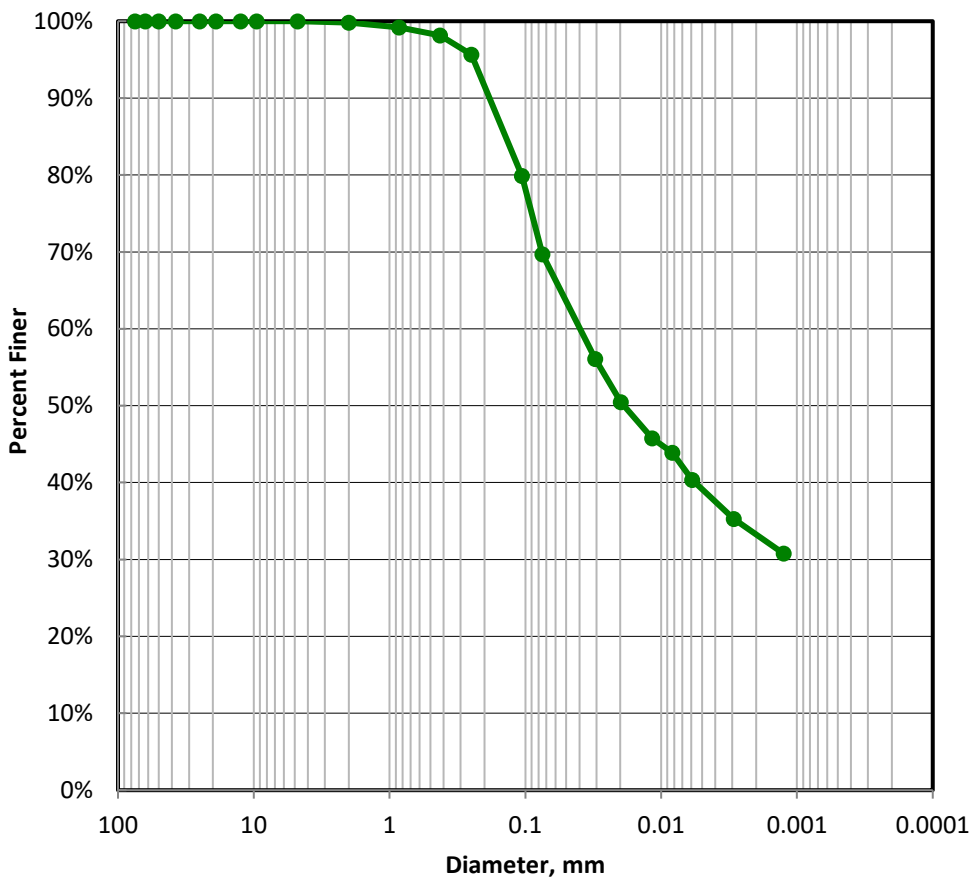
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-07
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-07-SD
		Lab Sample	40901007

Sample Color: **BLACK**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.8%
No. 20	0.85	99.2%
No. 40	0.425	98.1%
No. 60	0.25	95.7%
No. 140	0.106	79.9%
No. 200	0.075	69.7%
NA	0.0306	56.1%
NA	0.0198	50.5%
NA	0.0116	45.8%
NA	0.0083	43.9%
NA	0.0059	40.3%
NA	0.0029	35.3%
NA	0.0013	30.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=30.6% Clay=39.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**30.3**	D30, mm	NA
Coarse=0.2; Medium=1.7; Fine=28.4		D10, mm	NA
% Fines (-#200)	**69.7**	Cc	NA
% Plus #200 (-3")	**30.3**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.2	0
2	99.8			
		Sand	36.3	36.3
0.05	63.6			
		Silt	30.3	30.3
0.002	33.3			
		Clay	33.3	33.3

USDA Classification

CLAY LOAM

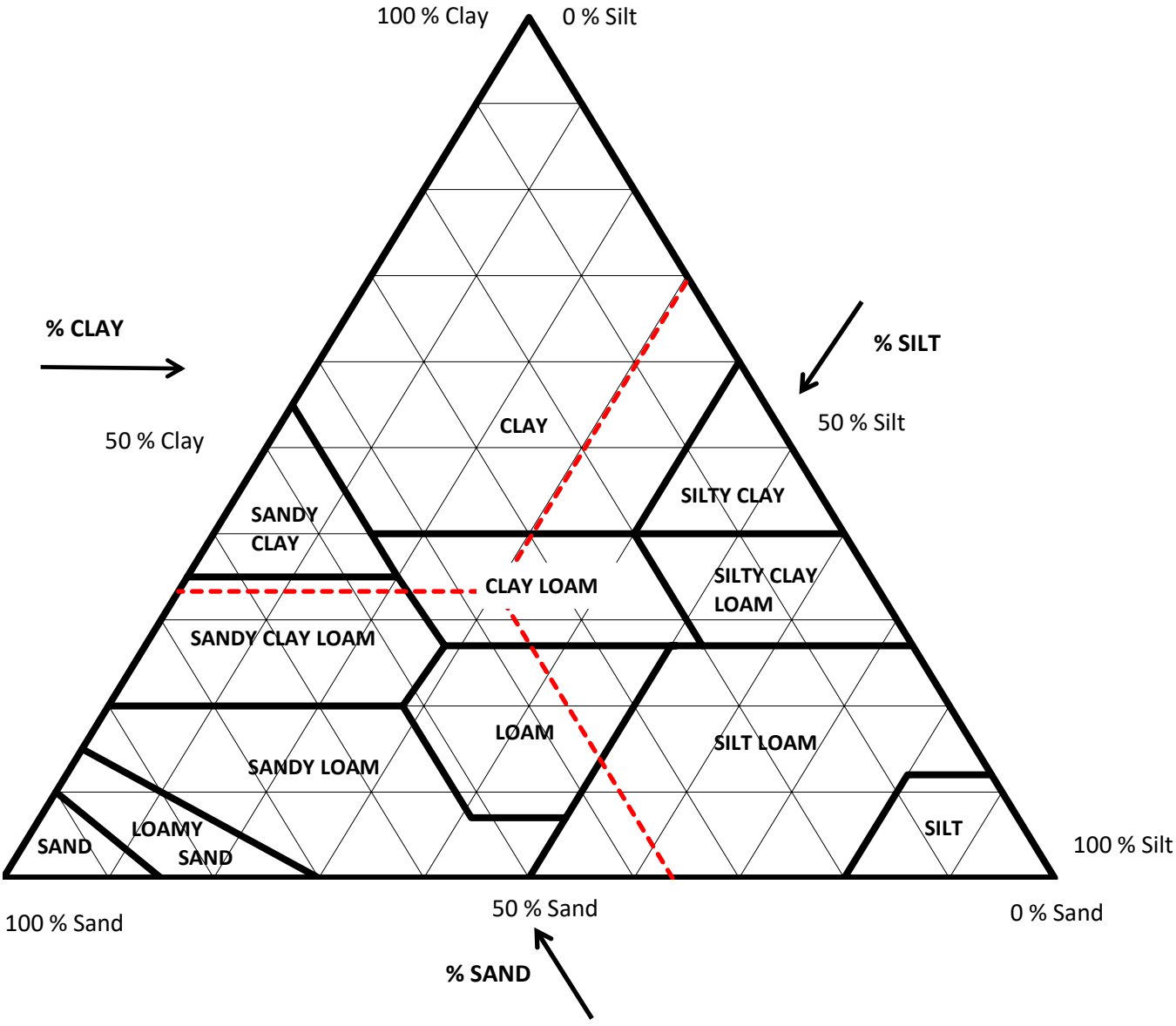
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-07
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-07-SD
		Lab Sample	40901007

Sample Color: **BLACK**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	36.3
Percent Silt, %	30.3
Percent Clay, %	33.3

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.5
Coarse Sand; 1-0.5	0.9
Medium Sand; 0.5-0.25	2.7
Fine Sand; 0.25-0.1	17.5
Very Fine Sand; 0.1-0.05	14.6
Total	**36.3**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-08
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-08-SD
		Lab Sample	40901008

Sample Color: **BROWN**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1054
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1054
Dry Wt. Passing Split, gm	712
Total Sample Dry Wt, gm	712

Split Sample - Passing No. 4	
Tare No.	87
Tare + WS., gm	642.39
Tare + DS., gm	482.08
Tare, gm	148.48
Water Content of Split Sample	**48.1%**
Wt. of DS., gm	333.60
Wt. of +#200 Sample, gm	47.61

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.5	0.1%	99.9%	
No. 20	0.85	0.94	0.3%	99.6%	
No. 40	0.425	1	0.3%	99.3%	
No. 60	0.25	2.03	0.6%	98.7%	
No. 140	0.106	32.02	9.6%	89.1%	
No. 200	0.075	11.12	3.3%	85.7%	

HYDROMETER (-#200)

Tare No.	240	Wt. Dispers., gm	5	Specific Gravity	2.64
Wt. Tare + DS., gm	235.9	Wt. Dry Soil, gm (*-#200*)	53.72		Tested
Wt. Tare, gm	177.18	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*1.0023*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	58	21.5	5.6	52.4	0.0135	97.8	0.0247	83.8%
5	56.5	21.6	5.6	50.9	0.0135	95.0	0.0159	81.4%
15	53.5	21.7	5.6	47.9	0.0134	89.4	0.0095	76.6%
30	51	21.7	5.6	45.4	0.0134	84.7	0.0069	72.6%
60	48	21.9	5.5	42.5	0.0134	79.3	0.0050	68.0%
250	40.5	22.8	5.3	35.2	0.0133	65.7	0.0026	56.3%
1440	34	21.4	5.6	28.4	0.0135	53.0	0.0012	45.4%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=17.7% Clay=68%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**14.3**	D30, mm	NA
Coarse=0.1; Medium=0.6; Fine=13.5		D10, mm	NA
% Fines (-#200)	**85.7**	Cc	NA
% Plus #200 (-3")	**14.3**	Cu	NA

USCS Description
FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.1	0
2	99.9			
		Sand	14.8	14.8
0.05	85.0			
		Silt	32.2	32.3
0.002	52.8			
		Clay	52.8	52.9

USDA Classification
CLAY

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-08
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-08-SD
		Lab Sample	40901008

Soil Description: BROWN FAT CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	87
Wt. Tare & WS, gm	642.39
Wt. Tare & DS, gm	482.08
Wt. Tare, gm	148.48
Water Content, %	48.1

SAMPLE SUMMARY

Liquid Limit (LL), %	**57**
Plastic Limit (PL), %	**19**
Plasticity Index (PI)	**38**
USCS Group Symbol (*-#40 Fraction*)	**CH**
USCS Group Name (*-#40 Fraction*)	**FAT CLAY**
Sample Color:	**BROWN**

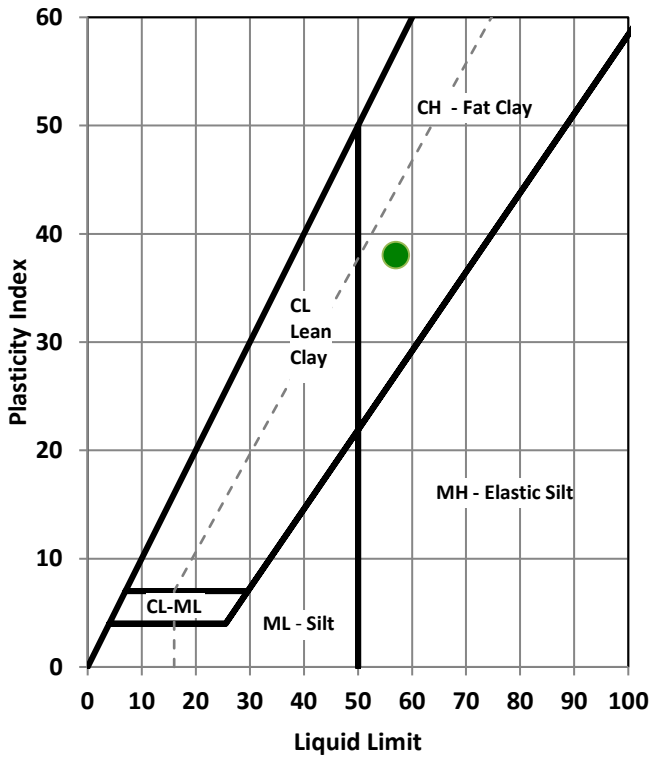
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	406	426	464
Wt. Tare & WS, gm	17.83	17.02	17.50
Wt. Tare & DS, gm	16.62	16.02	16.42
Wt. Tare, gm	10.72	10.71	10.76
Water Content, %	20.5	18.8	19.1

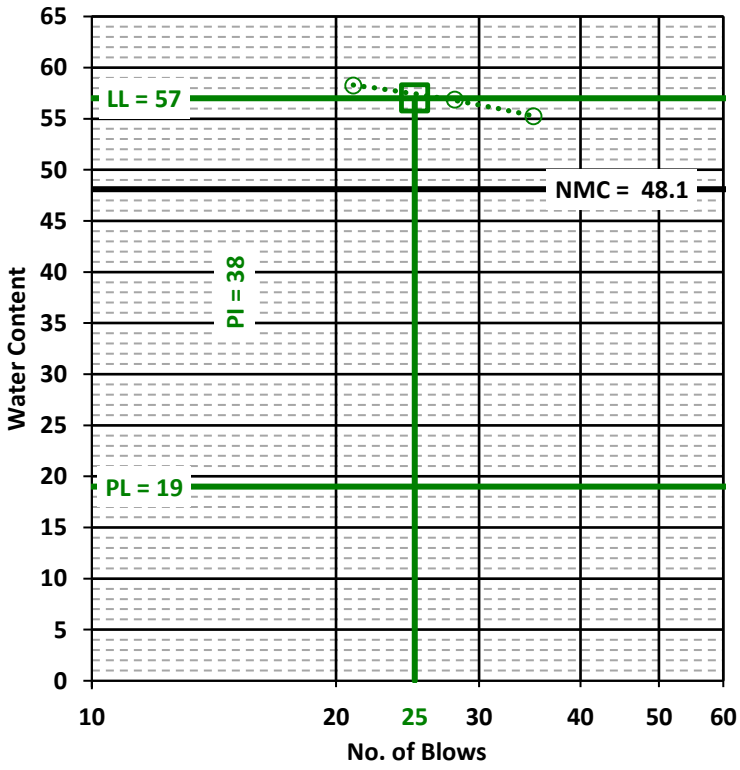
LIQUID LIMIT

	3 Points		
	510	414	480
Wt. Tare & WS, gm	19.14	19.68	19.09
Wt. Tare & DS, gm	16.07	16.45	16.08
Wt. Tare, gm	10.80	10.77	10.63
Water Content, %	58.3	56.9	55.2
# of Blows	21	28	35

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

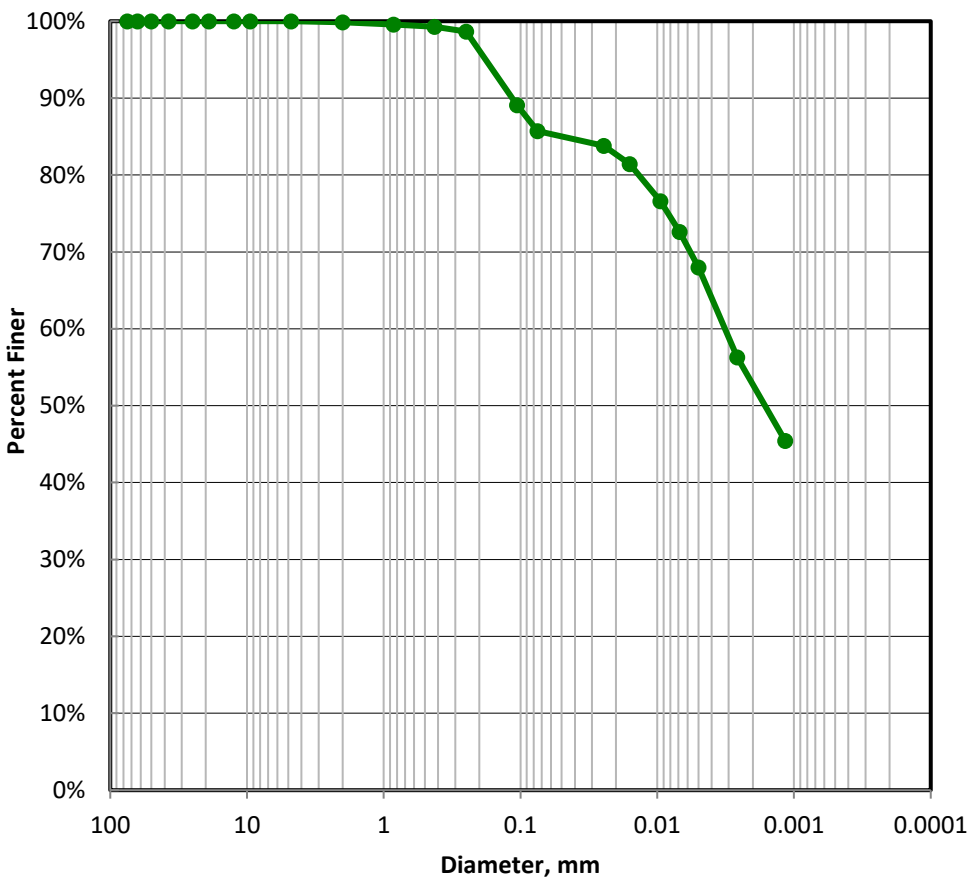
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-08
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-08-SD
		Lab Sample	40901008

Sample Color: **BROWN**

USCS Group Name: **FAT CLAY**

USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.9%
No. 20	0.85	99.6%
No. 40	0.425	99.3%
No. 60	0.25	98.7%
No. 140	0.106	89.1%
No. 200	0.075	85.7%
NA	0.0247	83.8%
NA	0.0159	81.4%
NA	0.0095	76.6%
NA	0.0069	72.6%
NA	0.0050	68.0%
NA	0.0026	56.3%
NA	0.0012	45.4%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=17.7% Clay=68%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**14.3**	D30, mm	NA
Coarse=0.1; Medium=0.6; Fine=13.5		D10, mm	NA
% Fines (-#200)	**85.7**	Cc	NA
% Plus #200 (-3")	**14.3**	Cu	NA

USCS Description

FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.1	0
2	99.9			
		Sand	14.8	14.8
0.05	85.0			
		Silt	32.2	32.3
0.002	52.8			
		Clay	52.8	52.9

USDA Classification

CLAY

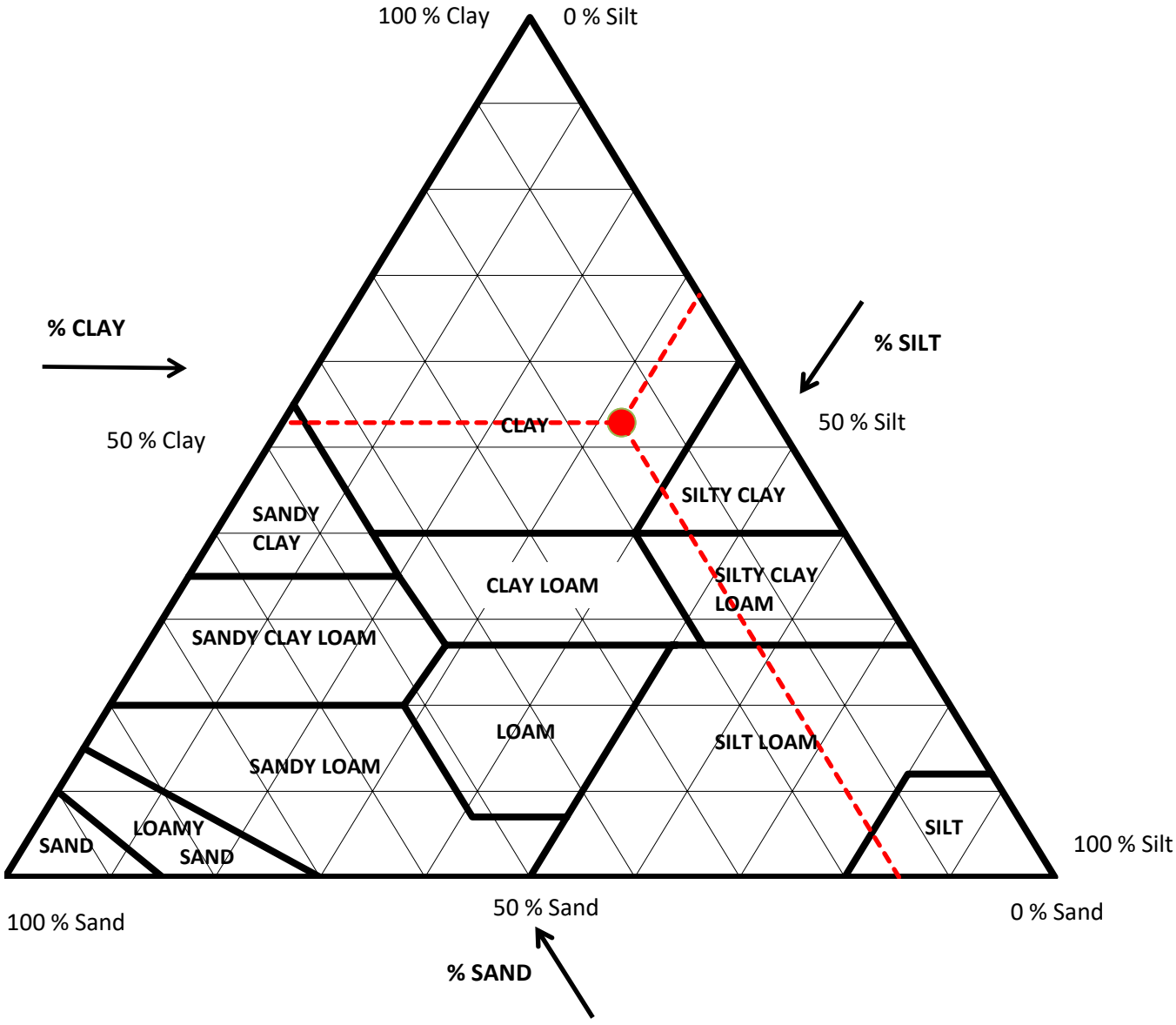
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-08
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-08-SD
		Lab Sample	40901008

Sample Color: **BROWN**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	14.8
Percent Silt, %	32.3
Percent Clay, %	52.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.2
Coarse Sand; 1-0.5	0.3
Medium Sand; 0.5-0.25	0.7
Fine Sand; 0.25-0.1	10.2
Very Fine Sand; 0.1-0.05	3.5
Total	**14.8**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-09
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-09-SD
		Lab Sample	40901009

Sample Color: **YELLOWISH RED**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1087
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1087
Dry Wt. Passing Split, gm	722
Total Sample Dry Wt, gm	722

Split Sample - Passing No. 4	
Tare No.	86
Tare + WS., gm	650.73
Tare + DS., gm	481.78
Tare, gm	147.98
Water Content of Split Sample	**50.6%**
Wt. of DS., gm	333.80
Wt. of +#200 Sample, gm	28.71

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	1.25	0.4%	99.6%	
No. 20	0.85	0.84	0.3%	99.4%	
No. 40	0.425	0.81	0.2%	99.1%	
No. 60	0.25	0.79	0.2%	98.9%	
No. 140	0.106	11.3	3.4%	95.5%	
No. 200	0.075	13.72	4.1%	91.4%	

HYDROMETER (-#200)

Tare No.	239	Wt. Dispers., gm	5	Specific Gravity	2.65
Wt. Tare + DS., gm	236.53	Wt. Dry Soil, gm (*-#200*)	51.83		Tested
Wt. Tare, gm	179.7	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*1.0000*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	54	21.5	5.6	48.4	0.0134	93.4	0.0258	85.4%
5	53	21.5	5.6	47.4	0.0134	91.5	0.0165	83.6%
15	51	21.6	5.6	45.4	0.0134	87.6	0.0097	80.1%
30	50	21.7	5.6	44.4	0.0134	85.7	0.0069	78.3%
60	47	21.9	5.5	41.5	0.0134	80.1	0.0050	73.2%
250	40	22.7	5.3	34.7	0.0132	66.9	0.0026	61.2%
1440	31	21.4	5.6	25.4	0.0135	49.0	0.0012	44.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=18.3% Clay=73.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**8.6**	D30, mm	NA
Coarse=0.4; Medium=0.5; Fine=7.7		D10, mm	NA
% Fines (-#200)	**91.4**	Cc	NA
% Plus #200 (-3")	**8.6**	Cu	NA

USCS Description
FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	10.5	10.6
0.05	89.1			
		Silt	33.4	33.5
0.002	55.7			
		Clay	55.7	55.9

USDA Classification
CLAY

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-09
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-09-SD
		Lab Sample	40901009

Soil Description: YELLOWISH RED FAT CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	86
Wt. Tare & WS, gm	650.73
Wt. Tare & DS, gm	481.78
Wt. Tare, gm	147.98
Water Content, %	50.6

SAMPLE SUMMARY

Liquid Limit (LL), %	**55**
Plastic Limit (PL), %	**21**
Plasticity Index (PI)	**34**
USCS Group Symbol (*-#40 Fraction*)	**CH**
USCS Group Name (*-#40 Fraction*)	**FAT CLAY**
Sample Color:	**YELLOWISH RED**

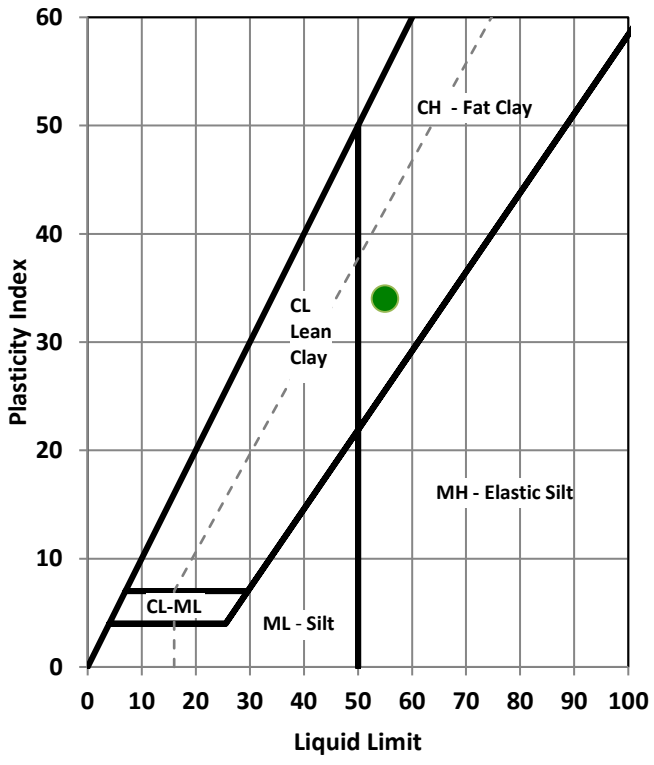
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	506	707	425
Wt. Tare & WS, gm	17.40	18.87	17.43
Wt. Tare & DS, gm	16.27	17.74	16.28
Wt. Tare, gm	10.76	12.43	10.78
Water Content, %	20.5	21.3	20.9

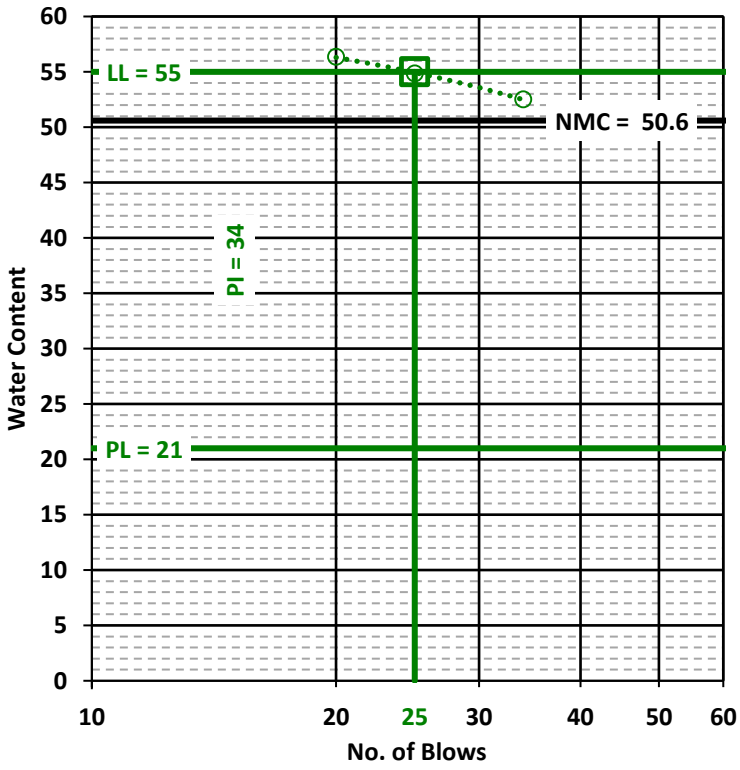
LIQUID LIMIT

	3 Points		
	411	402	496
	18.32	20.03	20.49
	15.57	16.75	17.15
	10.69	10.77	10.79
	56.4	54.8	52.5
# of Blows	20	25	34

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

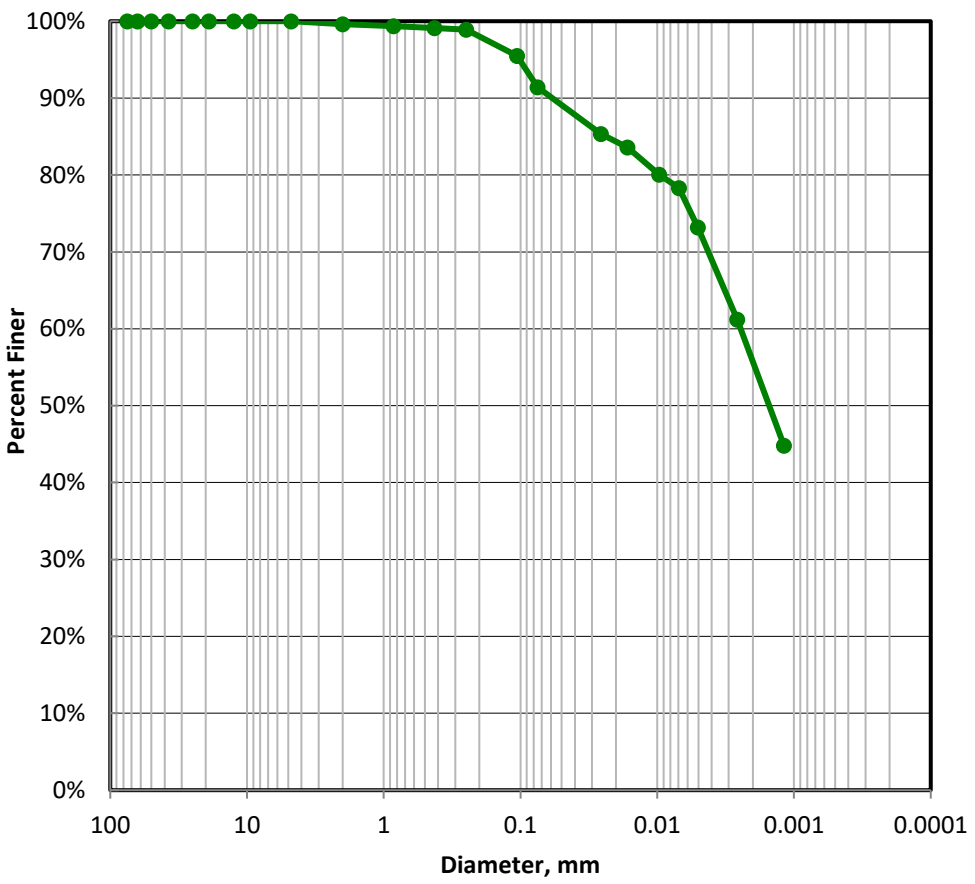
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-09
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-09-SD
		Lab Sample	40901009

Sample Color: **YELLOWISH RED**

USCS Group Name: **FAT CLAY**

USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.6%
No. 20	0.85	99.4%
No. 40	0.425	99.1%
No. 60	0.25	98.9%
No. 140	0.106	95.5%
No. 200	0.075	91.4%
NA	0.0258	85.4%
NA	0.0165	83.6%
NA	0.0097	80.1%
NA	0.0069	78.3%
NA	0.0050	73.2%
NA	0.0026	61.2%
NA	0.0012	44.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=18.3% Clay=73.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**8.6**	D30, mm	NA
Coarse=0.4; Medium=0.5; Fine=7.7		D10, mm	NA
% Fines (-#200)	**91.4**	Cc	NA
% Plus #200 (-3")	**8.6**	Cu	NA

USCS Description

FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	99.6
0.05	89.1
0.002	55.7

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.4	0
Sand	10.5	10.6
Silt	33.4	33.5
Clay	55.7	55.9

USDA Classification

CLAY

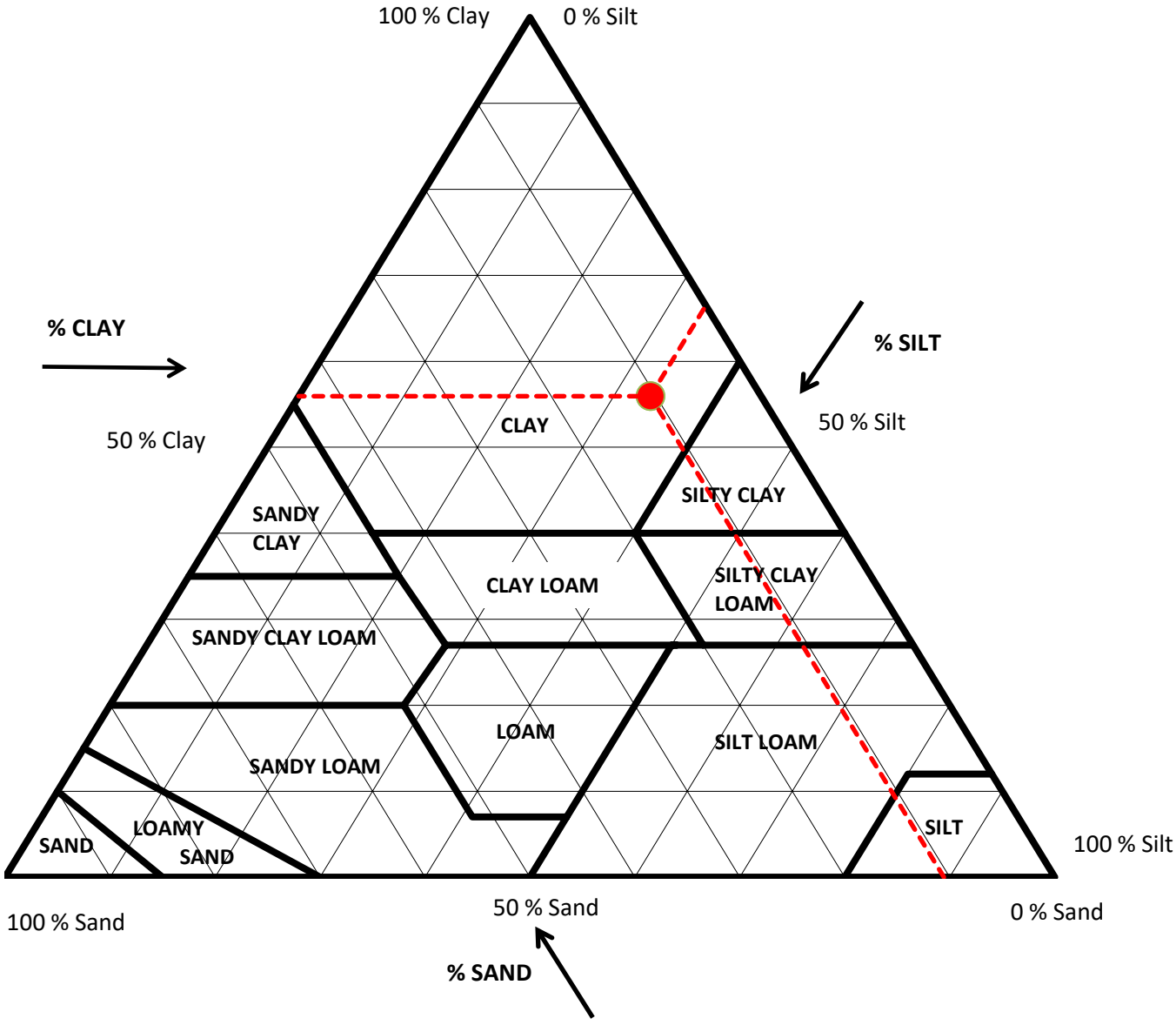
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-09
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-09-SD
		Lab Sample	40901009

Sample Color: **YELLOWISH RED**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	10.6
Percent Silt, %	33.5
Percent Clay, %	55.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.2
Coarse Sand; 1-0.5	0.2
Medium Sand; 0.5-0.25	0.3
Fine Sand; 0.25-0.1	4.1
Very Fine Sand; 0.1-0.05	5.7
Total	**10.6**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-10
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-10-SD
		Lab Sample	40901010

Sample Color: **BROWN**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (33)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1012
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1012
Dry Wt. Passing Split, gm	672
Total Sample Dry Wt, gm	672

Split Sample - Passing No. 4	
Tare No.	85
Tare + WS., gm	602.22
Tare + DS., gm	449.07
Tare, gm	146.04
Water Content of Split Sample	**50.5%**
Wt. of DS., gm	303.03
Wt. of +#200 Sample, gm	39.67

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.66	0.2%	99.8%	
No. 20	0.85	0.76	0.3%	99.5%	
No. 40	0.425	0.59	0.2%	99.3%	
No. 60	0.25	0.87	0.3%	99.0%	
No. 140	0.106	23.6	7.8%	91.3%	
No. 200	0.075	13.19	4.4%	86.9%	

HYDROMETER (-#200)

Tare No.	238	Wt. Dispers., gm	5	Specific Gravity	2.69
Wt. Tare + DS., gm	237.26	Wt. Dry Soil, gm (*-#200*)	52.38		Tested
Wt. Tare, gm	179.88	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9911*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	55	21.5	5.6	49.4	0.0133	93.5	0.0252	81.2%
5	52.5	21.5	5.6	46.9	0.0133	88.7	0.0164	77.1%
15	50	21.6	5.6	44.4	0.0133	84.0	0.0097	73.0%
30	48	21.7	5.6	42.4	0.0132	80.2	0.0070	69.7%
60	44.5	21.8	5.5	39.0	0.0132	73.8	0.0051	64.1%
250	38.5	22.7	5.3	33.2	0.0131	62.8	0.0026	54.6%
1440	32	21.3	5.7	26.3	0.0133	49.8	0.0012	43.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23% Clay=63.9%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**13.1**	D30, mm	NA
Coarse=0.2; Medium=0.4; Fine=12.4		D10, mm	NA
% Fines (-#200)	**86.9**	Cc	NA
% Plus #200 (-3")	**13.1**	Cu	NA

USCS Description
FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.2	0
2	99.8			
		Sand	15.0	15.0
0.05	84.8			
		Silt	33.9	34.0
0.002	50.9			
		Clay	50.9	51.0

USDA Classification
CLAY

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-10
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-10-SD
		Lab Sample	40901010

Soil Description: BROWN FAT CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	85
Wt. Tare & WS, gm	602.22
Wt. Tare & DS, gm	449.07
Wt. Tare, gm	146.04
Water Content, %	50.5

SAMPLE SUMMARY

Liquid Limit (LL), %	**56**
Plastic Limit (PL), %	**20**
Plasticity Index (PI)	**36**
USCS Group Symbol (*-#40 Fraction*)	**CH**
USCS Group Name (*-#40 Fraction*)	**FAT CLAY**
Sample Color:	**BROWN**

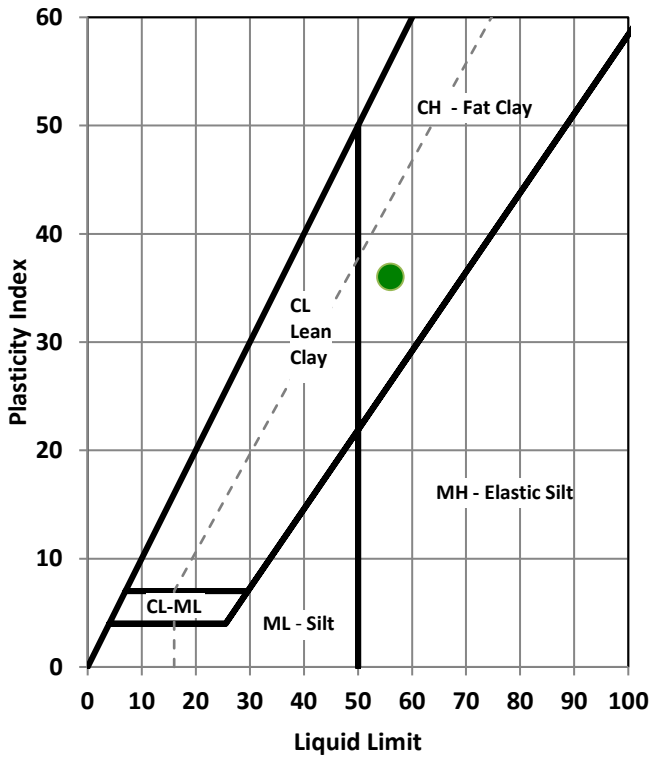
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	477	446	492
Wt. Tare & WS, gm	16.76	17.14	17.93
Wt. Tare & DS, gm	15.74	16.01	16.76
Wt. Tare, gm	10.73	10.68	10.76
Water Content, %	20.4	21.2	19.5

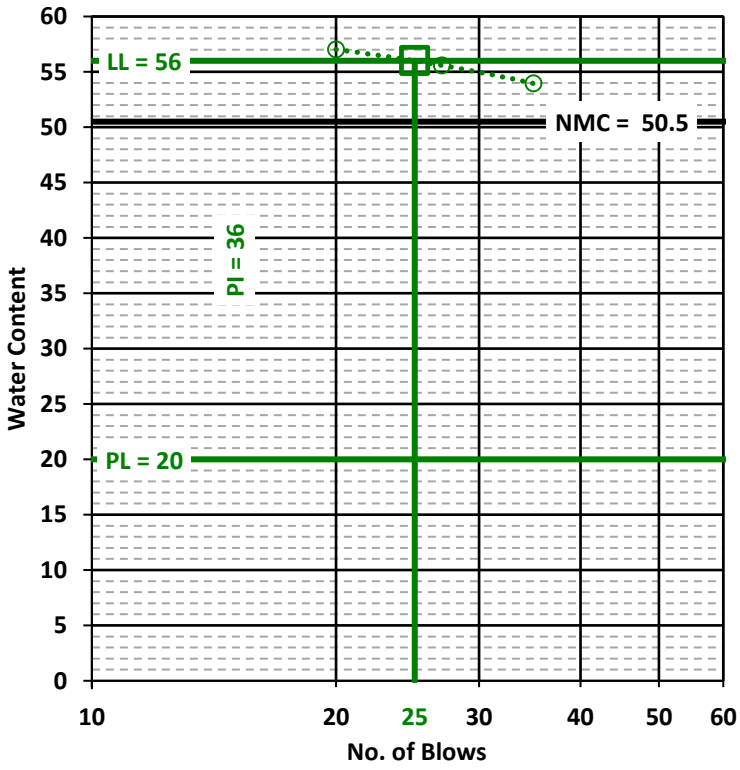
LIQUID LIMIT

	3 Points		
	711	703	512
	18.67	19.74	19.90
	15.99	16.70	16.69
	11.29	11.23	10.74
	57.0	55.6	53.9
# of Blows	20	27	35

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

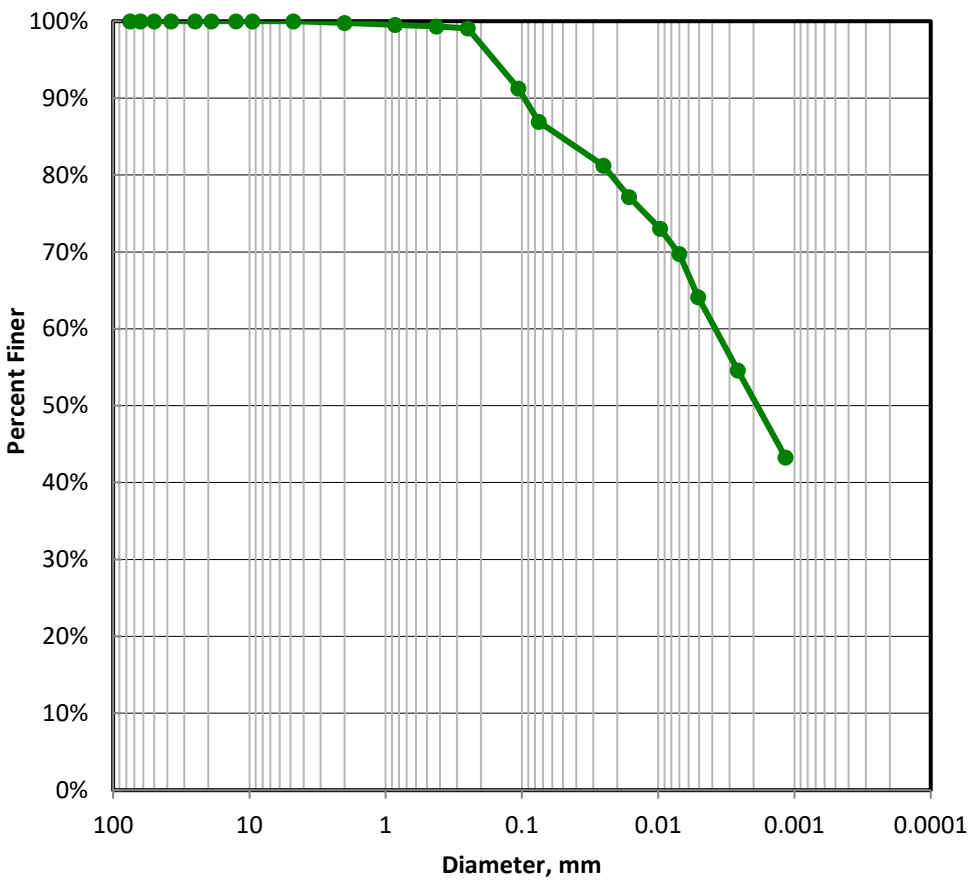
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-10
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-10-SD
		Lab Sample	40901010

Sample Color: **BROWN**

USCS Group Name: **FAT CLAY**

USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (33)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.8%
No. 20	0.85	99.5%
No. 40	0.425	99.3%
No. 60	0.25	99.0%
No. 140	0.106	91.3%
No. 200	0.075	86.9%
NA	0.0252	81.2%
NA	0.0164	77.1%
NA	0.0097	73.0%
NA	0.0070	69.7%
NA	0.0051	64.1%
NA	0.0026	54.6%
NA	0.0012	43.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23% Clay=63.9%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**13.1**	D30, mm	NA
Coarse=0.2; Medium=0.4; Fine=12.4		D10, mm	NA
% Fines (-#200)	**86.9**	Cc	NA
% Plus #200 (-3")	**13.1**	Cu	NA

USCS Description

FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	99.8
0.05	84.8
0.002	50.9

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.2	0
Sand	15.0	15.0
Silt	33.9	34.0
Clay	50.9	51.0

USDA Classification

CLAY

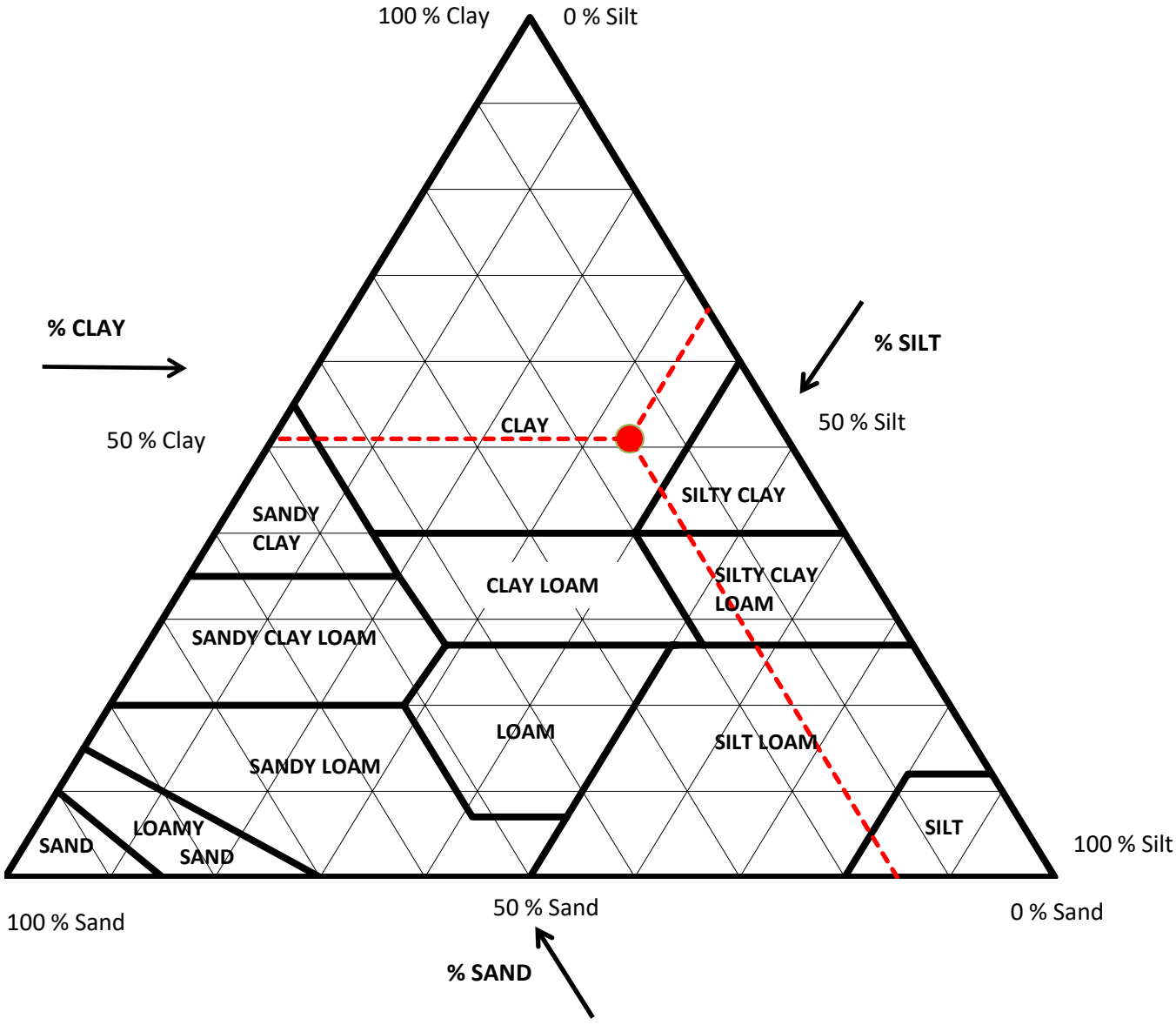
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-10
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-10-SD
		Lab Sample	40901010

Sample Color: **BROWN**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (33)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	15.0
Percent Silt, %	34.0
Percent Clay, %	51.0

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.2
Coarse Sand; 1-0.5	0.2
Medium Sand; 0.5-0.25	0.3
Fine Sand; 0.25-0.1	8.5
Very Fine Sand; 0.1-0.05	5.7
Total	**15.0**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-11
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-11-SD
		Lab Sample	40901011

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (7)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1064
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1064
Dry Wt. Passing Split, gm	775
Total Sample Dry Wt, gm	775

Split Sample - Passing No. 4	
Tare No.	B04
Tare + WS., gm	508.55
Tare + DS., gm	393.4
Tare, gm	84.25
Water Content of Split Sample	**37.2%**
Wt. of DS., gm	309.15
Wt. of +#200 Sample, gm	130.78

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	1.16	0.4%	99.6%	
No. 20	0.85	0.69	0.2%	99.4%	
No. 40	0.425	1.03	0.3%	99.1%	
No. 60	0.25	10.52	3.4%	95.7%	
No. 140	0.106	94.18	30.5%	65.2%	
No. 200	0.075	23.2	7.5%	57.7%	

HYDROMETER (-#200)

Tare No.	237	Wt. Dispers., gm	5	Specific Gravity	2.66
Wt. Tare + DS., gm	219.53	Wt. Dry Soil, gm (*-#200*)	41.1		Tested
Wt. Tare, gm	173.43	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9977*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	41.5	21.4	5.6	35.9	0.0134	87.1	0.0291	50.3%
5	39	21.4	5.6	33.4	0.0134	81.1	0.0188	46.8%
15	36	21.4	5.6	30.4	0.0134	73.8	0.0111	42.6%
30	34	21.5	5.6	28.4	0.0134	68.9	0.0080	39.8%
60	31	21.6	5.6	25.4	0.0134	61.7	0.0058	35.6%
250	27.5	22.8	5.3	22.2	0.0132	53.9	0.0029	31.1%
1440	24	21.3	5.7	18.3	0.0134	44.4	0.0012	25.6%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23.0% Clay=34.7%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**42.3**	D30, mm	NA
Coarse=0.4; Medium=0.6; Fine=41.4		D10, mm	NA
% Fines (-#200)	**57.7**	Cc	NA
% Plus #200 (-3")	**42.3**	Cu	NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	45.1	45.3
0.05	54.5			
		Silt	25.8	25.9
0.002	28.8			
		Clay	28.8	28.9

USDA Classification
SANDY CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-11
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-11-SD
		Lab Sample	40901011

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	B04
Wt. Tare & WS, gm	508.55
Wt. Tare & DS, gm	393.40
Wt. Tare, gm	84.25
Water Content, %	37.2

SAMPLE SUMMARY

Liquid Limit (LL), %	**32**
Plastic Limit (PL), %	**14**
Plasticity Index (PI)	**18**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

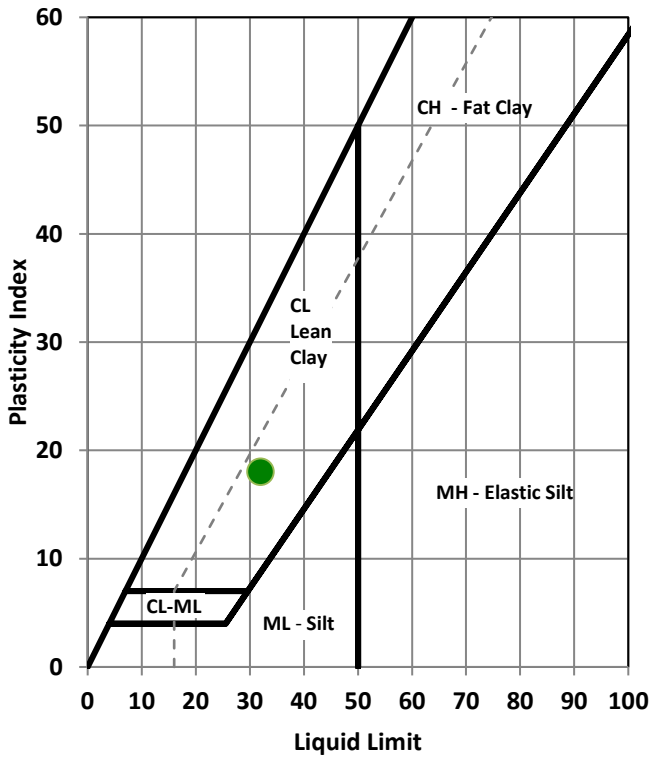
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	476	429	493
Wt. Tare & WS, gm	17.98	17.45	18.51
Wt. Tare & DS, gm	17.12	16.62	17.59
Wt. Tare, gm	10.81	10.63	10.72
Water Content, %	13.6	13.9	13.4

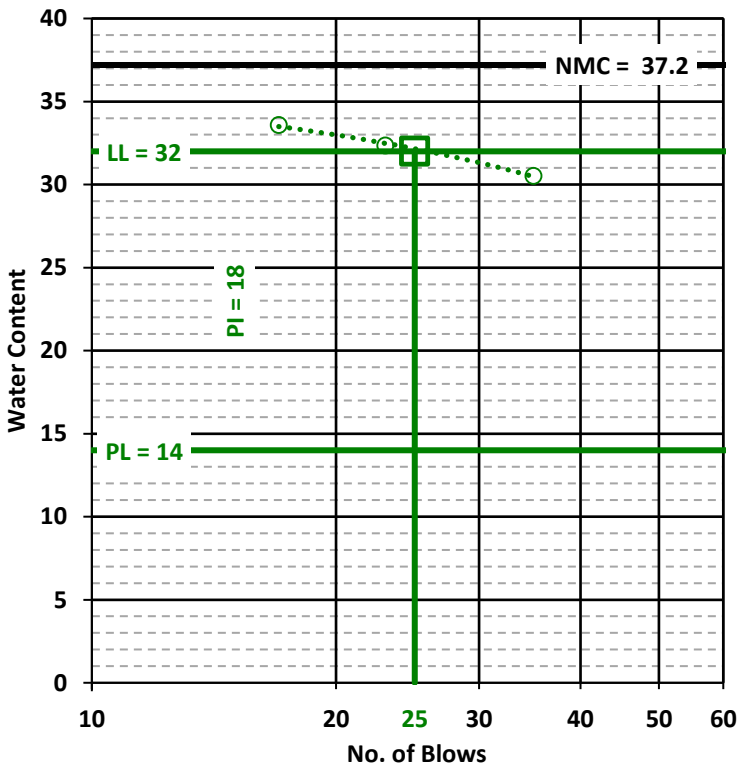
LIQUID LIMIT

	3 Points		
	462	412	490
	19.81	20.64	19.93
	17.54	18.22	17.79
	10.78	10.74	10.78
	33.6	32.4	30.5
# of Blows	17	23	35

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

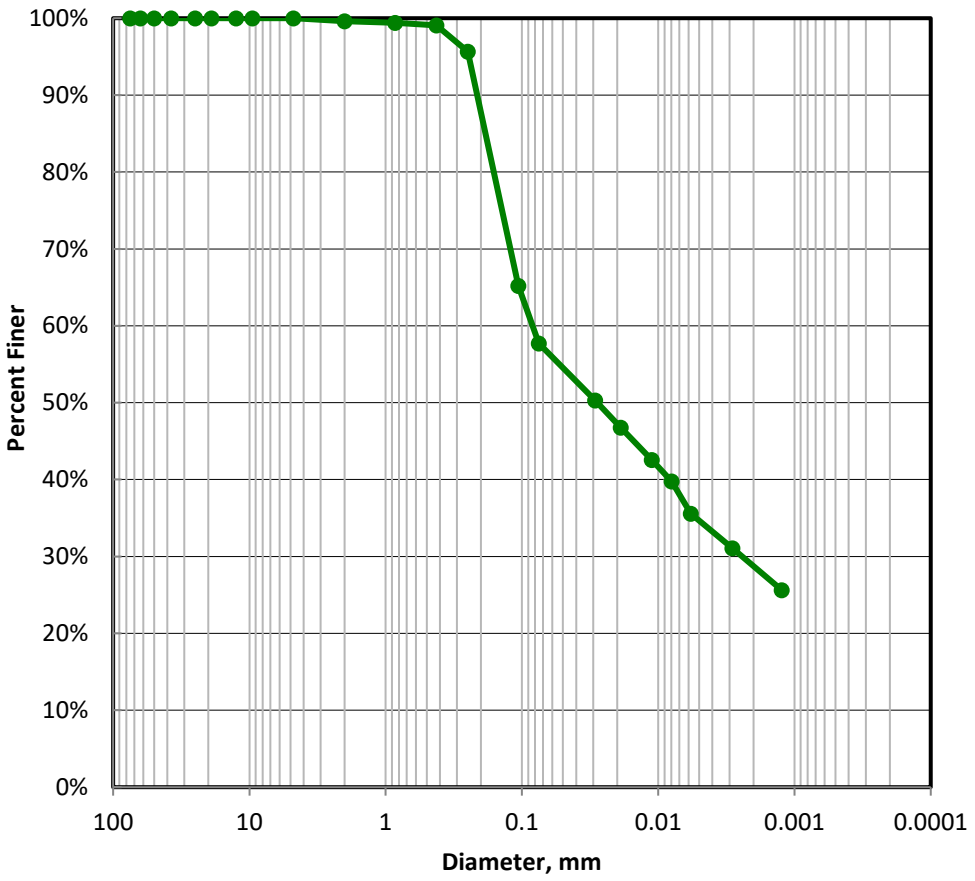
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-11
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-11-SD
		Lab Sample	40901011

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (7)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.6%
No. 20	0.85	99.4%
No. 40	0.425	99.1%
No. 60	0.25	95.7%
No. 140	0.106	65.2%
No. 200	0.075	57.7%
NA	0.0291	50.3%
NA	0.0188	46.8%
NA	0.0111	42.6%
NA	0.0080	39.8%
NA	0.0058	35.6%
NA	0.0029	31.1%
NA	0.0012	25.6%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23.0% Clay=34.7%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**42.3**	D30, mm	NA
Coarse=0.4; Medium=0.6; Fine=41.4		D10, mm	NA
% Fines (-#200)	**57.7**	Cc	NA
% Plus #200 (-3")	**42.3**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	45.1	45.3
0.05	54.5			
		Silt	25.8	25.9
0.002	28.8			
		Clay	28.8	28.9

USDA Classification

SANDY CLAY LOAM

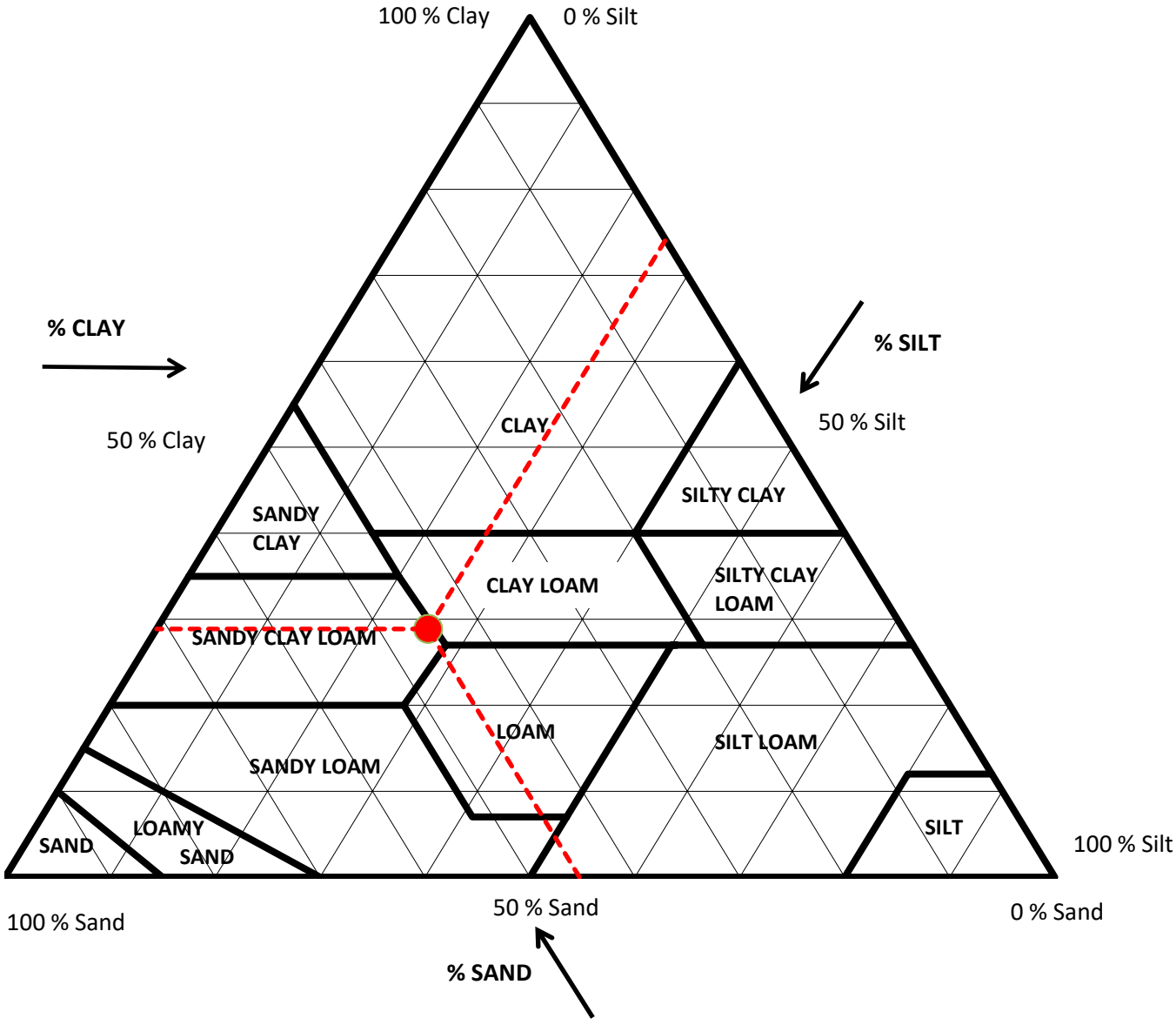
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-11
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-11-SD
		Lab Sample	40901011

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (7)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	45.3
Percent Silt, %	25.9
Percent Clay, %	28.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.2
Coarse Sand; 1-0.5	0.3
Medium Sand; 0.5-0.25	3.5
Fine Sand; 0.25-0.1	31.8
Very Fine Sand; 0.1-0.05	9.4
Total	**45.3**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-12
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-DUP
		Lab Sample	40901012

Sample Color: **GRAYISH BROWN**
USCS Group Name: **CLAYEY SAND**
USCS Group Symbol: **SC** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1041
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1041
Dry Wt. Passing Split, gm	821
Total Sample Dry Wt, gm	821

Split Sample - Passing No. 4	
Tare No.	B11
Tare + WS., gm	479.73
Tare + DS., gm	396.27
Tare, gm	84.26
Water Content of Split Sample	**26.7%**
Wt. of DS., gm	312.01
Wt. of +#200 Sample, gm	157.67

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	1.76	0.6%	99.4%	
No. 20	0.85	1.46	0.5%	99.0%	
No. 40	0.425	2.06	0.7%	98.3%	
No. 60	0.25	15.69	5.0%	93.3%	
No. 140	0.106	112.8	36.2%	57.1%	
No. 200	0.075	23.9	7.7%	49.5%	

HYDROMETER (-#200)

Tare No.	236	Wt. Dispers., gm	5	Specific Gravity	2.69
Wt. Tare + DS., gm	209.1	Wt. Dry Soil, gm (*-#200*)	29.94		Tested
Wt. Tare, gm	174.16	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9911*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	29	21.2	5.7	23.3	0.0133	77.1	0.0319	38.2%
5	26	21.2	5.7	20.3	0.0133	67.2	0.0206	33.2%
15	24	21.2	5.7	18.3	0.0133	60.6	0.0121	30.0%
30	23	21.4	5.6	17.4	0.0133	57.6	0.0086	28.5%
60	22	21.6	5.6	16.4	0.0133	54.3	0.0061	26.9%
250	20	22.8	5.3	14.7	0.0131	48.7	0.0030	24.1%
1440	17.5	20.9	5.8	11.7	0.0134	38.7	0.0013	19.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23.4% Clay=26.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**50.5**	D30, mm	NA
Coarse=0.6; Medium=1.1; Fine=48.8		D10, mm	NA
% Fines (-#200)	**49.5**	Cc	NA
% Plus #200 (-3")	**50.5**	Cu	NA

USCS Description
CLAYEY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SC	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.6	0
2	99.4			
		Sand	55.3	55.6
0.05	44.1			
		Silt	22.4	22.5
0.002	21.7			
		Clay	21.7	21.9

USDA Classification
SANDY CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-12
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-DUP
		Lab Sample	40901012

Soil Description: GRAYISH BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	B11
Wt. Tare & WS, gm	479.73
Wt. Tare & DS, gm	396.27
Wt. Tare, gm	84.26
Water Content, %	26.7

SAMPLE SUMMARY

Liquid Limit (LL), %	**25**
Plastic Limit (PL), %	**11**
Plasticity Index (PI)	**14**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**GRAYISH BROWN**

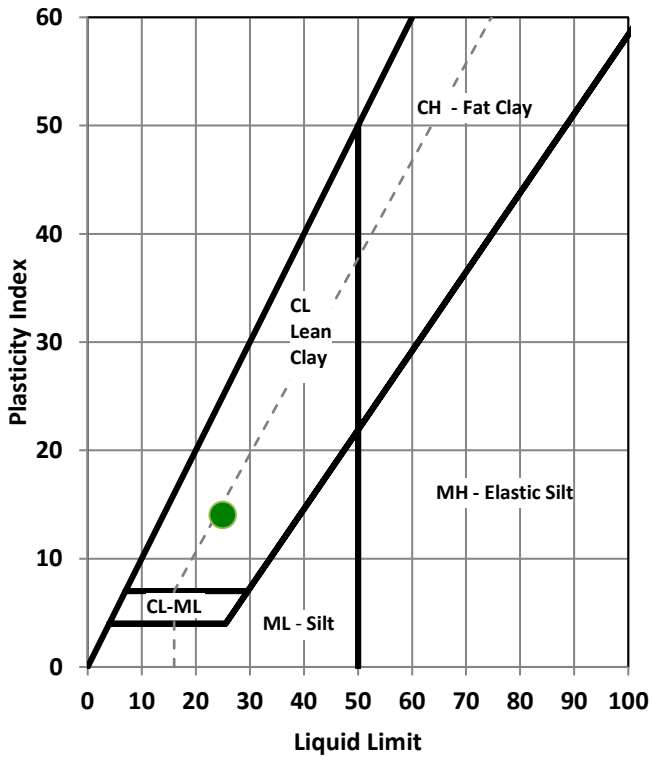
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	420	417	466
Wt. Tare & WS, gm	17.11	18.43	19.01
Wt. Tare & DS, gm	16.48	17.64	18.19
Wt. Tare, gm	10.72	10.72	10.74
Water Content, %	10.9	11.4	11.0

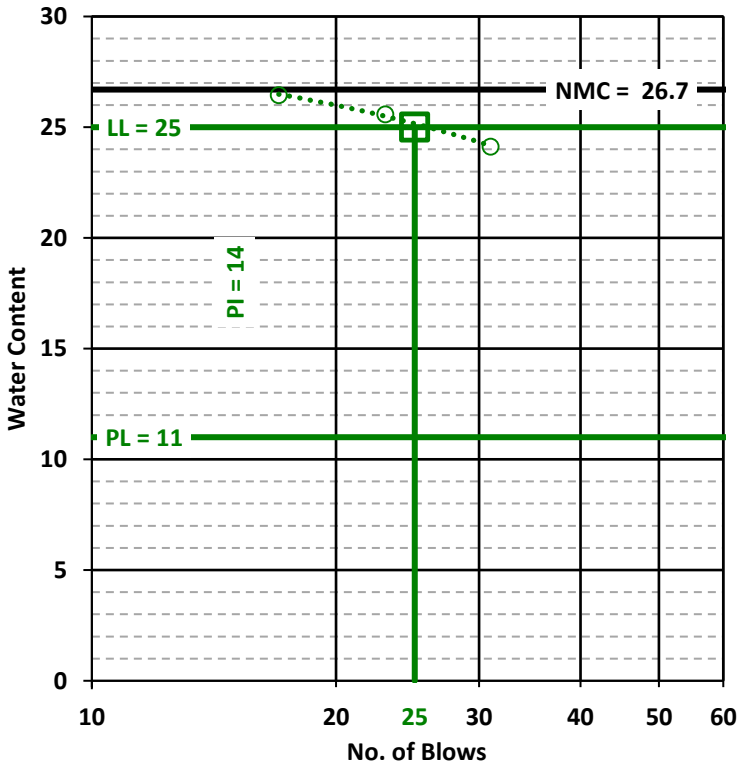
LIQUID LIMIT

	3 Points		
	709	453	701
	22.54	20.06	20.14
	20.43	18.17	18.42
	12.45	10.78	11.29
	26.4	25.6	24.1
# of Blows	17	23	31

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

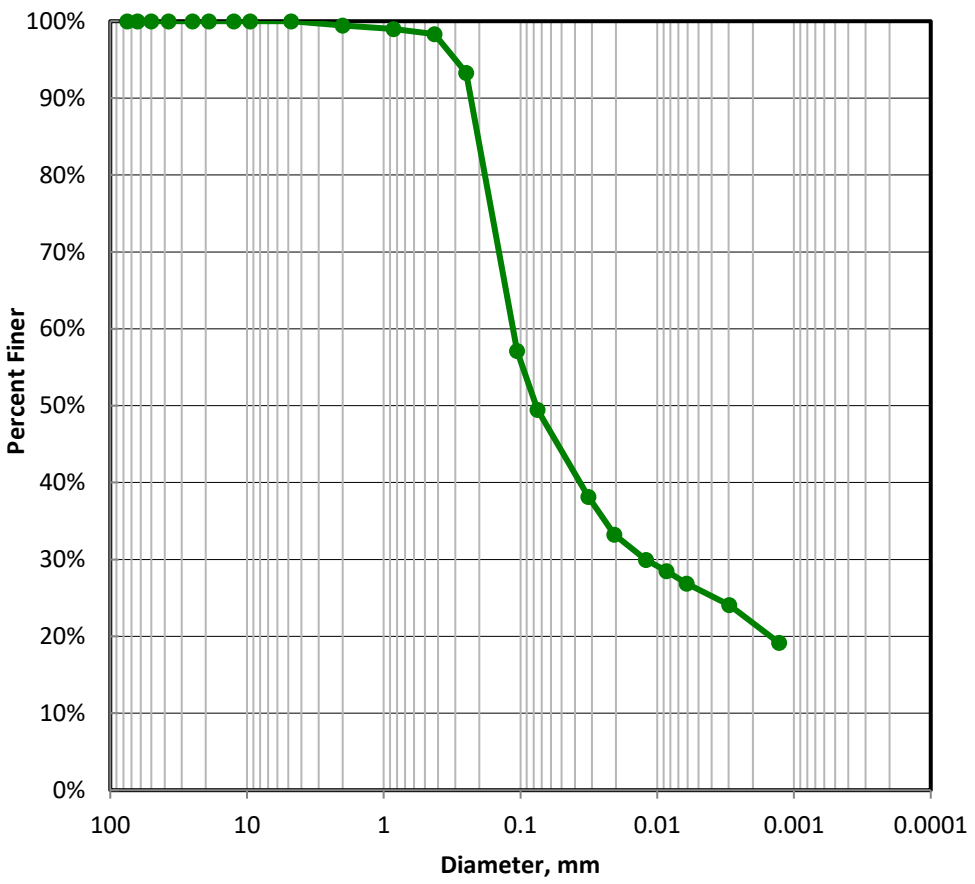
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-12
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-DUP
		Lab Sample	40901012

Sample Color: **GRAYISH BROWN**

USCS Group Name: **CLAYEY SAND**

USCS Group Symbol: **SC** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.4%
No. 20	0.85	99.0%
No. 40	0.425	98.3%
No. 60	0.25	93.3%
No. 140	0.106	57.1%
No. 200	0.075	49.5%
NA	0.0319	38.2%
NA	0.0206	33.2%
NA	0.0121	30.0%
NA	0.0086	28.5%
NA	0.0061	26.9%
NA	0.0030	24.1%
NA	0.0013	19.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23.4% Clay=26.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**50.5**	D30, mm	NA
Coarse=0.6; Medium=1.1; Fine=48.8		D10, mm	NA
% Fines (-#200)	**49.5**	Cc	NA
% Plus #200 (-3")	**50.5**	Cu	NA

USCS Description

CLAYEY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SC	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	99.4
0.05	44.1
0.002	21.7

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.6	0
Sand	55.3	55.6
Silt	22.4	22.5
Clay	21.7	21.9

USDA Classification

SANDY CLAY LOAM

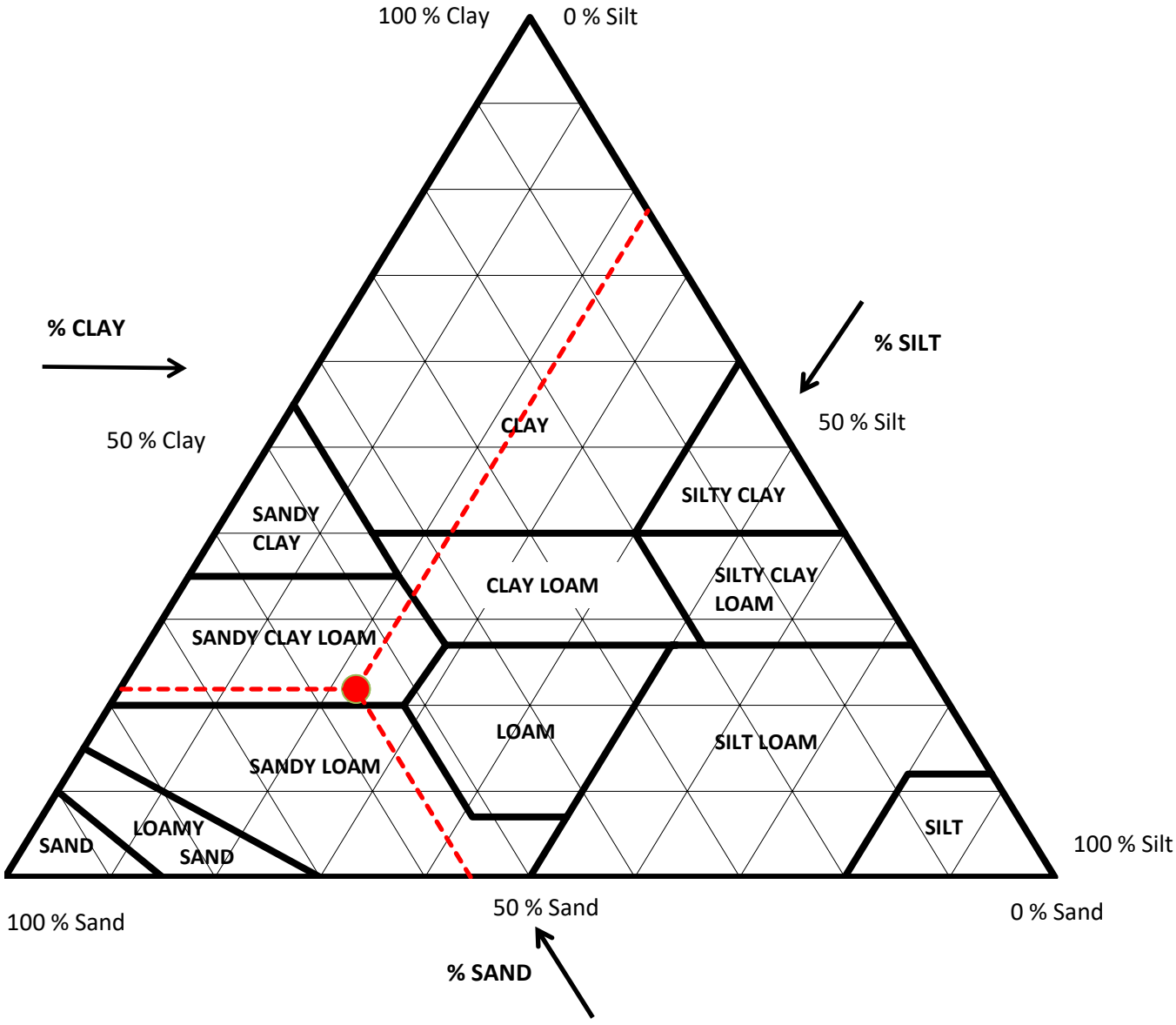
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-12
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-DUP
		Lab Sample	40901012

Sample Color: **GRAYISH BROWN**
USCS Group Name: **CLAYEY SAND**
USCS Group Symbol: **SC** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	55.6
Percent Silt, %	22.5
Percent Clay, %	21.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.4
Coarse Sand; 1-0.5	0.6
Medium Sand; 0.5-0.25	5.2
Fine Sand; 0.25-0.1	37.7
Very Fine Sand; 0.1-0.05	11.8
Total	**55.6**



Appendix 5: Full Analytical Data Tables

Table 5A: Site Water Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria				No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SW		HSCNew-NMP-02-SW		HSCNew-NMP-03-SW		HSCNew-NMP-04-SW		HSCNew-NMP-05-SW		HSCNew-NMP-06-SW		HSCNew-NMP-07-SW		HSCNew-NMP-08-SW		HSCNew-NMP-09-SW		HSCNew-NMP-10-SW		HSCNew-NMP-11-SW		HSCNew-NMP-03-SW-Field Dup	
				TSWQS (Acute) (b)	EPA WQC (Acute) (c)	NOAA (Marine Acute) (d)	Region 6 (Marine Chronic) (e)					10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018	
VOCs																																			
1,1,1-Trichloroethane	71-55-6	ug/L	-	-	-	31200	1560	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,1,2,2-Tetrachloroethane	79-34-5	ug/L	-	-	-	9020	451	12	0.40	0.40	0.40	0.40	Ua	0.40	Ua	0.40	Ua	0.40	Ua	0.40	Ua	0.40	Ua	0.40	Ua	0.4	Ua	0.4	Ua	0.40	Ua	0.40	Ua	0.40	Ua
1,1,2-Tetrachloro-1,2,2-trifluoroethane	76-13-1	ug/L	-	-	-	-	-	12	10	10	10	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua
1,1,2-Trichloroethane	79-00-5	ug/L	-	-	-	-	275	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,1-Dichloroethane	75-34-3	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,1-Dichloroethene	75-35-4	ug/L	-	-	-	224000	12500	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,2,3-Trichlorobenzene	87-61-6	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,2,4-Trichlorobenzene	120-82-1	ug/L	0.9	-	-	160	22	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,2-Dibromo-3-Chloropropane	96-12-8	ug/L	-	-	-	-	-	12	4.0	4.0	4.0	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua
1,2-Dibromoethane	106-93-4	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,2-Dichlorobenzene	95-50-1	ug/L	0.8	-	-	1970	99	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,2-Dichloroethane	107-06-2	ug/L	-	-	-	11300	5650	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,2-Dichloropropane	78-87-5	ug/L	-	-	-	10300	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,3-Dichlorobenzene	541-73-1	ug/L	0.9	-	-	1970	142	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,4-Dichlorobenzene	106-46-7	ug/L	1	-	-	1970	99	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,4-Dioxane	123-91-1	ug/L	-	-	-	-	-	12	100	100	100	100	Ua	100	Ua	100	Ua	100	Ua	100	Ua	100	Ua	100	Ua	100	Ua	100	Ua	100	Ua	100	Ua	100	Ua
2-Butanone	78-93-3	ug/L	-	-	-	-	-	12	10	10	10	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua
2-Hexanone	591-78-6	ug/L	-	-	-	-	-	12	5.0	5.0	5.0	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua
4-Methyl-2-Pentanone	108-10-1	ug/L	-	-	-	-	61500	12	5.0	5.0	5.0	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua
Acetone	67-64-1	ug/L	-	-	-	-	282000	12	10	10	10	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua
Benzene	71-43-2	ug/L	2	-	-	5100	109	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Bromodichloromethane	75-27-4	ug/L	-	-	-	-	-	12	0.50	0.58	0.51	0.50	Ua	0.50	Ua	0.50	Ua	**0.58**	-	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.5	Ua	0.50	Ua	0.50	Ua
Bromoform	75-25-2	ug/L	-	-	-	-	1220	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Bromomethane	74-83-9	ug/L	-	-	-	-	600	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Carbon Disulfide	75-15-0	ug/L	-	-	-	-	-	12	10	10	10	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua
Carbon Tetrachloride	56-23-5	ug/L	-	-	-	50000	1500	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Chlorobenzene	108-90-7	ug/L	-	-	-	-	105	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Chloroethane	75-00-3	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Chloroform	67-66-3	ug/L	2	-	-	-	4100	12	0.5	2.24	1.75	0.5	Ua	**1.6**	-	**1.0**	-	**1.7**	-	**1.9**	-	**2.2**	-	**2.2**	-	**2.2**	-	**1.9**	-	**2.0**	-	**2.2**	-	**1.5**	-
Chloromethane	74-87-3	ug/L	-	-	-	-	13500	12	1.0	2.26	1.22	1.0	Ua	1.0	Ua	**2.3**	-	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	**1.9**	-	1.0	Ua	1.0	Ua	**1.5**	-
cis-1,2-Dichloroethene	156-59-2	ug/L	-	-	-	224000	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
cis-1,3-Dichloropropene	10061-01-5	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Cyclohexane	110-82-7	ug/L	-	-	-		-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Dibromochloromethane	124-48-1	ug/L	-	-	-	12000	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Dichlorodifluoromethane	75-71-8	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Ethylbenzene	100-41-4	ug/L	5	-	-	430	249	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Isopropylbenzene	98-82-8	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Methyl acetate	79-20-9	ug/L	-	-	-	-	-	12	4.0	4.0	4.0	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua
Methyl tert-butyl ether	1634-04-4	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Methylcyclohexane	108-87-2	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Methylene chloride	75-09-2	ug/L	-	-	-	-	5420	12	4.0	4.0	4.0	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua
o-Xylene	95-47-6	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
m&p-Xylene	179601-23-1	ug/L	-	-	-	-	-	12	2.0	2.0	2.0	2.0	Ua	2.0	Ua	2.0	Ua	2.0	Ua	2.0	Ua	2.0	Ua	2.0	Ua	2.0	Ua	2.0	Ua	2.0	Ua	2.0	Ua	2.0	Ua
Styrene	100-42-5	ug/L	-	-	-	-	455	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Tetrachloroethene	127-18-4	ug/L	2	-	-	-	1450	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Toluene	108-88-3	ug/L	5	-	-	6300	480	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
trans-1,2-Dichloroethene	156-60-5	ug/L	-	-	-	224000	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
trans-1,3-Dichloropropene	10061-02-6	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Trichloroethene	79-01-6	ug/L	2	-	-	2000	970	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Trichlorofluoromethane	75-69-4	ug/L	-	-	-	12000	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Vinyl chloride	75-01-4	ug/L	-	-	-	-	-	12	0.50	0.50	0.50	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua
SVOCs																																			
1,2,4-Trichlorobenzene	120-82-1	ug/L	0.9 (g)	-	-	160	22	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
1,2-Dichlorobenzene	95-50-1	ug/L	0.8 (g)	-	-	1970	591	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Azobenzene (f)	103-33-3	ug/L	1	-	-	-	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
1,3-Dichlorobenzene	541-73-1	ug/L	0.9 (g)	-	-	1970	142	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
1,4-Dichlorobenzene	106-46-7	ug/L	1 (g)	-	-	1970	99	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
2,4,6-Trichlorophenol	88-06-2	ug/L	0.9 (g)	-	-	-	61	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
2,4-Dichlorophenol	120-83-2	ug/L	0.8 (g)	-	-	-	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
2,4-Dimethylphenol	105-67-9	ug/L	10	-	-	-	-	12	2.0	2.0	2.0	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub
2,4-Dinitrophenol	51-28-5	ug/L	5 (g)	-	-	4850	1330	12	5.0	5.1	5.0	5.0	Ub	5.1	Ub	5.0	Ub	5.0	Ub	5.0	Ub	5.1	Ub	5.1	Ub	5.1	Ub	5.0	Ub	5.0	Ub	5.1	Ub	5.0	Ub

Table 5A: Site Water Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria				No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SW		HSCNew-NMP-02-SW		HSCNew-NMP-03-SW		HSCNew-NMP-04-SW		HSCNew-NMP-05-SW		HSCNew-NMP-06-SW		HSCNew-NMP-07-SW		HSCNew-NMP-08-SW		HSCNew-NMP-09-SW		HSCNew-NMP-10-SW		HSCNew-NMP-11-SW		HSCNew-NMP-03-SW-Field Dup	
				TSWQS (Acute) (b)	EPA WQC (Acute) (c)	NOAA (Marine Acute) (d)	Region 6 (Marine Chronic) (e)					10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018	
2,4-Dinitrotoluene	121-14-2	ug/L	2 (g)	-	-	590	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
2,6-Dinitrotoluene	606-20-2	ug/L	2 (g)	-	-	-	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
2-Chloronapthalene	91-58-7	ug/L	0.8 (g)	-	-	7.5	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
2-Chlorophenol	95-57-8	ug/L	0.9 (g)	-	-	-	265	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
2-Methylphenol	95-48-7	ug/L	10	3060	-	-	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
2-Nitrophenol	88-75-5	ug/L	2 (g)	-	-	-	2940	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
3,3-Dichlorobenzidine	91-94-1	ug/L	3 (g)	-	-	-	73	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
4,6-Dinitro-o-cresol	534-52-1	ug/L	10	-	-	-	-	12	2.0	2.0	2.0	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub
4-Bromophenyl phenyl ether	101-55-3	ug/L	0.4 (g)	-	-	-	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
4-Chloro-3-methylphenol	59-50-7	ug/L	0.7 (g)	-	-	-	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
4-Chlorophenyl phenyl ether	7005-72-3	ug/L	0.6 (g)	-	-	-	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
4-Methylphenol	106-44-5	ug/L	10	-	-	-	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
4-Nitrophenol	100-02-7	ug/L	5 (g)	-	-	4850	717	12	2.5	2.6	2.51	2.5	Ub	2.5	Ub	2.5	Ub	2.5	Ub	2.5	Ub	2.5	Ub	2.5	Ub	2.6	Ub	2.5	Ub	2.5	Ub	2.5	Ub	2.5	Ub
Benzidine	92-87-5	ug/L	1	-	-	-	-	12	20	20	20.1	20.0	Ub	20	Ub	20	Ub	20	Ub	20	Ub	20	Ub	20	Ub	20	Ub	20	Ub	20	Ub	20	Ub	20	Ub
Bis(2-chloroethoxy)methane	111-91-1	ug/L	1 (g)	-	-	12000	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Bis(2-chloroethyl)ether	111-44-4	ug/L	0.9 (g)			-	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Bis(2-chloroisopropyl)ether	108-60-1	ug/L	0.7 (g)	-	-	-	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Bis[2-ethylhexyl] Phthalate	117-81-7	ug/L	2 (g)	-	-	400	-	12	0.17	0.51	0.40	**0.20**	**Jb**	**0.19**	**Jb**	**0.17**	**Jb**	**0.21**	**Jb**	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Butyl Benzyl Phthalate	85-68-7	ug/L	4 (g)	-	-	2944	147	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Diethyl Phthalate	84-66-2	ug/L	1 (g)	-	-	2944	884	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Dimethyl Phthalate	131-11-3	ug/L	1 (g)	-	-	2944	580	12	0.5	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Di-n-butyl Phthalate	84-74-2	ug/L	1 (g)	-	-	2944	NA	12	0.11	0.51	0.44	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	**0.12**	**Jb**	0.51	Ub	**0.11**	**Jb**	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Di-n-octyl Phthalate	117-84-0	ug/L	3 (g)	-	-	2944	-	12	1.0	1.0	1.0	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub
Hexachlorobenzene	118-74-1	ug/L	0.4 (g)	-	-	160	-	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Hexachlorobutadiene	87-68-3	ug/L	0.9 (g)	-	-	32	0. 32	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Hexachlorocyclopentadiene	77-47-4	ug/L	3.0 (g)	-	-	7	0. 07	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Hexachloroethane	67-72-1	ug/L	0.9 (g)	-	-	940	9.4	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Isophorone	78-59-1	ug/L	1	-	-	12900	1290	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Nitrobenzene	98-95-3	ug/L	0.9 (g)	-	-	6680	66.8	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
N-Nitrosodimethylamine	62-75-9	ug/L	3.1 (g)	-	-	-	330000	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
N-Nitrosodi-n-propylamine	621-64-7	ug/L	0.9 (g)	-	-	-	120	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
N-Nitrosodiphenylamine	86-30-6	ug/L	2.1 (g)	-	-	3300000	330000	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
Pentachlorophenol	87-86-5	ug/L	50	15.1	13	13	9.6	12	2.0	2.0	2.0	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub
Phenol	108-95-2	ug/L	10	-	-	5800	5500	12	0.50	0.51	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.51	Ub	0.50	Ub	0.50	Ub	0.51	Ub	0.50	Ub
PAHs																																			
Acenaphthene	83-32-9	ug/L	0.75 (g)	-	-	970	40.4	12	0.0020	0.010	0.0094	0.010	Ub	0.010	Ub	0.010	Ub	**0.0020**	**Jb**	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub
Acenaphthylene	208-96-8	ug/L	1.0 (g)	-	-	300	-	12	0.010	0.010	0.010	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub
Anthracene	120-12-7	ug/L	0.6 (g)	-	-	300	0. 18	12	0.010	0.010	0.010	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub
Benzo(a)anthracene	56-55-3	ug/L	0.4 (g)	-	-	300	-	12	0.0018	0.010	0.0080	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	**0.0018**	**Jb**	**0.0018**	**Jb**	**0.0019**	**Jb**	0.010	Ub
Benzo(a)pyrene	50-32-8	ug/L	0.3 (g)	-	-	300	-	12	0.00093	0.010	0.0047	0.010	Ub	0.010	Ub	**0.0015**	**Jb**	0.010	Ub	**0.0020**	**Jb**	**0.0012**	**Jb**	**0.0022**	**Jb**	0.010	Ub	**0.0026**	**Jb**	**0.0024**	**Jb**	**0.0027**	**Jb**	**0.00093**	**Jb**
Benzo(b)fluoranthene	205-99-2	ug/L	0.6 (g)	-	-	300	-	12	0.0015	0.010	0.0057	0.010	Ub	0.010	Ub	**0.0026**	**Jb**	0.010	Ub	**0.0034**	**Jb**	**0.0019**	**Jb**	**0.0040**	**Jb**	0.010	Ub	**0.0045**	**Jb**	**0.0040**	**Jb**	**0.0060**	**Jb**	**0.0015**	**Jb**
Benzo(e)pyrene	192-97-2	ug/L	-	-	-	-	-	12	0.0015	0.010	0.0054	0.010	Ub	0.010	Ub	**0.0025**	**Jb**	0.010	Ub	**0.0031**	**Jb**	**0.0018**	**Jb**	**0.0035**	**Jb**	0.010	Ub	**0.0040**	**Jb**	**0.0035**	**Jb**	**0.0045**	**Jb**	**0.0015**	**Jb**
Benzo[g,h,i]perylene	191-24-2	ug/L	1.2 (g)	-	-	300	-	12	0.0014	0.010	0.0046	**0.0014**	**Jb**	0.010	Ub	**0.0026**	**Jb**	0.010	Ub	**0.0031**	**Jb**	**0.0017**	**Jb**	**0.0035**	**Jb**	0.010	Ub	**0.0039**	**Jb**	**0.0034**	**Jb**	**0.0044**	**Jb**	**0.0014**	**Jb**
Benzo(k)fluoranthene	207-08-9	ug/L	0.6 (g)	-	-	300	-	12	0.0015	0.010	0.0058	0.010	Ub	0.010	Ub	**0.0020**	**Jb**	0.010	Ub	**0.0025**	**Jb**	**0.0015**	**Jb**	**0.0032**	**Jb**	0.010	Ub	**0.0034**	**Jb**	**0.0026**	**Jb**	**0.0035**	**Jb**	0.010	Ub
Chrysene	218-01-9	ug/L	0.3 (g)	-	-	300	-	12	0.0011	0.010	0.0037	0.010	Ub	0.010	Ub	**0.0021**	**Jb**	**0.0013**	**Jb**	**0.0027**	**Jb**	**0.0017**	**Jb**	**0.0032**	**Jb**	**0.0011**	**Jb**	**0.0038**	**Jb**	**0.0033**	**Jb**	**0.0045**	**Jb**	**0.0012**	**Jb**
Dibenzo[a,h]anthracene	53-70-3	ug/L	1.3 (g)	-	-	300	-	12	0.010	0.010	0.010	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub
Fluoranthene	206-44-0	ug/L	0.9 (g)	-	-	40	2.96	12	0.0020	0.0083	0.0039	**0.0023**	**Jb**	**0.0020**	**Jb**	**0.0032**	**Jb**	**0.0024**	**Jb**	**0.0044**	**Jb**	**0.0031**	**Jb**	**0.0060**	**Jb**	**0.0025**	**Jb**	**0.0049**	**Jb**	**0.0053**	**Jb**	**0.0083**	**Jb**	**0.0024**	**Jb**
Fluorene	86-73-7	ug/L	0.6 (g)	-	-	300	50	12	0.010	0.010	0.010	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub
Indeno[1,2,3-c,d]pyrene	193-39-5	ug/L	1.2 (g)	-		300	-	12	0.0074	0.014	0.0092	**0.014**	-	**0.0074**	**Jb**	**0.0088**	**Jb**	**0.0077**	**Jb**	**0.0089**	**Jb**	**0.0081**	**Jb**	**0.0097**	**Jb**	**0.0079**	**Jb**	**0.0096**	**Jb**	**0.0095**	**Jb**	**0.010**	-	**0.0082**	**Jb**
Naphthalene	91-20-3	ug/L	0.8 (g)	-	-	-	250	12	0.0019	0.024	0.0077	**0.024**	-	**0.012**	-	**0.0036**	**Jb**	**0.0076**	**Jb**	**0.0019**	**Jb**	**0.0051**	**Jb**	**0.0019**	**Jb**	**0.0061**	**Jb**	0.010	Ub	0.010	Ub	**0.0032**	**Jb**	**0.0077**	**Jb**
Phenanthrene	85-01-8	ug/L	0.5 (g)	7.7	-	7.7	4.6	12	0.0019	0.010	0.0067	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	**0.0023**	**Jb**	0.010	Ub	**0.0022**	**Jb**	**0.0020**	**Jb**	**0.0019**	**Jb**	**0.0020**	**Jb**
Pyrene	129-00-0	ug/L	1.5 (g)	-	-	300	0. 24	12	0.0024	0.0079	0.0049	**0.0037**	**Jb**	**0.0024**	**Jb**	**0.0048**	**Jb**	**0.0028**	**Jb**	**0.0066**	**Jb**	**0.0032**	**Jb**	**0.0079**	**Jb**	**0.0026**	**Jb**	**0.0071**	**Jb**	**0.0068**	**Jb**	**0.0077**	**Jb**	**0.0035**	**Jb**
PAH (Total) calculated (h)	130498-29-2	ug/L	-	-	-	-	-	12	0.020	0.059	0.037	**0.046**	-	**0.023**	-	**0.034**	-	**0.024**	-	**0.039**	-	**0.029**	-	**0.047**	-	**0.020**	-	**0.048**	-	**0.045**	-	**0.059**	-	**0.030**	-
Pesticides																																			
4,4'-DDD	72-54-8	ug/L	0.1	-	-	3.6	0. 025	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
4,4'-DDE	72-55-9	ug/L	0.1	-	-	14	0. 14	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
4,4'-DDT	50-29-3	ug/L	0.1	0.13	0.13 (G, ii)	0.065	0. 001	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Aldrin	309-00-2	ug/L	0.03 (g)	1.3	1.3 (G)	0.65	0. 13	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Alpha-BHC	319-84-6	ug/L	0.03	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Beta-BHC	319-85-7	ug/L	0.03	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Delta-BHC	319-86-8	ug/L	0.03	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Dieldrin	60-57-1	ug/L	0.03	0.71	0.71 (G)	0.355	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U

Table 5A: Site Water Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria				No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SW		HSCNew-NMP-02-SW		HSCNew-NMP-03-SW		HSCNew-NMP-04-SW		HSCNew-NMP-05-SW		HSCNew-NMP-06-SW		HSCNew-NMP-07-SW		HSCNew-NMP-08-SW		HSCNew-NMP-09-SW		HSCNew-NMP-10-SW		HSCNew-NMP-11-SW		HSCNew-NMP-03-SW-Field Dup	
				TSWQS (Acute) (b)	EPA WQC (Acute) (c)	NOAA (Marine Acute) (d)	Region 6 (Marine Chronic) (e)					10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018	
Endosulfan I	959-98-8	ug/L	0.1	0.034	0.034 (G, Y)	0.017	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endosulfan II	33213-65-9	ug/L	0.1	0.034	0.034 (G, Y)	0.017	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endosulfan Sulfate	1031-07-8	ug/L	0.1	0.034	0.034 (G, Y)	0.017	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endrin	72-20-8	ug/L	0.1	0.037	0.037 (G)	0.0185	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endrin Aldehyde	7421-93-4	ug/L	0.1	-	0.037 (G)	0.0185	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Gamma-BHC (lindane)	58-89-9	ug/L	0.1	-	0.16 (G)	0.08	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Heptachlor	76-44-8	ug/L	0.1	0.053	0.053 (G)	0.0265	0. 004	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Heptachlor Epoxide	1024-57-3	ug/L	0.1	-	0.053 (G)	0.0265	0. 004	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Toxaphene	8001-35-2	ug/L	0.5	0.21	0.21	0.21	0. 0002	12	0.30	0.30	0.30	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U
alpha-Chlordane	5103-71-9	ug/L	0.03 (g)	0.09	0.09 (G)	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
gamma-Chlordane	5566-34-7	ug/L	0.03 (g)	0.09	0.09 (G)	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Oxychlordane	26880-48-8	ug/L	0.03 (g)	0.09	0.09 (G)	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
cis-Nonachlor	510-37-31	ug/L	0.03 (g)	0.09	0.09 (G)	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
trans-Nonachlor	39765-80-5	ug/L	0.03 (g)	0.09	0.09 (G)	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCBs																																	
PCB 101	37680-73-2	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 105	32598-14-4	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 118	31508-00-6	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 126	57465-28-8	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 128	38380-07-3	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 138	35065-28-2	ug/L	-	-	-	-	-	12	0.010	0.010	0.010	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
PCB 153	35065-27-1	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 169	32774-16-6	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 170	35065-30-6	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 18	37680-65-2	ug/L	-	-	-	-	-	12	0.010	0.010	0.010	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
PCB 180	35065-29-3	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 187	52663-68-0	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 28	7012-37-5	ug/L	-	-	-	-	-	12	0.010	0.010	0.010	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
PCB 44	41464-39-5	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 52	35693-99-3	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 66	32598-10-0	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 77	32598-13-3	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCB 8	34883-43-7	ug/L	-	-	-	-	-	12	0.010	0.010	0.010	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Total PCB Congeners calculated (i)	NA	ug/L	0.01	-	-	0.033	-	12	0	0	0	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Dioxins and Furans																																	
Total TEQ (j)	-	pg/L	-	-	-	-	-	12	0	0.094	0.011	**0.0085**	-	0	-	0	-	0	-	**0.0094**	(o)	**0.0038**	-	**0.0080**	-	**0.0032**	-	0	(o)	**0.010**	-	**0.094**	(o, p)	0	-
Metals (z, l)																																	
Antimony	7440-36-0	ug/L	3 (0.03) (m)	-	-	1500	500	12	1.2	5.0	4.4	**4.6**	**J**	**1.6**	**J**	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**1.2**	**J**	5.0	U	5.0	U	5.0	U
Arsenic	7440-38-2	ug/L	(m)	149	69 (A, D)	69	78	12	1.9	3.2	2.5	**1.9**	**J**	**2.5**	**J**	**2.1**	**J**	**3.1**	**J**	**2.8**	**J**	**2.5**	**J**	**2.5**	**J**	**2.1**	**J**	**3.2**	**J**	**2.3**	**J**	**2.3**	**J**	**3.1**	**J**
Barium	7440-39-3	ug/L	-	-	-	1000	-	12	64	82	74	**74**	-	**80**	-	**73**	-	**72**	-	**74**	-	**64**	-	**67**	-	**71**	-	**77**	-	**79**	-	**73**	-	**82**	-
Beryllium	7440-41-7	ug/L	0.2	-	-	1500	-	12	0.20	5.0	3.8	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**0.30**	**J**	**0.20**	**J**	5.0	U	**0.30**	**J**	5.0	U
Cadmium	7440-43-9	ug/L	1 (0.01) (m)	40	40 (D)	40	-	12	5.0	5.0	5.0	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chromium (total)	7440-47-3	ug/L	1	-	-	-	103	12	0.80	5.0	2.2	**1.3**	**J**	**0.80**	**J**	**1.1**	**J**	5.0	U	**2.8**	**J**	5.0	U	**0.90**	**J**	5.0	U	**1.2**	**J**	**0.80**	**J**	**1.6**	**J**	**1.4**	**J**
Chromium (3+)	7440-47-3 (III)	ug/L	1	-	-	103000	-	12	0.30	2.0	0.78	**0.50**	**J**	**0.30**	**J**	**0.90**	**J**	1.0	U	**2.0**	-	**0.40**	**J**	**0.40**	**J**	1.0	U	**0.70**	**J**	**0.30**	**J**	**1.0**	-	**0.90**	**J**
Chromium (6+)	7440-47-3 (Cr6+)	ug/L	1	1090	1,100 (D)	1100	49.6	12	0.80	2.0	1.9	**0.80**	**Z-03, J**	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U	2.0	Z-03, U
Copper	7440-50-8	ug/L	1 (0.1) (m)	13.5	4.8 (D, cc)	4.8	3.6	12	2.1	4.6	2.9	**2.5**	**J**	**2.4**	**J**	**3.0**	**J**	**2.2**	**J**	**3.0**	**J**	**2.3**	**J**	**3.3**	**J**	**2.1**	**J**	**3.4**	**J**	**2.5**	**J**	**4.6**	**J**	**3.2**	**J**
Lead	7439-92-1	ug/L	1 (0.03) (m)	133	210 (D)	210	5.3	12	0.80	5.0	2.4	**1.3**	**J**	5.0	U	**1.0**	**J**	5.0	U	**1.0**	**J**	5.0	U	**1.1**	**J**	5.0	U	**1.2**	**J**	**0.90**	**J**	**1.5**	**J**	**0.80**	**J**
Mercury	7439-97-6	ug/L	0.2 (0.0003) (m)	2.1	-	1.8	1.1	12	0.0020	0.020	0.015	0.020	U	0.020	U	0.020	U	0.020	U	**0.0020**	**J**	**0.013**	**J**	0.020	U	0.020	U	0.020	U	**0.0030**	**J**	0.020	U	**0.0030**	**J**
Nickel	7440-02-0	ug/L	1 (0.1) (m)	118	74 (D)	74	13.1	12	1.3	2.6	1.8	**1.3**	**J**	**1.8**	**J**	**1.7**	**J**	**1.3**	**J**	**2.5**	**J**	**1.4**	**J**	**1.7**	**J**	**1.4**	**J**	**1.4**	**J**	**1.8**	**J**	**2.6**	**J**	**2.1**	**J**
Selenium	7782-49-2	ug/L	2	564	290 (D, dd)	290	136	12	10	10	10	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Silver	7440-22-4	ug/L	1 (0.1) (m)	2	1.9 (D)	0.95	-	12	0.90	9.2	3.9	**9.2**	-	**1.3**	**J**	**0.90**	**J**	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**3.1**	**J**	**1.2**	**J**	5.0	U	**1.3**	**J**
Thallium	7440-28-0	ug/L	1 (0.03) (m)	-	-	2130	21.3	12	5.0	5.0	5.0	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Zinc	7440-66-6	ug/L	1 (0.5) (m)	92.7	90 (D)	90	84.2	12	57	91	74	**57**	-	**77**	-	**78**	-	**79**	-	**62**	-	**91**	-	**88**	-	**83**	-	**58**	-	**65**	-	**86**	-	**68**	-
Miscellaneous Parameters																																	
Cyanide	57-12-5	ug/L	100 (n)	-	1 (Q)	1	5.6	12	10	10	10	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U
DOC rep1	NA	%	-	-	-	-	-	12	0.0039	0.010	0.0095	0.010	U	0.010	U	0.010	U	**0.0039**	**J**	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
DOC rep2	NA	%	-	-	-	-	-	12	0.010	0.010	0.010	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
DOC rep3	NA	%	-	-	-	-	-	12	0.010	0.010	0.010	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
DOC rep4	NA	%	-	-	-	-	-	12	0.010	0.010	0.010	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Dissolved Organic Carbon	NA	%	0.1	-	-	-	-	12	0.010	0.010	0.010	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Total Suspended Solids	NA	ug/L	NA	-	-	-	-	12	6400	18700	10458	**11200**	-	**7600**	-	**8000**	-	**6400**	-	**7200**	-	**12700**	-	**8800**	-	**8800**	-	**9200**	-	**17300**	-	**18700**	-	**9600**	-

Table 5A: Site Water Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria				No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SW		HSCNew-NMP-02-SW		HSCNew-NMP-03-SW		HSCNew-NMP-04-SW		HSCNew-NMP-05-SW		HSCNew-NMP-06-SW		HSCNew-NMP-07-SW		HSCNew-NMP-08-SW		HSCNew-NMP-09-SW		HSCNew-NMP-10-SW		HSCNew-NMP-11-SW		HSCNew-NMP-03-SW-Field Dup	
				TSWQS (Acute) (b)	EPA WQC (Acute) (c)	NOAA (Marine Acute) (d)	Region 6 (Marine Chronic) (e)					10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018	
TOC rep1	NA	%	-	-	-	-	-	12	0.0046	0.010	0.0096	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0046**	**J**	0.01	U	0.010	U
TOC rep2	NA	%	-	-	-	-	-	12	0.0044	0.010	0.0087	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0055**	**J**	0.010	U	0.010	U	**0.0044**	**J**	**0.0044**	**J**
TOC rep3	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0095	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.00356**	**J**	0.010	U	0.010	U
TOC rep4	NA	%	-	-	-	-	-	12	0.0038	0.010	0.0066	**0.0038**	**J**	0.010	U	**0.0043**	J	0.010	U	**0.0038**	**J**	**0.0043**	**J**	0.010	U	**0.0047**	**J**	**0.0039**	**J**	**0.0041**	**J**	0.010	U	0.010	U
Total Organic Carbon	NA	%	0.1	-	-	-	-	12	0.0038	0.010	0.0090	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0041**	**J**	0.010	U	**0.0038**	**J**	0.010	U	0.010	U
Ammonia as N, filtered	7664-41-7	ug/L	30	-	-	-	-	12	115	320	254	**115**	-	**205**	-	**230**	-	**320**	-	**290**	-	**290**	-	**281**	-	**272**	-	**266**	-	**272**	-	**302**	-	**207**	-
Sulfide	184-96-258	ug/L	1	-	-	-	-	12	2.6	10	9.0	10	U	10	U	**5.3**	**J**	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	**2.6**	**J**
Petroleum Hydrocarbons																																			
>C12-C28	NA	ug/L	-	-	-	-	-	12	4500	4600	4575	4500	Uc	4600	Uc	4600	Uc	4600	Uc	4600	Uc	4600	Uc	4500	Uc	4600	Uc	4600	Uc	4600	Uc	4600	Uc	4500	Uc
>C28-C35	NA	ug/L	-	-	-	-	-	12	4500	4600	4575	4500	Uc	4600	Uc	4600	Uc	4600	Uc	4600	Uc	4600	Uc	4500	Uc	4600	Uc	4600	Uc	4600	Uc	4600	Uc	4500	Uc
C6-C12	NA	ug/L	-	-	-	-	-	12	1900	4600	4000	**2600**	**Jd**	4600	Uc	4600	Uc	4600	Uc	4600	Uc	4600	Uc	4500	Uc	4600	Uc	4600	Uc	**1900**	**Jd**	4600	Uc	**2200**	**Jd**
C6-C35	NA	ug/L	-	-	-	-	-	12	8900	9300	9117	9000	Uc	9300	Uc	9100	Uc	9100	Uc	9200	Uc	9100	Uc	8900	Uc	9200	Uc	9100	Uc	9200	Uc	9200	Uc	9000	Uc
Total Petroleum Hydrocarbons	8012-95-1	ug/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FOOTNOTES- lowercase footnotes were created by the table generator

a) The primary sources for this table were: TDLs - EPA 823-B-95-001, QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations. USEPA/USACE, Regional Implementation Agreement, July 2003; US EPA SW-846 http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm;

b) TSWQS Rule 307.6- (2014) https://www.tceq.texas.gov/waterquality/standards ; **NOTE**2018 TSWQSs were adopted by the commision on February 7, 2018, these Standards are effective for all state permits; however, until approved by USEPA, the 2014 Standards apply to federal permits.

c) EPA WQC- http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm; see EPA footnote section below for individual EPA value

d) NOAA- http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

e) Region 6 screening benchmarks come from TCEQ's ecological benchmarks for water,

f) Azobenzene is reported by the laboratory instead of 1,2-diphenylhydrazine. 1,2-diphenylhydrazine is rapidly oxidized into azobenzene during analysis.

g) These values are based on recommendations from the EPA Region 6 laboratory in Houston; these values were based on data or other technical basis;

h) PAHs did not have any elevated RL. PAH (total) calculated was determined by summing all non-U qualified data.

i) Total PCBs were not calculated since all analytes were nondetect, U qualified, and there were no elevated RL.

j) Total TEQ was calculated using 2005 WHO TEF values from Van den Berg et al; 2006 (doi:10.1093/toxsci/kfl055) and https://clu-in.org/download/contaminantfocus/dioxins/Dioxin_TEFs_for_TEQs.pdf. Total TEQ was calculacted by summing all TEF adjusted non-U qualified data.

l) Samples for metals analysis were diluted 10X for antimony, arsenic, barium, beryllium, cadmium, chromium (total), copper, lead, nickel, selenium, silver, thallium and zinc, 1X for chromium (3+), 2X for chromium (6+) and mercury

m) The values in parentheses are based on EPA "clean techniques", (EPA 1600 series methods) which are applicable in instances where other TDLs are inadequate to assess EPA water quality criteria;

n) This value recommended by Houston lab using colorimetric method. This value is based upon FREE cyanide, not complexed as the method is designed to analyze for. If free cyanide is expected, consult the laboratory as to the best method for quantifying free cyanide;

o) Total TEQ does not include J qualified result for Total Hepta CDD since there is no reported TEF for Total Hepta CDD.

p) Total TEQ does not include J qualified result for Total Hexa CDF since there is no reported TEF for Total Hexa CDF.

z) Metals are expressed as Dissolved values in water samples, except for mercury and selenium, which are reported as Total Recoverable Concentrations;

EPA WQC footnotes- uppercase and double-lettered footnotes are directly from the NRWQC footnotes; only footnotes for constituents of concern are retained in this table

A) This recommended water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive. Please consult the criteria document for details.

D) Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column. See "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic life Metals Criteria (PDF)," (49 pp, 3MB) October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available on NSCEP's web site and 40CFR§131.36(b)(1). Conversion Factors applied in the table can be found in Appendix A to the Preamble- Conversion Factors for Dissolved Metals.

G) This Criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (PDF) (153 pp, 7.3MB) (EPA 440/5-80-019), Chlordane (PDF) (68 pp, 3.1MB) (EPA 440/5-80-027), DDT (PDF) (175 pp, 8.3MB) (EPA 440/5-80-038), Endosulfan (PDF) (155 pp, 7.3MB) (EPA 440/5-80-046), Endrin (PDF) (103 pp, 4.6MB) (EPA 440/5-80-047), Heptachlor (PDF) (114 pp, 5.4MB) (EPA 440/5-80-052), Hexachlorocyclohexane (PDF) (109 pp, 4.8MB) (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines (PDF) (104 pp, 3.3MB). If evaluation is to be done using an averaging period, the acute criteria values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

Q) This recommended water quality criterion is expressed as ug free cyanide (as CN)/l.

Y) This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.

cc) When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be appropriate.

dd) Selenium criteria document (EPA 440/5-87-006, September 1987)states that if selenium is as toxic to saltwater fishes in the field as it is to freshwater fishes in the field, the status of the fish community should be monitored whenever the conc.of selenium exceeds 5.0 µg/l in salt water because the saltwater CCC does not take into account uptake via the food chain.

ii)This criterion applies to DDT and its metabolites (i.e., the total conc. DDT plus metabolites should not exceed this value).

Laboratory Qualifer

Cl	Residual Chlorine or other oxidizing agent was detected in the container used to analyze this sample.
J	Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.
Ja	Estimated concentration between the EDL and RDL
Jb	Estimated value less than RL
Jd	Used for Pesticides, PCBs, Herbicides, Formaldehyde, Explosives and Method 504.1 analytes when there is a greater than 40 % difference for detected concentrations between the two GC columns.
U	Analyte included in the analysis, but not detected
Ua	Analyte included in the analysis, but not detected at or above the Reporting Limit
Ub	Compound was analyzed for but was not detected (non-detect)
Uc	Indicates the compound was analyzed for but not detected above the specified level.
Ud	Undetected at the limit of quantitation.
Z-03	See case narrative.

Samples with Detections are BOLD

One or more sample concentrations exceed screening criteria

Sample concentration exceeds screening criteria

Table 5B: Site Water Analytical Results and Screening for PAHs[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria				No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SW		HSCNew-NMP-02-SW		HSCNew-NMP-03-SW		HSCNew-NMP-04-SW		HSCNew-NMP-05-SW		HSCNew-NMP-06-SW		HSCNew-NMP-07-SW		HSCNew-NMP-08-SW		HSCNew-NMP-09-SW		HSCNew-NMP-10-SW		HSCNew-NMP-11-SW		HSCNew-NMP-03-SW-Field Dup		Field Equipment Blank	
				TSWQS (Acute) (b)	EPA WQC (Acute) (c)	NOAA (Marine Acute) (d)	Region 6 (Marine) Chronic (e)					10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018		10/22/2018	
PAHs																																			
Acenaphthene	83-32-9	ug/L	0.75 (g)	-	-	970	40.4	12	0.0020	0.010	0.0094	0.010	Ub	0.010	Ub	0.010	Ub	**0.0020**	**Jb**	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	**0.0057**	**Jb**
Acenaphthylene	208-96-8	ug/L	1.0 (g)	-	-	300	-	12	0.010	0.010	0.010	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	**0.0042**	**Jb**
Anthracene	120-12-7	ug/L	0.6 (g)	-	-	300	0. 18	12	0.010	0.010	0.010	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub
Benzo(a)anthracene	56-55-3	ug/L	0.4 (g)	-	-	300	-	12	0.0018	0.010	0.0080	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	**0.0018**	**Jb**	**0.0018**	**Jb**	**0.0019**	**Jb**	0.010	Ub	0.010	Ub
Benzo(a)pyrene	50-32-8	ug/L	0.3 (g)	-	-	300	-	12	0.00093	0.010	0.0047	0.010	Ub	0.010	Ub	**0.0015**	**Jb**	0.010	Ub	**0.0020**	**Jb**	**0.0012**	**Jb**	**0.0022**	**Jb**	0.010	Ub	**0.0026**	**Jb**	**0.0024**	**Jb**	**0.0027**	**Jb**	**0.00093**	**Jb**	**0.0014**	**Jb**
Benzo(b)fluoranthene	205-99-2	ug/L	0.6 (g)	-	-	300	-	12	0.0015	0.010	0.0057	0.010	Ub	0.010	Ub	**0.0026**	**Jb**	0.010	Ub	**0.0034**	**Jb**	**0.0019**	**Jb**	**0.0040**	**Jb**	0.010	Ub	**0.0045**	**Jb**	**0.0040**	**Jb**	**0.0060**	**Jb**	**0.0015**	**Jb**	**0.0022**	**Jb**
Benzo(e)pyrene	192-97-2	ug/L	-	-	-	-	-	12	0.0015	0.010	0.0054	0.010	Ub	0.010	Ub	**0.0025**	**Jb**	0.010	Ub	**0.0031**	**Jb**	**0.0018**	**Jb**	**0.0035**	**Jb**	0.010	Ub	**0.0040**	**Jb**	**0.0035**	**Jb**	**0.0045**	**Jb**	**0.0015**	**Jb**	**0.0014**	**Jb**
Benzo[g,h,i]perylene	191-24-2	ug/L	1.2 (g)	-	-	300	-	12	0.0014	0.010	0.0046	**0.0014**	**Jb**	0.010	Ub	**0.0026**	**Jb**	0.010	Ub	**0.0031**	**Jb**	**0.0017**	**Jb**	**0.0035**	**Jb**	0.010	Ub	**0.0039**	**Jb**	**0.0034**	**Jb**	**0.0044**	**Jb**	**0.0014**	**Jb**	**0.0014**	**Jb**
Benzo(k)fluoranthene	207-08-9	ug/L	0.6 (g)	-	-	300	-	12	0.0015	0.010	0.0058	0.010	Ub	0.010	Ub	**0.0020**	**Jb**	0.010	Ub	**0.0025**	**Jb**	**0.0015**	**Jb**	**0.0032**	**Jb**	0.010	Ub	**0.0034**	**Jb**	**0.0026**	**Jb**	**0.0035**	**Jb**	0.010	Ub	**0.0013**	**Jb**
Chrysene	218-01-9	ug/L	0.3 (g)	-	-	300	-	12	0.0011	0.010	0.0037	0.010	Ub	0.010	Ub	**0.0021**	**Jb**	**0.0013**	**Jb**	**0.0027**	**Jb**	**0.0017**	**Jb**	**0.0032**	**Jb**	**0.0011**	**Jb**	**0.0038**	**Jb**	**0.0033**	**Jb**	**0.0045**	**Jb**	**0.0012**	**Jb**	**0.0016**	**Jb**
Dibenzo[a,h]anthracene	53-70-3	ug/L	1.3 (g)	-	-	300	-	12	0.010	0.010	0.010	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub
Fluoranthene	206-44-0	ug/L	0.9 (g)	-	-	40	2.96	12	0.0020	0.0083	0.0039	**0.0023**	**Jb**	**0.0020**	**Jb**	**0.0032**	**Jb**	**0.0024**	**Jb**	**0.0044**	**Jb**	**0.0031**	**Jb**	**0.0060**	**Jb**	**0.0025**	**Jb**	**0.0049**	**Jb**	**0.0053**	**Jb**	**0.0083**	**Jb**	**0.0024**	**Jb**	**0.0030**	**Jb**
Fluorene	86-73-7	ug/L	0.6 (g)	-	-	300	50	12	0.010	0.010	0.010	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	**0.014**	-
Indeno[1,2,3-c,d]pyrene	193-39-5	ug/L	1.2 (g)	-	-	300	-	12	0.0074	0.014	0.0092	**0.014**	-	**0.0074**	**Jb**	**0.0088**	**Jb**	**0.0077**	**Jb**	**0.0089**	**Jb**	**0.0081**	**Jb**	**0.0097**	**Jb**	**0.0079**	**Jb**	**0.0096**	**Jb**	**0.0095**	**Jb**	**0.010**	-	**0.0082**	**Jb**	**0.0081**	**Jb**
Naphthalene	91-20-3	ug/L	0.8 (g)	-	-	-	250	12	0.0019	0.024	0.0077	**0.024**	-	**0.012**	-	**0.0036**	**Jb**	**0.0076**	**Jb**	**0.0019**	**Jb**	**0.0051**	**Jb**	**0.0019**	**Jb**	**0.0061**	**Jb**	0.010	Ub	0.010	Ub	**0.0032**	**Jb**	**0.0077**	**Jb**	**0.075**	-
Phenanthrene	85-01-8	ug/L	0.5 (g)	7.7	-	7.7	4.6	12	0.0019	0.010	0.0067	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub	**0.0023**	**Jb**	0.010	Ub	**0.0022**	**Jb**	**0.0020**	**Jb**	**0.0019**	**Jb**	**0.0020**	**Jb**	**0.011**	-
Pyrene	129-00-0	ug/L	1.5 (g)	-	-	300	0. 24	12	0.0024	0.0079	0.0049	**0.0037**	**Jb**	**0.0024**	**Jb**	**0.0048**	**Jb**	**0.0028**	**Jb**	**0.0066**	**Jb**	**0.0032**	**Jb**	**0.0079**	**Jb**	**0.0026**	**Jb**	**0.0071**	**Jb**	**0.0068**	**Jb**	**0.0077**	**Jb**	**0.0035**	**Jb**	**0.0028**	**Jb**
PAH (Total) calculated (f)	130498-29-2	ug/L	-	-	-	-	-	12	0.020	0.059	0.037	**0.046**	-	**0.023**	-	**0.034**	-	**0.024**	-	**0.039**	-	**0.029**	-	**0.047**	-	**0.020**	-	**0.048**	-	**0.045**	-	**0.059**	-	**0.030**	-	**0.13**	-

FOOTNOTES- lowercase footnotes were created by the table generator

a) The primary sources for this table were: TDLs - EPA 823-B-95-001, QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations. USEPA/USACE, Regional Implementation Agreement, July 2003; US EPA SW-846 http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm;

b) TSWQS Rule 307.6- (2014) https://www.tceq.texas.gov/waterquality/standards ; **NOTE**2018 TSWQSs were adopted by the commision on February 7, 2018, these Standards are effective for all state permits; however, until approved by USEPA, the 2014 Standards apply to federal permits.

c) EPA WQC- http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm; see EPA footnote section below for individual EPA

d) NOAA- http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

e) Region 6 screening benchmarks come from TCEQ's ecological benchmarks for water,

f) PAHs did not have any elevated RL. PAH (total) calculated was determined by summing all non-U qualified data.

g) These values are based on recommendations from the EPA Region 6 laboratory in Houston; these values were based on data or other technical basis;

Laboratory Qualifer

Jb	Estimated value less than RL
Ub	Compound was analyzed for but was not detected (non-detect)

Samples with Detections are BOLD

Table 5C: Site Water Analytical Results for Dioxins and Furans
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SW				HSCNew-NMP-02-SW				HSCNew-NMP-03-SW				HSCNew-NMP-04-SW				HSCNew-NMP-05-SW				HSCNew-NMP-06-SW				HSCNew-NMP-07-SW				HSCNew-NMP-08-SW				HSCNew-NMP-09-SW				HSCNew-NMP-10-SW				HSCNew-NMP-11-SW				HSCNew-NMP-03-SW-Field			
							10/22/2018		TEF	TEQ	10/22/2018		TEF	TEQ	10/22/2018		TEF	TEQ	10/22/2018		TEF	TEQ	10/22/2018		TEF	TEQ	10/22/2018		TEF	TEQ	10/22/2018		TEF	TEQ	##########		TEF	TEQ	10/22/2018		TEF	TEQ	10/22/2018		TEF	TEQ	10/22/2018		TEF	TEQ	10/22/2018		TEF	TEQ
Dioxins and Furans																																																				
1,2,3,4,6,7,8-Hepta CDD	35822-46-9	pg/L	12	9.4	50	47	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	A8644, U	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	A8644, U	0.010	0.50	50	Ud	0.010	0.50	**9.4**	**Ja**	0.010	**0.094**	50	A8644, U	0.010	0.50
1,2,3,4,6,7,8-Hepta CDF	67562-39-4	pg/L	12	50	50	50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	A8644, U	0.010	0.50	50	Ud	0.010	0.50
1,2,3,4,7,8,9-Hepta CDF	55673-89-7	pg/L	12	50	50	50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50	50	Ud	0.010	0.50
1,2,3,4,7,8-Hexa CDD	39227-28-6	pg/L	12	50	50	50	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0
1,2,3,4,7,8-Hexa CDF	70648-26-9	pg/L	12	50	50	50	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0
1,2,3,6,7,8-Hexa CDD	57653-85-7	pg/L	12	50	50	50	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0
1,2,3,6,7,8-Hexa CDF	57117-44-9	pg/L	12	50	50	50	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0
1,2,3,7,8,9-Hexa CDD	19408-74-3	pg/L	12	50	50	50	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0
1,2,3,7,8,9-Hexa CDF	72918-21-9	pg/L	12	50	50	50	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0
1,2,3,7,8-Penta CDD	40321-76-4	pg/L	12	50	50	50	50	Ud	1.0	50	50	Ud	1.0	50	50	Ud	1.0	50	50	Ud	1.0	50	50	Ud	1.0	50	50	Ud	1.0	50	50	Ud	1.0	50	50	Ud	1.0	50	50	Ud	1.0	50	50	Ud	1.0	50	50	Ud	1.0	50	50	Ud	1.0	50
1,2,3,7,8-Penta CDF	57117-41-6	pg/L	12	50	50	50	50	Ud	0.030	1.5	50	Ud	0.030	1.5	50	Ud	0.030	1.5	50	Ud	0.030	1.5	50	Ud	0.030	1.5	50	Ud	0.030	1.5	50	Ud	0.030	1.5	50	Ud	0.030	1.5	50	Ud	0.030	1.5	50	Ud	0.030	1.5	50	Ud	0.030	1.5	50	Ud	0.030	1.5
2,3,4,6,7,8-Hexa CDF	60851-34-5	pg/L	12	50	50	50	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0	50	Ud	0.10	5.0
2,3,4,7,8-Penta CDF	57117-31-4	pg/L	12	50	50	50	50	Ud	0.30	15	50	Ud	0.30	15	50	Ud	0.30	15	50	Ud	0.30	15	50	Ud	0.30	15	50	Ud	0.30	15	50	Ud	0.30	15	50	Ud	0.30	15	50	Ud	0.30	15	50	Ud	0.30	15	50	Ud	0.30	15	50	Ud	0.30	15
2,3,7,8-Tetra CDD	1746-01-6	pg/L	12	10	10	10	10	Ud	1.0	10	10	Ud	1.0	10	10	Ud	1.0	10	10	Ud	1.0	10	10	Ud	1.0	10	10	Ud	1.0	10	10	Ud	1.0	10	10	Ud	1.0	10	10	Ud	1.0	10	10	Ud	1.0	10	10	Ud	1.0	10	10	Ud	1.0	10
2,3,7,8-Tetra CDF	51207-31-9	pg/L	12	10	10	10	10	Ud	0.10	1.0	10	Ud	0.10	1.0	10	Ud	0.10	1.0	10	Ud	0.10	1.0	10	Ud	0.10	1.0	10	Ud	0.10	1.0	10	Ud	0.10	1.0	10	Ud	0.10	1.0	10	Ud	0.10	1.0	10	Ud	0.10	1.0	10	Ud	0.10	1.0	10	Ud	0.10	1.0
OCDD	3268-87-9	pg/L	12	11	100	62	**28**	**Ja**	0.00030	**0.00846**	100	A9441, U	0.00030	0.030	100	A9441, U	0.00030	0.030	100	A9444, U	0.00030	0.030	**31**	**Ja**	0.00030	**0.0094**	**13**	**Ja**	0.00030	**0.0038**	**27**	**Ja**	0.00030	**0.0080**	**11**	**Ja**	0.00030	**0.0032**	100	A9441, U	0.00030	0.030	**33**	**Ja**	0.00030	**0.010**	100	A9441, U	0.00030	0.030	100	A9441, U	0.00030	0.030
OCDF	39001-02-0	pg/L	12	100	100	100	100	Ud	0.00030	0.030	100	Ud	0.00030	0.030	100	Ud	0.00030	0.030	100	Ud	0.00030	0.030	100	Ud	0.00030	0.030	100	Ud	0.00030	0.030	100	Ud	0.00030	0.030	100	Ud	0.00030	0.030	100	Ud	0.00030	0.030	100	Ud	0.00030	0.030	100	Ud	0.00030	0.030	100	A9428, U	0.00030	0.030	100	Ud	0.00030	0.030
Total Hepta CDD	37871-00-4	pg/L	12	3.3	50	40	50	Ud	-	-	50	Ud	-	-	50	A9441, U	-	-	50	Ud	-	-	**3.3**	**Ja**	(b)	-	50	Ud	-	-	50	A8644, U	-	-	50	Ud	-	-	**4.7**	**Ja**	(b)	-	50	Ud	-	-	**19**	**Ja**	(b)	-	50	A8644, Ud	-	-
Total Hepta CDF	38998-75-3	pg/L	12	50	50	50	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	A8644, U	-	-	50	Ud	-	-
Total Hexa CDD	34465-46-8	pg/L	12	50	50	50	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-
Total Hexa CDF	55684-94-1	pg/L	12	1.4	50	46	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	**1.4**	**Ja**	(c)	-	50	Ud	-	-
Total Penta CDD	36088-22-9	pg/L	12	50	50	50	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-
Total Penta CDF	30402-15-4	pg/L	12	50	50	50	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-	50	Ud	-	-
Total Tetra CDD	41903-57-5	pg/L	12	10	10	10	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-
Total Tetra CDF	55722-27-5	pg/L	12	10	10	10	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	Ud	-	-	10	A8644, U	-	-	10	Ud	-	-
Total TEQ (a)	-	pg/L	12	0	0.094	0.012				**0.00846**				0				0				0				**0.0094**				**0.0038**				**0.0080**				**0.0032**				0 (b)				**0.010**				**0.094**				0

FOOTNOTES- lowercase footnotes were created by the table generator

a) Total TEQ was calculated using 2005 WHO TEF values from Van den Berg et al; 2006 (doi:10.1093/toxsci/kfl055) and https://clu-in.org/download/contaminantfocus/dioxins/Dioxin_TEFs_for_TEQs.pdf. Total TEQ was calculacted by summing all non-U qualified data.

b) Total TEQ does not include J qualified result for Total Hepta CDD since there is no reported TEF for Total Hepta CDD.

c) Total TEQ does not include J qualified result for Total Hexa CDF since there is no reported TEF for Total Hexa CDF.

Laboratory Qualifer

A8644	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
A9428	RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.**&** RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds
A9441	RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds
A9444	RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.
Ja	Estimated concentration between the EDL and RDL
Ud	Undetected at the limit of quantitation.

Samples with Detections are BOLD

Table 5D: Sediment Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Sediment Screening Criteria			No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SD		HSCNew-NMP-02-SD		HSCNew-NMP-03-SD		HSCNew-NMP-04-SD		HSCNew-NMP-05-SD		HSCNew-NMP-06-SD		HSCNew-NMP-07-SD		HSCNew-NMP-08-SD		HSCNew-NMP-09-SD		HSCNew-NMP-10-SD		HSCNew-NMP-11-SD		HSCNew-NMP-03-SD-Field Dup	
				NOAA (Marine-ERL) (b)	NOAA (Marine-ERM) (c)	Region 6 (Marine) (d)					10/6/2018		10/6/2018		10/5/2018		10/5/2018		10/4/2018		10/4/2018		10/3/2019		10/3/2018		10/2/2018		10/2/2018		10/2/2018		10/5/2018	
VOCs																																		
1,1,1-Trichloroethane	71-55-6	mg/kg	-	-	-	2.63	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
1,1,2,2-Tetrachloroethane	79-34-5	mg/kg	-	-	-	0.61	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
1,1,2-Tetrachloro-1,2,2-trifluoroethane	76-13-1	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
1,1,2-Trichloroethane	79-00-5	mg/kg	-	-	-	0.3	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
1,1-Dichloroethane	75-34-3	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
1,1-Dichloroethene	75-35-4	mg/kg	-	-	-	15.41	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
1,2,3-Trichlorobenzene	87-61-6	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
1,2,4-Trichlorobenzene	120-82-1	mg/kg	0.01	-	-	0.39	12	0.0024	0.0037	0.0028	0.003	Ua	0.0029	Ua	0.0024	Ua	0.0037	Ua	0.0025	Ua	0.0028	Ua	0.0029	Ua	0.0029	Ua	0.0028	Ua	0.0026	Ua	0.0027	Ua	0.0025	Ua
1,2-Dibromo-3-Chloropropane	96-12-8	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
1,2-Dibromoethane	106-93-4	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
1,2-Dichlorobenzene	95-50-1	mg/kg	0.02	-	-	0.74	12	0.0024	0.004	0.0028	0.0035	Ua	0.003	Ua	0.0024	Ua	0.004	Ua	0.003	Ua	0.0028	Ua	0.0029	Ua	0.0029	Ua	0.0028	Ua	0.003	Ua	0.003	Ua	0.0025	Ua
1,2-Dichloroethane	107-06-2	mg/kg	-	-	-	4.3	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
1,2-Dichloropropane	78-87-5	mg/kg	-	-	-	2.82	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
1,3-Dichlorobenzene	541-73-1	mg/kg	0.02	-	-	0.32	12	0.0024	0.015	0.0042	0.0035	Ua	**0.0079**	-	0.0024	Ua	**0.015**	-	0.003	Ua	0.0028	Ua	0.0029	Ua	0.0029	Ua	0.0028	Ua	0.0026	Ua	0.0027	Ua	0.0025	Ua
1,4-Dichlorobenzene	106-46-7	mg/kg	0.02	-	-	0.7	12	0.0024	0.0037	0.0028	0.0035	Ua	0.0029	Ua	0.0024	Ua	0.004	Ua	0.0025	Ua	0.0028	Ua	0.0029	Ua	0.0029	Ua	0.0028	Ua	0.0026	Ua	0.0027	Ua	0.0025	Ua
1,4-Dioxane	123-91-1	mg/kg	-	-	-	-	12	0.47	0.73	0.57	0.69	Ua	0.57	Ua	0.47	Ua	0.73	Ua	0.51	Ua	0.57	Ua	0.59	Ua	0.59	Ua	0.56	Ua	0.53	Ua	0.53	Ua	0.49	Ua
2-Butanone	78-93-3	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
2-Hexanone	591-78-6	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
4-Methyl-2-Pentanone	108-10-1	mg/kg	-	-	-	45.34	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Acetone	67-64-1	mg/kg	-	-	-	167.23	12	0.059	0.26	0.13	0.086	Ua	**0.079**	-	0.059	Ua	**0.26**	-	**0.13**	-	**0.21**	-	**0.12**	-	**0.13**	-	**0.15**	-	**0.19**	-	**0.078**	-	0.062	Ua
Benzene	71-43-2	mg/kg	0.01	-	-	-	12	0.0024	0.047	0.0091	0.0035	Ua	**0.011**	-	0.0024	Ua	**0.047**	-	0.0025	Ua	0.0028	Ua	0.0029	Ua	**0.026**	-	0.0028	Ua	0.0026	Ua	0.0027	Ua	0.0025	Ua
Bromodichloromethane	75-27-4	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Bromoform	75-25-2	mg/kg	-	-	-	1.78	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Bromomethane	74-83-9	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Carbon Disulfide	75-15-0	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Carbon Tetrachloride	56-23-5	mg/kg	-	-	-	3.67	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Chlorobenzene	108-90-7	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Chloroethane	75-00-3	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Chloroform	67-66-3	mg/kg	0.01	-	-	4.3	12	0.0024	0.0037	0.0028	0.0035	Ua	0.0029	Ua	0.0024	Ua	0.004	Ua	0.0025	Ua	0.0028	Ua	0.0029	Ua	0.0029	Ua	0.0028	Ua	0.003	Ua	0.0027	Ua	0.0025	Ua
Chloromethane	74-87-3	mg/kg	-	-	-	8.74	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
cis-1,2-Dichloroethene	156-59-2	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
cis-1,3-Dichloropropene	10061-01-5	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Cyclohexane	110-82-7	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Dibromochloromethane	124-48-1	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Dichlorodifluoromethane	75-71-8	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Ethylbenzene	100-41-4	mg/kg	0.01	-	-	0.65	12	0.0024	0.042	0.0072	0.0035	Ua	**0.015**	-	0.0024	Ua	**0.0043**	-	0.0025	Ua	0.0028	Ua	**0.0037**	-	**0.042**	-	0.0028	Ua	0.0026	Ua	0.0027	Ua	0.0025	Ua
Isopropylbenzene	98-82-8	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Methyl acetate	79-20-9	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Methyl tert-butyl ether	1634-04-4	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Methylcyclohexane	108-87-2	mg/kg	-	-	-	-	12	0.030	0.14	0.044	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	**0.14**	-	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Methylene chloride	75-09-2	mg/kg	-	-	-	3.82	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
o-Xylene	95-47-6	mg/kg	-	-	-	-	12	0.030	0.075	0.039	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	**0.075**	-	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
m&p-Xylene	179601-23-1	mg/kg	-	-	-	-	12	0.030	0.078	0.039	0.043	Ua	0.036	Ua	0.030	Ua	**0.047**	-	0.032	Ua	0.036	Ua	0.037	Ua	**0.078**	-	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Styrene	100-42-5	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Tetrachloroethene	127-18-4	mg/kg	0.01	-	-	3.1	12	0.0024	0.0037	0.0028	0.0035	Ua	0.0029	Ua	0.0024	Ua	0.0037	Ua	0.0025	Ua	0.0028	Ua	0.0029	Ua	0.0029	Ua	0.0028	Ua	0.0026	Ua	0.0027	Ua	0.0025	Ua
Toluene	108-88-3	mg/kg	0.01	-	-	0.94	12	0.0024	0.015	0.0041	0.0035	Ua	**0.0064**	-	0.0024	Ua	0.0037	Ua	0.0025	Ua	0.0028	Ua	0.0029	Ua	**0.015**	-	0.0028	Ua	0.0026	Ua	0.0027	Ua	0.0025	Ua
trans-1,2-Dichloroethene	156-60-5	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
trans-1,3-Dichloropropene	10061-02-6	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Trichloroethene	79-01-6	mg/kg	-	-	-	1.47	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Trichlorofluoromethane	75-69-4	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
Vinyl chloride	75-01-4	mg/kg	-	-	-	-	12	0.030	0.046	0.036	0.043	Ua	0.036	Ua	0.030	Ua	0.046	Ua	0.032	Ua	0.036	Ua	0.037	Ua	0.037	Ua	0.035	Ua	0.033	Ua	0.033	Ua	0.031	Ua
SVOCs																																		
1,2,4-Trichlorobenzene	120-82-1	ug/kg	10	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
1,2-Dichlorobenzene	95-50-1	ug/kg	20	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
Azobenzene (f)	103-33-3	ug/kg	10	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
1,3-Dichlorobenzene	541-73-1	ug/kg	20	-	-	-	12	36	78	50	78	Ub	**36**	**Jc**	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
1,4-Dichlorobenzene	106-46-7	ug/kg	20	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
2,4,6-Trichlorophenol	88-06-2	ug/kg	140 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
2,4-Dichlorophenol	120-83-2	ug/kg	120 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
2,4-Dimethylphenol	105-67-9	ug/kg	20	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub

Table 5D: Sediment Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Sediment Screening Criteria			No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SD		HSCNew-NMP-02-SD		HSCNew-NMP-03-SD		HSCNew-NMP-04-SD		HSCNew-NMP-05-SD		HSCNew-NMP-06-SD		HSCNew-NMP-07-SD		HSCNew-NMP-08-SD		HSCNew-NMP-09-SD		HSCNew-NMP-10-SD		HSCNew-NMP-11-SD		HSCNew-NMP-03-SD-Field Dup	
				NOAA (Marine-ERL) (b)	NOAA (Marine-ERM) (c)	Region 6 (Marine) (d)					10/6/2018		10/6/2018		10/5/2018		10/5/2018		10/4/2018		10/4/2018		10/3/2019		10/3/2018		10/2/2018		10/2/2018		10/2/2018		10/5/2018	
2,4-Dinitrophenol	51-28-5	ug/kg	500 (e)	-	-	-	12	250	468	305	468	Ub	287	Ub	250	Ub	326	Ub	329	Ub	286	Ub	294	Ub	304	Ub	293	Ub	304	Ub	272	Ub	252	Ub
2,4-Dinitrotoluene	121-14-2	ug/kg	200 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
2,6-Dinitrotoluene	606-20-2	ug/kg	200 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
2-Chloronapthalene	91-58-7	ug/kg	160 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
2-Chlorophenol	95-57-8	ug/kg	110 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
2-Nitrophenol	88-75-5	ug/kg	200 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
3,3-Dichlorobenzidine	91-94-1	ug/kg	300 (e)	-	-	-	12	83	156	102	156	Ub	96	Ub	83	Ub	109	Ub	110	Ub	95	Ub	98	Ub	101	Ub	98	Ub	101	Ub	91	Ub	84	Ub
4,6-Dinitro-o-cresol	534-52-1	ug/kg	600	-	-	-	12	250	468	305	468	Ub	287	Ub	250	Ub	326	Ub	329	Ub	286	Ub	294	Ub	304	Ub	293	Ub	304	Ub	272	Ub	252	Ub
4-Bromophenyl phenyl ether	101-55-3	ug/kg	160 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
4-Chloro-3-methylphenol	59-50-7	ug/kg	140 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
4-Chlorophenyl phenyl ether	7005-72-3	ug/kg	170 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
4-Nitrophenol	100-02-7	ug/kg	500 (e)	-	-	-	12	691	1300	846	1300	Ub	795	Ub	691	Ub	903	Ub	912	Ub	792	Ub	815	Ub	842	Ub	811	Ub	841	Ub	751	Ub	698	Ub
Benzidine	92-87-5	ug/kg	5	-	-	-	12	1160	2180	1426	2180	Ub	1340	Ub	1160	Ub	1520	Ub	1540	Ub	1340	Ub	1370	Ub	1420	Ub	1370	Ub	1420	Ub	1270	Ub	1180	Ub
Bis(2-chloroethoxy)methane	111-91-1	ug/kg	170 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
Bis(2-chloroethyl)ether	111-44-4	ug/kg	170 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
Bis(2-chloroisopropyl)ether	108-60-1	ug/kg	140 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
Bis[2-ethylhexyl] Phthalate	117-81-7	ug/kg	50	-	-	182 (i)	12	22	2240	789	**100**	-	**229**	-	**22**	**Jc**	**2240**	-	**1020**	-	**1800**	-	**1250**	-	**598**	-	**293**	-	**1160**	-	**726**	-	**26**	**Jc**
Butyl Benzyl Phthalate	85-68-7	ug/kg	50	-	-	-	12	16	78	46	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	**17**	**Jc**	51	Ub	**16**	**Jc**	42	Ub
Diethyl Phthalate	84-66-2	ug/kg	50	-	-	-	12	8.1	78	48	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	**8.1**	**Jc**	51	Ub	45	Ub	42	Ub
Dimethyl Phthalate	131-11-3	ug/kg	50	-	-	-	12	24	78	49	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	**24**	**Jc**	42	Ub
Di-n-butyl Phthalate	84-74-2	ug/kg	50	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
Di-n-octyl Phthalate	117-84-0	ug/kg	50	-	-	-	12	83	156	102	156	Ub	96	Ub	83	Ub	109	Ub	110	Ub	95	Ub	98	Ub	101	Ub	98	Ub	101	Ub	91	Ub	84	Ub
Hexachlorobenzene	118-74-1	ug/kg	10	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
Hexachlorobutadiene	87-68-3	ug/kg	20	-	-	-	12	11	55	44	**32**	**Jc**	**11**	**Jc**	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
Hexachlorocyclopentadiene	77-47-4	ug/kg	300 (e)	-	-	-	12	250	468	305	468	Ub	287	Ub	250	Ub	326	Ub	329	Ub	286	Ub	294	Ub	304	Ub	293	Ub	304	Ub	272	Ub	252	Ub
Hexachloroethane	67-72-1	ug/kg	100	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
Isophorone	78-59-1	ug/kg	10	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
Nitrobenzene	98-95-3	ug/kg	160 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
N-Nitrosodimethylamine	62-75-9	ug/kg	-	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
N-Nitrosodi-n-propylamine	621-64-7	ug/kg	150 (e)	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
N-Nitrosodiphenylamine	86-30-6	ug/kg	20	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
Pentachlorophenol	87-86-5	ug/kg	100	-	-	-	12	250	468	305	468	Ub	287	Ub	250	Ub	326	Ub	329	Ub	286	Ub	294	Ub	304	Ub	293	Ub	304	Ub	272	Ub	252	Ub
Phenol	108-95-2	ug/kg	100	-	-	-	12	42	78	51	78	Ub	48	Ub	42	Ub	54	Ub	55	Ub	48	Ub	49	Ub	51	Ub	49	Ub	51	Ub	45	Ub	42	Ub
PAHs (g)																																		
Acenaphthene	83-32-9	ug/kg	20	16	500	16	12	4.7	683	198	**9.2**	-	**66**	-	4.7	Ub	**311**	-	**35**	-	**57**	-	**206**	-	**476**	-	**683**	-	**410**	-	**118**	-	**5.7**	-
Acenaphthylene	208-96-8	ug/kg	20	44	640	44	12	2.2	92	38	**12**	-	**89**	-	**2.2**	**Jc**	**92**	-	**23**	-	**21**	-	**39**	-	**55**	-	**21**	-	**39**	-	**57**	-	**3.2**	**Jc**
Anthracene	120-12-7	ug/kg	20	85.3	1100	85.3	12	4.7	733	178	**20**	-	**56**	-	4.7	Ub	**162**	-	**35**	-	**44**	-	**179**	-	**733**	-	**465**	-	**288**	-	**136**	-	**12**	-
Benzo(a)anthracene	56-55-3	ug/kg	20	261	1600	261	12	8.0	902	357	**45**	-	**82**	-	**8.0**	-	**745**	-	**201**	-	**390**	-	**902**	-	**640**	-	**351**	-	**524**	-	**381**	-	**21**	-
Benzo(a)pyrene	50-32-8	ug/kg	20	430	1600	430	12	8.9	709	269	**63**	-	**159**	-	**8.9**	-	**539**	-	**166**	-	**327**	-	**709**	-	**292**	-	**187**	-	**434**	-	**324**	-	**22**	-
Benzo(b)fluoranthene	205-99-2	ug/kg	20	-	-	-	12	6.7	1110	346	**61**	-	**76**	-	**6.7**	-	**471**	-	**230**	-	**502**	-	**1110**	-	**406**	-	**263**	-	**604**	-	**405**	-	**23**	-
Benzo(e)pyrene	192-97-2	ug/kg	-	-	-	-	12	6.8	810	306	**64**	-	**132**	-	**6.8**	-	**670**	-	**227**	-	**361**	-	**810**	-	**360**	-	**201**	-	**488**	-	**335**	-	**20**	-
Benzo[g,h,i]perylene	191-24-2	ug/kg	20	-	-	-	12	7.0	671	284	**108**	-	**526**	-	**7.0**	-	**510**	-	**180**	-	**307**	-	**671**	-	**222**	-	**149**	-	**420**	-	**290**	-	**21**	-
Benzo(k)fluoranthene	207-08-9	ug/kg	20	-	-	-	12	5.2	545	203	**46**	-	**45**	-	**5.2**	-	**238**	-	**108**	-	**270**	-	**545**	-	**250**	-	**164**	-	**439**	-	**311**	-	**17**	-
Chrysene	218-01-9	ug/kg	20	384	2800	384	12	7.0	850	337	**53**	-	**76**	-	**7.0**	-	**651**	-	**210**	-	**370**	-	**850**	-	**536**	-	**291**	-	**585**	-	**389**	-	**23**	-
Dibenzo[a,h]anthracene	53-70-3	ug/kg	20	63.4	260	63.4	12	4.1	153	54	**8.2**	**Jc**	**4.6**	**Jc**	4.7	Ub	**153**	-	**41**	-	**66**	-	**147**	-	**41**	-	**32**	-	**80**	-	**62**	-	**4.1**	**Jc**
Fluoranthene	206-44-0	ug/kg	20	600	5100	600	12	14	1830	861	**126**	-	**543**	-	**14**	-	**1240**	-	**307**	-	**739**	-	**1830**	-	**1800**	-	**1120**	-	**1580**	-	**990**	-	**49**	-
Fluorene	86-73-7	ug/kg	20	19	540	19	12	4.7	614	202	**10**	-	**51**	-	4.7	Ub	**200**	-	**49**	-	**77**	-	**252**	-	**614**	-	**602**	-	**436**	-	**126**	-	**5.3**	-
Indeno[1,2,3-c,d]pyrene	193-39-5	ug/kg	20	-	-	-	12	7.3	563	206	**58**	-	**171**	-	**7.3**	-	**246**	-	**136**	-	**283**	-	**563**	-	**181**	-	**142**	-	**393**	-	**268**	-	**18**	-
Naphthalene	91-20-3	ug/kg	20	160	2100	160	12	2.1	463	74	**8.9**	-	**78**	-	**2.1**	**Jc**	**108**	-	**94**	-	**9.2**	-	**26**	-	**61**	-	**18**	-	**463**	-	**20**	-	5.0	Ub
Phenanthrene	85-01-8	ug/kg	20	240	1500	240	12	4.6	1860	665	**45**	-	**239**	-	**4.6**	**Jc**	**888**	-	**213**	-	**317**	-	**952**	-	**1860**	-	**1620**	-	**1300**	-	**528**	-	**20**	-
Pyrene	129-00-0	ug/kg	20	665	2600	665	12	19	1480	798	**211**	-	**1160**	-	**19**	-	**1480**	-	**378**	-	**644**	-	**1430**	-	**1430**	-	**865**	-	**1160**	-	**752**	-	**53**	-
PAH (Total) calculated	130498-29-2	ug/kg	20	4022	44792	4022	12	108	11220	5378	**948**	-	**3554**	-	**108**	-	**8704**	-	**2632**	-	**4783**	-	**11220**	-	**9957**	-	**7173**	-	**9643**	-	**5491**	-	**317**	-
Pesticides																																		
4,4′-DDD	72-54-8	ug/kg	5 (e)	2	20	1.22	12	0.59	10	3.6	**0.59**	-	**9.8**	-	**0.81**	-	**10**	-	**2.4**	-	**2.5**	-	**4.5**	-	**4.3**	-	**0.86**	-	**1.8**	-	**2.9**	-	**2.5**	-
4,4′-DDE	72-55-9	ug/kg	5 (e)	2.2	27	2.07	12	0.30	15	5.0	**0.30**	-	**3.4**	-	**0.40**	-	**9.2**	-	**5.1**	-	**8.9**	-	**15**	-	**7.2**	-	**1.6**	-	**2.0**	-	**5.7**	-	**1.6**	-
4,4′-DDT	50-29-3	ug/kg	5 (e)	1	7	1.19	12	0.082	9.3	1.5	0.29	U	0.23	U	**0.082**	**J**	**9.3**	-	**2.6**	-	0.21	U	0.21	U	**4.7**	-	0.23	U	0.18	U	0.21	U	0.18	U
Aldrin	309-00-2	ug/kg	3 (e)	-	-	-	12	0.17	0.47	0.24	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	**0.47**	-	0.18	U	0.21	U	0.18	U
Alpha-BHC	319-84-6	ug/kg	3 (e)	-	-	-	12	0.17	0.48	0.24	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	**0.48**	-	0.18	U	0.21	U	0.18	U
Beta-BHC	319-85-7	ug/kg	3 (e)	-	-	-	12	0.17	0.29	0.22	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
Delta-BHC	319-86-8	ug/kg	3 (e)	-	-	-	12	0.17	0.29	0.22	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
Dieldrin	60-57-1	ug/kg	5 (e)	0.02	8	0.715 (i)	12	0.17	0.79	0.27	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	**0.79**	-

Table 5D: Sediment Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Sediment Screening Criteria			No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SD		HSCNew-NMP-02-SD		HSCNew-NMP-03-SD		HSCNew-NMP-04-SD		HSCNew-NMP-05-SD		HSCNew-NMP-06-SD		HSCNew-NMP-07-SD		HSCNew-NMP-08-SD		HSCNew-NMP-09-SD		HSCNew-NMP-10-SD		HSCNew-NMP-11-SD		HSCNew-NMP-03-SD-Field Dup	
				NOAA (Marine-ERL) (b)	NOAA (Marine-ERM) (c)	Region 6 (Marine) (d)					10/6/2018		10/6/2018		10/5/2018		10/5/2018		10/4/2018		10/4/2018		10/3/2019		10/3/2018		10/2/2018		10/2/2018		10/2/2018		10/5/2018	
Endosulfan I	959-98-8	ug/kg	5 (e)	-	-	-	12	0.17	0.29	0.22	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
Endosulfan II	33213-65-9	ug/kg	5 (e)	-	-	-	12	0.17	0.29	0.22	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
Endosulfan Sulfate	1031-07-8	ug/kg	5 (e)	-	-	-	12	0.17	0.29	0.22	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
Endrin	72-20-8	ug/kg	5 (e)	-	-	-	12	0.17	0.29	0.22	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
Endrin Aldehyde	7421-93-4	ug/kg	5 (e)	-	-	-	12	0.17	0.29	0.22	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
Gamma-BHC (lindane)	58-89-9	ug/kg	3 (e)	-	-	0.32 (i)	12	0.17	0.86	0.38	0.29	U	**0.86**	-	0.19	U	0.26	U	**0.81**	-	**0.42**	-	**0.76**	-	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
Heptachlor	76-44-8	ug/kg	3 (e)	-	-	-	12	0.17	0.29	0.22	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
Heptachlor Epoxide	1024-57-3	ug/kg	3 (e)	-	-	-	12	0.17	0.29	0.22	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
Toxaphene	8001-35-2	ug/kg	50	-	-	-	12	6.9	12	8.7	12	U	9.4	U	7.8	U	11	U	9.0	U	8.4	U	8.4	U	6.9	U	9.1	U	7.4	U	8.5	U	7.1	U
alpha-Chlordane	5103-71-9	ug/kg	3 (e)	0.5	6	2.26 (i)	12	0.045	1.9	0.75	**0.045**	J	0.23	U	0.19	U	0.26	U	0.22	U	**1.9**	-	**1.9**	-	**1.1**	-	**0.71**	-	**0.76**	-	**1.6**	-	0.18	U
gamma-Chlordane	5566-34-7	ug/kg	3 (e)	0.5	6	2.26 (i)	12	0.10	2.2	0.45	0.29	U	**2.2**	-	**0.097**	J	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	**1.2**	-	0.18	U	0.21	U	0.18	U
Oxychlordane	26880-48-8	ug/kg	3 (e)	0.5	6	2.26 (i)	12	0.17	3.6	0.50	0.29	U	**3.6**	-	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
cis-Nonachlor	510-37-31	ug/kg	3 (e)	0.5	6	2.26 (i)	12	0.17	0.29	0.22	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	0.21	U	0.21	U	0.17	U	0.23	U	0.18	U	0.21	U	0.18	U
trans-Nonachlor	39765-80-5	ug/kg	3 (e)	0.5	6	2.26 (i)	12	0.17	1.4	0.48	0.29	U	0.23	U	0.19	U	0.26	U	0.22	U	**1.4**	-	0.21	U	0.17	U	**0.79**	-	**0.61**	-	**1.3**	-	0.18	U
PCBs																																		
PCB 101	37680-73-2	ug/kg	-	-	-	-	12	0.20	7.9	3.6	**0.50**	-	**5.1**	-	**0.20**	J	**7.9**	-	**2.1**	-	**5.7**	-	**6.7**	-	**3.8**	-	**1.6**	-	**2.3**	-	**5.2**	-	**1.5**	-
PCB 105	32598-14-4	ug/kg	-	-	-	-	12	0.050	1.7	0.78	0.50	U	**1.7**	-	**0.050**	J	**1.5**	-	**0.40**	-	**1.0**	-	**1.5**	-	**0.90**	-	**0.20**	J	**0.60**	-	**0.70**	-	**0.30**	-
PCB 118	31508-00-6	ug/kg	-	-	-	-	12	0.10	4.7	2.0	**0.20**	J	**2.8**	-	**0.10**	J	**4.7**	-	**1.3**	-	**3.3**	-	**3.8**	-	**2.6**	-	**0.90**	-	**1.1**	-	**2.2**	-	**1.1**	-
PCB 126	57465-28-8	ug/kg	-	-	-	-	12	0.20	0.40	0.31	**0.30**	J	0.40	U	0.30	U	0.40	U	0.40	U	0.30	U	0.30	U	0.30	U	**0.20**	J	0.30	U	0.30	U	**0.20**	J
PCB 128	38380-07-3	ug/kg	-	-	-	-	12	0.20	0.50	0.34	0.50	U	0.40	U	0.30	U	0.40	U	0.40	U	0.30	U	0.30	U	0.30	U	0.40	U	0.30	U	0.30	U	**0.20**	J
PCB 138	35065-28-2	ug/kg	-	-	-	-	12	0.10	7.0	3.2	**0.30**	J	**4.5**	-	**0.10**	J	**4.9**	-	**2.1**	-	**5.5**	-	**6.1**	-	**3.7**	-	**1.5**	-	**2.0**	-	**7.0**	-	**1.0**	-
PCB 153	35065-27-1	ug/kg	-	-	-	-	12	0.20	9.4	4.1	**0.50**	-	**4.8**	-	**0.20**	J	**6.3**	-	**2.8**	-	**6.9**	-	**7.3**	-	**4.4**	-	**2.0**	-	**2.7**	-	**9.4**	-	**1.3**	-
PCB 169	32774-16-6	ug/kg	-	-	-	-	12	0.30	0.50	0.35	0.50	U	0.40	U	0.30	U	0.40	U	0.40	U	0.30	U	0.30	U	0.30	U	0.40	U	0.30	U	0.30	U	0.30	U
PCB 170	35065-30-6	ug/kg	-	-	-	-	12	0.30	3.0	1.2	0.50	U	**1.4**	-	0.30	U	**2.5**	-	**0.90**	-	**2.0**	-	**1.7**	-	**1.1**	-	**0.40**	-	**0.60**	-	**3.0**	-	**0.30**	-
PCB 18	37680-65-2	ug/kg	-	-	-	-	12	0.30	7.3	2.9	**0.60**	-	**5.5**	-	0.30	U	**6.3**	-	**2.1**	-	**3.1**	-	**7.3**	-	**3.0**	-	**1.1**	-	**1.7**	-	**2.2**	-	**1.2**	-
PCB 180	35065-29-3	ug/kg	-	-	-	-	12	0.060	5.9	1.8	**0.10**	J	**1.5**	-	**0.060**	J	**2.4**	-	**1.3**	-	**2.9**	-	**2.8**	-	**1.8**	-	**1.0**	-	**1.3**	-	**5.9**	-	**0.40**	-
PCB 187	52663-68-0	ug/kg	-	-	-	-	12	0.030	3.0	0.97	**0.090**	J	**1.0**	-	**0.030**	J	**1.7**	-	0.40	U	**1.5**	-	**1.5**	-	**0.90**	-	**0.60**	-	**0.60**	-	**3.0**	-	**0.30**	-
PCB 28	7012-37-5	ug/kg	-	-	-	-	12	0.30	13	3.5	**1.1**	-	**2.7**	-	**0.30**	-	**13**	-	**3.3**	-	**4.4**	-	**5.4**	-	**2.1**	-	**1.3**	-	**2.6**	-	**3.9**	-	**2.2**	-
PCB 44	41464-39-5	ug/kg	-	-	-	-	12	0.20	5.9	2.6	**0.70**	-	**5.1**	-	**0.20**	J	**5.9**	-	**1.8**	-	**4.0**	-	**4.9**	-	**2.0**	-	**1.1**	-	**1.5**	-	**2.5**	-	**1.2**	-
PCB 52	35693-99-3	ug/kg	-	-	-	-	12	0.20	7.6	3.1	**1.1**	-	**6.5**	-	**0.20**	J	**7.6**	-	**2.4**	-	**3.3**	-	**6.0**	-	**2.8**	-	**0.90**	-	**1.7**	-	**2.6**	-	**1.7**	-
PCB 66	32598-10-0	ug/kg	-	-	-	-	12	0.20	7.6	2.3	**0.60**	-	**4.8**	-	**0.20**	J	**7.6**	-	**2.1**	-	**2.7**	-	**3.4**	-	**1.5**	-	**0.50**	-	**0.80**	-	**1.9**	-	**1.2**	-
PCB 77	32598-13-3	ug/kg	-	-	-	-	12	0.08	1.1	0.46	**0.080**	J	**1.0**	-	0.30	U	**1.1**	-	**0.50**	-	**0.50**	-	**0.60**	-	**0.50**	-	**0.10**	J	**0.30**	-	**0.40**	-	**0.10**	J
PCB 8	34883-43-7	ug/kg	-	-	-	-	12	0.30	4.2	0.96	**0.70**	-	0.40	U	0.30	U	0.40	U	0.40	U	0.30	U	**4.2**	-	0.30	U	**0.50**	-	**1.4**	-	**1.6**	-	**1.0**	-
Total PCB Congeners calculated (h)	NA	ug/kg	1	22.7	180	22.7	12	2.7	74	34	**7.9**	J	**49**	-	**2.7**	J	**74**	-	**24**	-	**47**	-	**64**	-	**32**	-	**14**	-	**22**	-	**52**	-	**15**	-
Dioxins and Furans																																		
Total TEQ (j)	NA	pg/g	-	-	-	-	12	2.8	1370	161	**28**	-	**166**	-	**2.8**	-	**1370**	-	**108**	-	**34**	-	**76**	-	**65**	-	**5.5**	-	**15**	-	**8.3**	-	**54**	-
Metals (k)																																		
Antimony	7440-36-0	mg/kg	2.5	2	-	-	12	0.10	0.52	0.33	**0.27**	-	**0.19**	-	**0.10**	-	**0.42**	-	**0.28**	-	**0.37**	-	**0.50**	-	**0.43**	-	**0.41**	-	**0.52**	-	**0.32**	-	**0.14**	-
Arsenic	7440-38-2	mg/kg	0.3 (e)	8.2	70	8.2	12	1.9	6.2	3.62	**4.1**	-	**2.6**	-	**2.1**	-	**6.2**	-	**3.9**	-	**3.6**	-	**3.0**	-	**4.5**	-	**4.9**	-	**4.1**	-	**2.6**	-	**1.9**	-
Barium	7440-39-3	mg/kg	-	-	-	-	12	66	263	151	**129**	MB-02, B	**108**	MB-02, B	**66**	MB-02, B	**263**	MB-02, B	**137**	MB-02, B	**130**	MB-02, B	**140**	MB-02, B	**216**	MB-02, B	**211**	MB-02, B	**178**	MB-02, B	**124**	MB-02, B	**109**	MB-02, B
Beryllium	7440-41-7	mg/kg	1 (e)	-	-	-	12	0.41	1.8	0.83	**0.99**	-	**0.75**	-	**0.41**	-	**1.1**	-	**0.78**	-	**0.64**	-	**0.68**	-	**0.94**	-	**1.8**	-	**0.86**	-	**0.49**	-	**0.48**	-
Cadmium	7440-43-9	mg/kg	0.1	1.2	9.6	1.2	12	0.058	2.1	0.61	**0.18**	-	**0.30**	-	**0.058**	J	**2.1**	-	**0.56**	-	**0.95**	-	**0.82**	-	**0.77**	-	**0.39**	-	**0.64**	-	**0.50**	-	**0.13**	-
Chromium (total)	7440-47-3	mg/kg	1 (e)	81	370	81	12	10	66	28	**26**	-	**23**	-	**10**	-	**66**	-	**28**	-	**32**	-	**29**	-	**34**	-	**31**	-	**26**	-	**17**	-	**12**	-
Chromium (3+)	7440-47-3 (III)	mg/kg	1	-	-	-	12	10	66	28	**26**	-	**23**	-	**10**	-	**66**	-	**28**	-	**32**	-	**29**	-	**34**	-	**31**	-	**26**	-	**17**	-	**12**	-
Chromium (6+)	7440-47-3 (Cr6+)	mg/kg	1	-	-	-	12	0.014	0.022	0.018	**0.022**	J	**0.020**	J	**0.022**	J	**0.020**	J	**0.014**	J	**0.020**	J	**0.016**	J	**0.015**	J	**0.018**	J	**0.015**	J	**0.019**	J	**0.020**	J
Copper	7440-50-8	mg/kg	1 (e)	34	270	34	12	4.6	40	19	**14**	-	**11**	-	**4.6**	-	**40**	-	**19**	-	**23**	-	**27**	-	**25**	-	**19**	-	**25**	-	**14**	-	**7.0**	-
Lead	7439-92-1	mg/kg	0.3 (e)	46.7	218	46.7	12	8.4	81	39	**25**	-	**32**	-	**8.4**	-	**81**	-	**32**	-	**48**	-	**70**	-	**60**	-	**26**	-	**38**	-	**33**	-	**16**	-
Mercury	7439-97-6	mg/kg	0.2	0.15	0.71	0.15	12	0.012	0.41	0.15	**0.20**	-	**0.40**	-	**0.012**	-	**0.41**	-	**0.082**	-	**0.12**	-	**0.22**	-	**0.16**	-	**0.048**	-	**0.11**	-	**0.063**	-	**0.026**	-
Nickel	7440-02-0	mg/kg	0.5 (e)	20.9	51.6	20.9	12	7.0	26	15	**15**	-	**14**	-	**7.9**	-	**26**	-	**14**	-	**15**	-	**11**	-	**19**	-	**22**	-	**15**	-	**11**	-	**7.0**	-
Selenium	7782-49-2	mg/kg	0.5 (e)	-	-	-	12	2.2	11	3.9	**3.9**	-	**3.6**	-	**2.8**	-	**4.7**	-	**3.3**	-	**3.4**	-	**2.4**	-	**3.3**	-	**11**	-	**3.4**	-	**2.2**	-	**2.8**	-
Silver	7440-22-4	mg/kg	0.2	1	3.7	1	12	0.049	0.82	0.42	**0.23**	B	**0.14**	B	**0.049**	J, B	**0.70**	B	**0.40**	B	**0.77**	B	**0.82**	B	**0.62**	B	**0.32**	B	**0.53**	B	**0.36**	B	**0.11**	B
Thallium	7440-28-0	mg/kg	0.2	-	-	-	12	0.100	0.34	0.18	**0.23**	-	**0.17**	-	**0.10**	-	**0.34**	-	**0.17**	-	**0.15**	-	**0.15**	-	**0.21**	-	**0.24**	-	**0.17**	-	**0.11**	-	**0.10**	-
Zinc	7440-66-6	mg/kg	2 (e)	150	410	150	12	20	237	107	**90**	-	**59**	-	**20**	-	**237**	-	**99**	-	**122**	-	**168**	-	**133**	-	**96**	-	**139**	-	**91**	-	**36**	-
Miscellaneous Parameters																																		
Cyanide	57-12-5	mg/kg	2	-	-	-	12	1.1	1.6	1.3	1.5	Ua	1.2	Ua	1.1	Ua	1.6	Ua	1.4	Ua	1.2	Ua	1.2	Ua	1.3	Ua	1.2	Ua	1.2	Ua	1.3	Ua	1.1	Ua
Acid Volatile Sulfide	NA	mg/kg	0.1	-	-	-	12	27	1130	320	**169**	-	**567**	-	**27**	-	**1130**	-	**486**	-	**235**	-	**485**	-	**311**	-	**48**	-	**188**	-	**161**	-	**27**	-
Volatile Solids	NA	mg/kg	10000	-	-	-	12	10600	62600	39050	**35800**	-	**29600**	-	**10600**	-	**62600**	-	**39300**	-	**41800**	-	**45200**	-	**56800**	-	**50500**	-	**46300**	-	**32500**	-	**17600**	-
% Moisture	NA	%	-	-	-	-	12	19	50	33	**50**	-	**35**	-	**19**	-	**45**	-	**35**	-	**33**	-	**32**	-	**31**	-	**31**	-	**34**	-	**28**	-	**20**	-
% Solids	NA	%	0.10%	-	-	-	12	50	81	67	**50**	-	**65**	-	**81**	-	**55**	-	**66**	-	**68**	-	**68**	-	**69**	-	**69**	-	**66**	-	**72**	-	**80**	-
TOC Min	NA	%	-	-	-	-	12	0.12	0.55	0.34	0.34	Ua	**0.27**	-	**0.12**	-	**0.50**	-	**0.36**	-	**0.26**	-	**0.44**	-	**0.33**	-	**0.34**	-	**0.55**	-	**0.38**	-	**0.20**	-
TOC Max	NA	%	-	-	-	-	12	0.23	0.70	0.43	**0.58**	-	**0.31**	-	**0.24**	-	**0.56**	-	**0.41**	-	**0.38**	-	**0.56**	-	**0.40**	-	**0.42**	-	**0.70**	-	**0.41**	-	**0.23**	-

Table 5D: Sediment Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Sediment Screening Criteria			No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SD		HSCNew-NMP-02-SD		HSCNew-NMP-03-SD		HSCNew-NMP-04-SD		HSCNew-NMP-05-SD		HSCNew-NMP-06-SD		HSCNew-NMP-07-SD		HSCNew-NMP-08-SD		HSCNew-NMP-09-SD		HSCNew-NMP-10-SD		HSCNew-NMP-11-SD		HSCNew-NMP-03-SD-Field Dup	
				NOAA (Marine-ERL) (b)	NOAA (Marine-ERM) (c)	Region 6 (Marine) (d)					10/6/2018		10/6/2018		10/5/2018		10/5/2018		10/4/2018		10/4/2018		10/3/2019		10/3/2018		10/2/2018		10/2/2018		10/2/2018		10/5/2018	
TOC Mean	NA	%	0.10%	-	-	-	12	0.15	0.61	0.38	**0.47**	-	**0.30**	-	**0.15**	-	**0.54**	-	**0.39**	-	**0.31**	-	**0.49**	-	**0.37**	-	**0.38**	-	**0.61**	-	**0.41**	-	**0.22**	-
Ammonia as N, filtered	7664-41-7	mg/kg	0.1	-	-	-	12	13	235	124	**123**	B	**114**	B	**13**	B	**139**	B	**117**	B	**149**	B	**235**	B	**165**	B	**110**	B	**170**	B	**133**	B	**22**	B
Petroleum Hydrocarbons																																		
>C12-C28	NA	mg/kg	-	-	-	-	12	7.3	870	168.2	**30**	Ja	**250**	-	**8.3**	Ja	**870**	-	**7.3**	Ja	**150**	-	**77**	-	**130**	-	**310**	-	**42**	Bb	**44**	Bb	**100**	-
>C28-C35	NA	mg/kg	-	-	-	-	12	11	140	49.1	**19**	Ja	**46**	Ja	**11**	Ja	**140**	-	**12**	Ja	**81**	Bb	**49**	Bb	**44**	Bb	**100**	-	**33**	Ja	**26**	Ja	**28**	Ja
C6-C12	NA	mg/kg	-	-	-	-	12	7.3	94	22.9	**19**	Ja	**41**	Ja	**7.8**	Ja	**94**	-	**7.3**	Ja	**15**	Ja	**12**	Ja	**17**	Ja	**23**	Ja	**12**	Ja	**11**	Ja	**16**	Ja
C6-C35	NA	mg/kg	-	-	-	-	12	24	1100	237	**62**	Ja	**340**	-	**24**	Ja	**1100**	-	**24**	Ja	**240**	-	**140**	Bb	**190**	-	**430**	-	**84**	Bb	**71**	Bb	**140**	Bb
Total Petroleum Hydrocarbons	8012-95-1	mg/kg	5	-	-	-	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FOOTNOTES- lowercase footnotes were created by the table generator

a) The primary sources for this table were: TDLs - EPA 823-B-95-001, QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations. USEPA/USACE, Regional Implementation Agreement, July 2003; US EPA SW-846 http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm;

b) NOAA- http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

c) These values are based on recommendations from the EPA Region 6 Laboratory in Houston; these values were based on data or other technical basis;

d) Region 6 screening benchmarks come from TCEQ's ecological benchmarks for sediment, http://www.tceq.state.tx.us/assets/public/remediation/eco/0106eragupdate.pdf; unless otherwise noted, benchmarks are Effects Range Low (ERL) from: Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder. 1995. Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. Environ. Manage. 19(1):81-97; see footnote (i)

e) These values are based on recommendations from the EPA Region 6 Laboratory in Houston; these values were based on data or other technical basis;

f) Azobenzene is reported by the laboratory instead of 1,2-diphenylhydrazine. 1,2-diphenylhydrazine is rapidly oxidized into azobenzene during analysis.

g) PAHs methylnapthalene and 2-methylnapthalene were not analyzed for by the laboratory

h) Total PCBs for Region 6 from "Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (revised) January 2006; Total PCBs for NOAA from Squirt Table for Organics in Sediment

i) Threshold Effects Level (TEL) from: Smith, S.L., D.D. MacDonald, K.A. Keenleyside, and C.L. Gaudet. 1996b. The Development and Implementation of Canadian Sediment Quality Guidelines. In: Development and Progress in Sediment Quality Assessment: Rationale, Challenges, Techniques & Strategies. Ecovision World Monograph Series. Munawar & Dave (Eds.). Academic Publishing, Amsterdam, The Netherlands.

j) Total TEQ was calculated using 2005 WHO TEF values from Van den Berg et al; 2006 (doi:10.1093/toxsci/kfl055) and https://clu-in.org/download/contaminantfocus/dioxins/Dioxin_TEFs_for_TEQs.pdf. Total TEQ was calculacted by summing all non-U qualified data.

k) Samples for metals analysis were diluted 4X for antimony, arsenic, barium, beryllium, cadmoum, chromium (total), copper, lead, nickel, selenium, silver, 1X for chromium (3+) and chromium (+6), 2X for zinc and mercury

Laboratory Qualifer

B	Analyte is found in the associated blank as well as in the sample.
Bb	Indicates the analyte was detected in the laboratory method blank analyzed concurrently with the sample.
J	Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.
Ja	Estimated value. This analyte was detected in the sample at a concentration less than the laboratory Limit of Quantitation, but above the Method Detection Limit.
Jb	Estimated concentration between the EDL and RDL
Jc	Estimated value less than RL
MB-02	The method blank contains the analyte at a concentration above the MRL due to memory interferences.
U	Analyte included in the analysis, but not detected
Ua	Analyte included in the analysis, but not detected at or above the Reporting Limit
Ub	Compound was analyzed for but was not detected (non-detect)

Samples with Detections are BOLD

One or more sample concentrations exceed criteria

Sample concentration exceeds criteria

Table 5E: Sediment Analytical Results for Dioxins and Furans
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-SD			HSCNew-NMP-02-SD			HSCNew-NMP-03-SD			HSCNew-NMP-04-SD			HSCNew-NMP-05-SD			HSCNew-NMP-06-SD			HSCNew-NMP-07-SD			HSCNew-NMP-08-SD			HSCNew-NMP-09-SD			HSCNew-NMP-10-SD			HSCNew-NMP-11-SD			HSCNew-NMP-03-SD-Field		
							10/6/2018		TEF	TEQ	10/6/2018		TEF	TEQ	10/5/2018		TEF	TEQ	10/5/2018		TEF	TEQ	10/4/2018		TEF	TEQ	10/4/2018		TEF	TEQ	10/3/2018		TEF	TEQ	10/3/2018		TEF	TEQ	10/2/2018		TEF	TEQ	10/2/2018		TEF	TEQ	########	TEF	TEQ	#########	TEF	TEQ
1,2,3,4,6,7,8-Hepta CDD	35822-46-9	pg/g	12	5.5	473	207	**132**	-	0.01	**1.3**	**61**	-	0.01	**0.61**	**5.5**	-	0.01	**0.055**	**473**	-	0.01	**4.7**	**157**	-	0.01	**1.6**	**286**	-	0.01	**2.9**	**438**	-	0.01	**4.4**	**294**	-	0.01	**2.9**	**102**	-	0.01	**1.0**	**311**	-	0.01	**3.1**	**198**	-	0.01	**2.0**	**26**	-	0.01	**0.26**
1,2,3,4,6,7,8-Hepta CDF	67562-39-4	pg/g	12	0.85	124	41	**20**	-	0.01	**0.20**	**18**	-	0.01	**0.18**	**0.85**	**Jb**	0.01	**0.00846**	**124**	-	0.01	**1.2**	**31**	-	0.01	**0.31**	**45**	-	0.01	**0.45**	**81**	-	0.01	**0.81**	**72**	-	0.01	**0.72**	**16**	-	0.01	**0.16**	**52**	-	0.01	**0.52**	**28**	-	0.01	**0.28**	**4.7**	**Jb**	0.01	**0.047**
1,2,3,4,7,8,9-Hepta CDF	55673-89-7	pg/g	12	0.61	11	3.9	**2.7**	**Jb**	0.01	**0.027**	**2.3**	**Jb**	0.01	**0.023**	5.0	Uc	0.01	0.050	**11**	-	0.01	**0.11**	**3.3**	**Jb**	0.01	**0.033**	**3.6**	**Jb**	0.01	**0.036**	**6.4**	-	0.01	**0.064**	**5.3**	-	0.01	**0.053**	**1.0**	**Jb**	0.01	**0.010**	**3.2**	**Jb**	0.01	**0.032**	**2.2**	**Jb**	0.01	**0.022**	**0.61**	**Jb**	0.01	**0.0061**
1,2,3,4,7,8-Hexa CDD	39227-28-6	pg/g	12	0.21	5.0	1.7	**1.2**	**Jb**	0.1	**0.12**	**0.50**	**Jb**	0.1	**0.050**	5.0	Uc	0.1	0.50	**2.1**	**Jb**	0.1	**0.21**	**1.0**	**Jb**	0.1	**0.10**	**1.3**	**Jb**	0.1	**0.13**	**2.2**	**Jb**	0.1	**0.22**	**0.81**	**Jb**	0.1	**0.081**	5.0	A2946, U	0.1	0.50	**1.0**	**Jb**	0.1	**0.10**	**0.64**	**Jb**	0.1	**0.064**	**0.21**	**Jb**	0.1	**0.021**
1,2,3,4,7,8-Hexa CDF	70648-26-9	pg/g	12	0.34	46	8.9	**3.8**	**Jb**	0.1	**0.38**	**6.2**	-	0.1	**0.62**	**0.34**	**Jb**	0.1	**0.034**	**46**	-	0.1	**4.6**	**15**	-	0.1	**1.5**	**5.2**	-	0.1	**0.52**	**8.7**	-	0.1	**0.87**	**13**	-	0.1	**1.3**	**1.3**	**Jb**	0.1	**0.13**	**3.9**	**Jb**	0.1	**0.39**	**2.2**	**Jb**	0.1	**0.22**	**1.8**	**Jb**	0.1	**0.18**
1,2,3,6,7,8-Hexa CDD	57653-85-7	pg/g	12	0.34	17	5.7	**2.6**	**Jb**	0.1	**0.26**	**2.4**	**Jb**	0.1	**0.24**	**0.34**	**Jb**	0.1	**0.034**	**17**	-	0.1	**1.7**	**3.9**	**Jb**	0.1	**0.39**	**6.9**	-	0.1	**0.69**	**11**	-	0.1	**1.1**	**8.4**	-	0.1	**0.84**	**2.6**	**Jb**	0.1	**0.26**	**6.8**	-	0.1	**0.68**	**4.5**	**Jb**	0.1	**0.45**	**1.0**	**Jb**	0.1	**0.10**
1,2,3,6,7,8-Hexa CDF	57117-44-9	pg/g	12	0.46	11	3.6	**1.5**	**Jb**	0.1	**0.15**	**1.7**	**Jb**	0.1	**0.17**	5.0	Uc	0.1	0.50	**11**	-	0.1	**1.1**	**4.4**	**Jb**	0.1	**0.44**	**2.2**	**Jb**	0.1	**0.22**	**5.1**	-	0.1	**0.51**	**4.5**	**Jb**	0.1	**0.45**	**0.76**	**Jb**	0.1	**0.076**	5.0	A2946, U	0.1	0.50	**1.8**	**Jb**	0.1	**0.18**	**0.46**	**Jb**	0.1	**0.046**
1,2,3,7,8,9-Hexa CDD	19408-74-3	pg/g	12	0.41	14	4.1	**4.9**	**Jb**	0.1	**0.49**	**1.9**	**Jb**	0.1	**0.19**	**0.41**	**Jb,A0550**	0.1	**0.041**	**14**	-	0.1	**1.4**	**3.3**	**Jb**	0.1	**0.33**	**4.4**	**Jb**	0.1	**0.44**	**6.5**	-	0.1	**0.65**	**4.1**	**Jb**	0.1	**0.41**	**1.7**	**Jb, A0550**	0.1	**0.17**	**3.9**	**Jb**	0.1	**0.39**	**3.0**	**Jb**	0.1	**0.30**	**0.88**	**Jb**	0.1	**0.088**
1,2,3,7,8,9-Hexa CDF	72918-21-9	pg/g	12	0.35	5	4.6	5.0	Uc	0.1	0.50	5.0	Uc	0.1	0.50	5.0	Uc	0.1	0.50	5.0	A2946,U	0.1	0.50	**0.35**	**Jb**	0.1	**0.035**	5.0	Uc	0.1	0.50	5.0	Uc	0.1	0.50	5.0	A2946, U	0.1	0.50	5.0	Uc	0.1	0.50	5.0	Uc	0.1	0.50	5.0	Uc	0.1	0.50	5.0	Uc	0.1	0.50
1,2,3,7,8-Penta CDD	40321-76-4	pg/g	12	0.35	12	2.3	**0.66**	**Jb**	1	**0.66**	**1.6**	**Jb**	1	**1.6**	5.0	Uc	1	5.0	**12**	-	1	**12**	**1.3**	**Jb**	1	**1.3**	**1.0**	**Jb**	1	**1.0**	**2.1**	**Jb**	1	**2.1**	**1.2**	**Jb**	1	**1.2**	**0.35**	**Jb**	1	**0.35**	**0.89**	**Jb**	1	**0.89**	**0.52**	**Jb**	1	**0.52**	**0.64**	**Jb**	1	**0.64**
1,2,3,7,8-Penta CDF	57117-41-6	pg/g	12	0.62	32	5.8	**1.9**	**Jb**	0.03	**0.058**	**4.4**	**Jb**	0.03	**0.13**	5.0	Uc	0.03	0.15	**32**	-	0.03	**0.97**	**7.5**	-	0.03	**0.22**	**1.9**	**Jb**	0.03	**0.058**	**3.0**	**Jb**	0.03	**0.091**	**5.3**	-	0.03	**0.16**	5.0	A0553, U	0.03	0.15	**1.0**	**Jb**	0.03	**0.031**	**0.62**	**Jb**	0.03	**0.019**	**1.4**	**Jb**	0.03	**0.041**
2,3,4,6,7,8-Hexa CDF	60851-34-5	pg/g	12	0.22	5.0	1.7	**0.72**	**Jb**	0.1	**0.072**	**0.62**	**Jb**	0.1	**0.062**	5.0	Uc	0.1	0.50	**3.5**	**Jb**	0.1	**0.35**	**1.1**	**Jb**	0.1	**0.11**	**1.3**	**Jb**	0.1	**0.13**	**2.5**	**Jb**	0.1	**0.25**	**2.3**	**Jb**	0.1	**0.23**	**0.51**	**Jb**	0.1	**0.051**	**1.4**	**Jb**	0.1	**0.14**	**0.99**	**Jb**	0.1	**0.099**	**0.22**	**Jb**	0.1	**0.022**
2,3,4,7,8-Penta CDF	57117-31-4	pg/g	12	0.19	26	4.0	**1.2**	**Jb**	0.3	**0.35**	**3.8**	**Jb**	0.3	**1.1**	**0.19**	**Jb**	0.3	**0.058**	**26**	-	0.3	**7.9**	**3.9**	**Jb**	0.3	**1.2**	**1.6**	**Jb**	0.3	**0.49**	**3.4**	**Jb**	0.3	**1.0**	**3.2**	**Jb**	0.3	**0.96**	**0.39**	**Jb**	0.3	**0.12**	**1.5**	**Jb**	0.3	**0.44**	**0.67**	**Jb**	0.3	**0.20**	**1.3**	**Jb**	0.3	**0.40**
2,3,7,8-Tetra CDD	1746-01-6	pg/g	12	1.9	1070	121	**18**	-	1	**18**	**130**	-	1	**130**	**2.1**	-	1	**2.1**	**1070**	**A2949**	1	**1070**	**76**	-	1	**76**	**19**	-	1	**19**	**46**	-	1	**46**	**39**	-	1	**39**	**1.9**	-	1	**1.9**	**4.8**	-	1	**4.8**	**2.2**	-	1	**2.2**	**40**	-	1	**40**
2,3,7,8-Tetra CDF	51207-31-9	pg/g	12	4.6	2620	312	**50**	-	0.1	**5.0**	**304**	**A1369**	0.1	**30**	**4.6**	-	0.1	**0.46**	**2620**	**A1626**	0.1	**262**	**230**	**A1369**	0.1	**23**	**66**	-	0.1	**6.6**	**162**	-	0.1	**16**	**156**	-	0.1	**16**	**7.4**	-	0.1	**0.74**	**19**	-	0.1	**1.9**	**8.7**	-	0.1	**0.87**	**122**	-	0.1	**12**
OCDD	3268-87-9	pg/g	12	114	7480	3046	**3080**	-	0.0003	**0.92**	**1020**	-	0.0003	**0.31**	**114**	-	0.0003	**0.034**	**5350**	**A2949**	0.0003	**1.6**	**2330**	-	0.0003	**0.70**	**3660**	-	0.0003	**1.10**	**7480**	**A2949**	0.0003	**2.2**	**3810**	-	0.0003	**1.1**	**1490**	-	0.0003	**0.45**	**4730**	**A2949**	0.0003	**1.4**	**2870**	-	0.0003	**0.86**	**623**	-	0.0003	**0.19**
OCDF	39001-02-0	pg/g	12	6.1	1540	342	**513**	-	0.0003	**0.15**	**769**	-	0.0003	**0.23**	**6.1**	**Jb**	0.0003	**0.00183**	**1540**	-	0.0003	**0.46**	**165**	-	0.0003	**0.050**	**180**	-	0.0003	**0.054**	**330**	-	0.0003	**0.099**	**211**	-	0.0003	**0.063**	**52**	-	0.0003	**0.016**	**191**	-	0.0003	**0.057**	**98**	-	0.0003	**0.029**	**45**	-	0.0003	**0.013**
Total Hepta CDD	37871-00-4	pg/g	12	17	1100	537	**451**	-			**165**	-			**17**	-			**1100**	-			**400**	-			**713**	-			**1070**	-			**724**	-			**284**	-			**891**	-			**567**	-			**68**	-		
Total Hepta CDF	38998-75-3	pg/g	12	1.8	343	135	**47**	-			**44**	-			**1.8**	**Jb**			**343**	-			**92**	-			**164**	-			**301**	-			**248**	-			**55**	-			**204**	-			**106**	-			**12**	-		
Total Hexa CDD	34465-46-8	pg/g	12	4.0	206	64	**95**	-			**32**	-			**4.0**	**Jb**			**206**	-			**45**	-			**62**	-			**103**	-			**73**	-			**24**	-			**68**	-			**46**	-			**12**	-		
Total Hexa CDF	55684-94-1	pg/g	12	0.92	175	58	**20**	-			**24**	-			**0.92**	**Jb**			**175**	-			**49**	-			**60**	-			**120**	-			**117**	-			**20**	-			**66**	-			**38**	-			**7.5**	-		
Total Penta CDD	36088-22-9	pg/g	12	0.25	36	8.1	**17**	-			**7.7**	-			**0.25**	**Jb**			**36**	-			**4.2**	**Jb**			**4.1**	**Jb**			**9.7**	-			**5.5**	-			**1.9**	**Jb**			**5.0**	**Jb**			**4.1**	**Jb**			**2.2**	**Jb**		
Total Penta CDF	30402-15-4	pg/g	12	0.46	157	41	**13**	-			**26**	-			**0.46**	**Jb**			**157**	-			**34**	-			**28**	-			**83**	-			**77**	-			**14**	-			**36**	-			**17**	-			**8.5**	-		
Total Tetra CDD	41903-57-5	pg/g	12	2.1	1180	134	**19**	-			**137**	-			**2.1**	-			**1180**	-			**87**	-			**26**	-			**57**	-			**47**	-			**2.5**	-			**9.7**	-			**2.3**	-			**43**	-		
Total Tetra CDF	55722-27-5	pg/g	12	5.9	4360	531	**74**	-			**582**	-			**5.9**	-			**4360**	-			**396**	-			**118**	-			**298**	-			**268**	-			**9.3**	-			**47**	-			**8.8**	-			**203**	-		
Total TEQ (a)			12	3	1370	161				**28**				**166**				**2.8**				**1370**				**108**				**34**				**76**				**65**				**5.5**				**15**				**8.3**				**54**

a) Total TEQ was calculated using 2005 WHO TEF values from Van den Berg et al; 2006 (doi:10.1093/toxsci/kfl055) and https://clu-in.org/download/contaminantfocus/dioxins/Dioxin_TEFs_for_TEQs.pdf. Total TEQ was calculacted by summing all non-U qualified data.

Laboratory Qualifer

A0550	EMPC / Merged Peak
A0553	RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.
A1369	From 5X dilution.
A1626	From 20X dilution.
A2946	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
A2949	Result from 5X dilution
Jb	Estimated concentration between the EDL and RDL
U	Analyte included in the analysis, but not detected
Uc	Undetected at the limit of quantitation.

Samples with Detections are BOLD

Table 5F: Modified Elutriate Testing Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria				No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-EL		HSCNew-NMP-02-EL		HSCNew-NMP-03-EL		HSCNew-NMP-04-EL		HSCNew-NMP-05-EL		HSCNew-NMP-06-EL		HSCNew-NMP-07-EL		HSCNew-NMP-08-EL		HSCNew-NMP-09-EL		HSCNew-NMP-10-EL		HSCNew-NMP-11-EL		HSCNew-NMP-03-EL-Field Dup	
				TSWQS (Acute) (b)	EPA WQC (Acute) (o)	NOAA (Marine Acute) (p)	Region 6 (Marine Chronic) (q)					10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018	
VOCs																																		
1,1,1-Trichloroethane	71-55-6	ug/L	-	-	-	31200	1560	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,1,2,2-Tetrachloroethane	79-34-5	ug/L	-	-	-	9020	451	12	0.40	0.40	0.40	0.40	Ua	0.40	Ua	0.40	Ua	0.40	Ua	0.40	Ua	0.40	Ua	0.40	Ua	0.40	Ua	0.4	Ua	0.40	Ua	0.40	Ua	0.40	Ua
1,1,2-Tetrachloro-1,2,2-trifluoroethane	76-13-1	ug/L	-	-	-	-	-	12	10	10	10	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua
1,1,2-Trichloroethane	79-00-5	ug/L	-	-	-	-	275	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,1-Dichloroethane	75-34-3	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,1-Dichloroethene	75-35-4	ug/L		-	-	224000	12500	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,2,3-Trichlorobenzene	87-61-6	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,2,4-Trichlorobenzene	120-82-1	ug/L	0.9	-	-	160	22	12	0.90	0.90	0.90	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua
1,2-Dibromo-3-Chloropropane	96-12-8	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,2-Dibromoethane	106-93-4	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,2-Dichlorobenzene	95-50-1	ug/L	0.8	-	-	1970	99	12	0.50	0.50	0.50	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua
1,2-Dichloroethane	107-06-2	ug/L	-	-	-	11300	5650	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,2-Dichloropropane	78-87-5	ug/L	-	-	-	10300	-	12	0.50	0.50	0.50	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua
1,3-Dichlorobenzene	541-73-1	ug/L	0.9	-	-	1970	142	12	0.47	0.90	0.86	0.90	Ua	0.90	Ua	0.90	Ua	**0.47**	**Jc**	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua	0.90	Ua
1,4-Dichlorobenzene	106-46-7	ug/L	1	-	-	1970	99	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
1,4-Dioxane	123-91-1	ug/L	-	-	-	-	-	12	80	80	80	80	Ua	80	Ua	80	Ua	80	Ua	80	Ua	80	Ua	80	Ua	80	Ua	80	Ua	80	Ua	80	Ua	80	Ua
2-Butanone	78-93-3	ug/L	-	-	-	-	-	12	3.2	10	7.1	10	Ua	10	Ua	10	Ua	**5.1**	**Jc**	**3.5**	**Jc**	**3.3**	**Jc**	**5.6**	**Jc**	**4.0**	**Jc**	10	Ua	10	Ua	**3.2**	**Jc**	10	Ua
2-Hexanone	591-78-6	ug/L	-	-	-	-	-	12	5.0	5.0	5.0	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua
4-Methyl-2-Pentanone	108-10-1	ug/L	-	-	-	-	61500	12	5.0	5.0	5.0	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua	5.0	Ua
Acetone	67-64-1	ug/L	-	-	-	-	282000	12	10	74	42	**33**	-	**19**	-	10	Ua	**49**	-	**74**	-	**42**	-	**45**	-	**46**	-	**46**	-	**60**	-	**54**	-	**27**	-
Benzene	71-43-2	ug/L	2	-	-	5100	109	12	0.47	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	**0.47**	**Jc**	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Bromodichloromethane	75-27-4	ug/L	-	-	-	-	-	12	0.50	0.50	0.50	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua
Bromoform	75-25-2	ug/L	-	-	-	-	1220	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Bromomethane	74-83-9	ug/L	-	-	-	-	600	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Carbon Disulfide	75-15-0	ug/L	-	-	-	-	-	12	10	10	10	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua	10	Ua
Carbon Tetrachloride	56-23-5	ug/L	-	-	-	50000	1500	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Chlorobenzene	108-90-7	ug/L	-	-	-	-	105	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Chloroethane	75-00-3	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Chloroform	67-66-3	ug/L	2	-	-	-	4100	12	0.50	0.50	0.50	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	**0.50**	-	0.50	Ua
Chloromethane	74-87-3	ug/L	-	-	-	-	13500	12	1.0	3.4	1.6	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	**3.4**	-	**2.7**	-	1.0	Ua	**2.1**	-	1.0	Ua	1.0	Ua	**3.1**	-
cis-1,2-Dichloroethene	156-59-2	ug/L	-	-	-	224000	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
cis-1,3-Dichloropropene	10061-01-5	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Cyclohexane	110-82-7	ug/L	-	-	-		-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Dibromochloromethane	124-48-1	ug/L	-	-	-	12000	-	12	0.50	0.50	0.50	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua
Dichlorodifluoromethane	75-71-8	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Ethylbenzene	100-41-4	ug/L	5	-	-	430	249	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Isopropylbenzene	98-82-8	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Methyl acetate	79-20-9	ug/L	-	-	-	-	-	12	4.0	4.0	4.0	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua	4.0	Ua
Methyl tert-butyl ether	1634-04-4	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Methylcyclohexane	108-87-2	ug/L	-	-	-	-	-	12	1.0	1.2	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	**1.2**	-	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Methylene chloride	75-09-2	ug/L	-	-	-	-	5420	12	4.0	16	8.3	**4.6**	-	**4.0**	**Jc**	**4.0**	**Jc**	**4.0**	-	**8.8**	-	**14**	-	**14**	-	**15**	-	**16**	-	**4.7**	-	4.0	Ua	**6.2**	-
o-Xylene	95-47-6	ug/L	-	-	-	-	-	12	0.43	2.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	**0.92**	**Jc**	1.0	Ua	1.0	Ua	**0.43**	**Jc**	**2.0**	-	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
m&p-Xylene	179601-23-1	ug/L	-	-	-	-	-	12	0.90	2.0	1.8	2.0	Ua	2.0	Ua	2.0	Ua	**0.98**	**Jc**	2.0	Ua	2.0	Ua	2.0	Ua	**0.90**	**Jc**	2.0	Ua	2.0	Ua	2.0	Ua	2.0	Ua
Styrene	100-42-5	ug/L	-	-	-	-	455	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Tetrachloroethene	127-18-4	ug/L	2	-	-	-	1450	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Toluene	108-88-3	ug/L	5	-	-	6300	480	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
trans-1,2-Dichloroethene	156-60-5	ug/L	-	-	-	224000	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
trans-1,3-Dichloropropene	10061-02-6	ug/L	-	-	-	-	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Trichloroethene	79-01-6	ug/L	2	-	-	2000	970	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Trichlorofluoromethane	75-69-4	ug/L	-	-	-	12000	-	12	1.0	1.0	1.0	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua	1.0	Ua
Vinyl chloride	75-01-4	ug/L	-	-	-	-	-	12	0.50	0.50	0.50	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua	0.50	Ua
SVOCs																																		
1,2,4-Trichlorobenzene	120-82-1	ug/L	0.9 (g)	-	-	160	22	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
1,2-Dichlorobenzene	95-50-1	ug/L	0.8 (g)	-	-	1970	591	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Azobenzene (c)	103-33-3	ug/L	1	-	-	-	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
1,3-Dichlorobenzene	541-73-1	ug/L	0.9 (g)	-	-	1970	142	12	0.10	0.52	0.44	0.50	Ub	**0.10**	**Jb**	0.50	Ub	**0.15**	**Jb**	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
1,4-Dichlorobenzene	106-46-7	ug/L	1 (g)	-	-	1970	99	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
2,4,6-Trichlorophenol	88-06-2	ug/L	0.9 (g)	-	-	-	61	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
2,4-Dichlorophenol	120-83-2	ug/L	0.8 (g)	-	-	-	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
2,4-Dimethylphenol	105-67-9	ug/L	10	-	-	-	-	12	1.9	2.1	2.0	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.1	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.1	Ub	1.9	Ub	2.0	Ub
2,4-Dinitrophenol	51-28-5	ug/L	5 (g)	-	-	4850	1330	12	4.7	5.2	5.0	5.0	Ub	5.1	Ub	5.0	Ub	5.1	Ub	5.0	Ub	5.2	Ub	5.0	Ub	5.1	Ub	5.1	Ub	5.2	Ub	4.7	Ub	5.0	Ub
2,4-Dinitrotoluene	121-14-2	ug/L	2 (g)	-	-	590	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
2,6-Dinitrotoluene	606-20-2	ug/L	2 (g)	-	-	-	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
2-Chloronapthalene	91-58-7	ug/L	0.8 (g)	-	-	7.5	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub

Table 5F: Modified Elutriate Testing Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria				No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-EL		HSCNew-NMP-02-EL		HSCNew-NMP-03-EL		HSCNew-NMP-04-EL		HSCNew-NMP-05-EL		HSCNew-NMP-06-EL		HSCNew-NMP-07-EL		HSCNew-NMP-08-EL		HSCNew-NMP-09-EL		HSCNew-NMP-10-EL		HSCNew-NMP-11-EL		HSCNew-NMP-03-EL-Field Dup	
				TSWQS (Acute) (b)	EPA WQC (Acute) (o)	NOAA (Marine Acute) (p)	Region 6 (Marine Chronic) (q)					10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018	
2-Chlorophenol	95-57-8	ug/L	0.9 (g)	-	-	-	265	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
2-Methylphenol	95-48-7	ug/L	10	3060	-	-	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
2-Nitrophenol	88-75-5	ug/L	2 (g)	-	-	-	2940	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
3,3-Dichlorobenzidine	91-94-1	ug/L	3 (g)	-	-	-	73	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
4,6-Dinitro-o-cresol	534-52-1	ug/L	10	-	-	-	-	12	1.9	2.1	2.0	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.1	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.1	Ub	1.9	Ub	2.0	Ub
4-Bromophenyl phenyl ether	101-55-3	ug/L	0.4 (g)	-	-	-	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
4-Chloro-3-methylphenol	59-50-7	ug/L	0.7 (g)	-	-	-	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
4-Chlorophenyl phenyl ether	7005-72-3	ug/L	0.6 (g)	-	-	-	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
4-Methylphenol	106-44-5	ug/L	10	-	-	-	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
4-Nitrophenol	100-02-7	ug/L	5 (g)	-	-	4850	717	12	2.4	2.6	2.5	2.5	Ub	2.5	Ub	2.5	Ub	2.5	Ub	2.5	Ub	2.6	Ub	2.50	Ub	2.5	Ub	2.5	Ub	2.6	Ub	2.4	Ub	2.5	Ub
Benzidine	92-87-5	ug/L	1	-	-	-	-	12	19	21	20	20	Ub	20	Ub	20	Ub	20	Ub	20	Ub	21	Ub	20.0	Ub	20	Ub	20	Ub	21	Ub	19	Ub	20	Ub
Bis(2-chloroethoxy)methane	111-91-1	ug/L	1 (g)	-	-	12000	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Bis(2-chloroethyl)ether	111-44-4	ug/L	0.9 (g)			-	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Bis(2-chloroisopropyl)ether	108-60-1	ug/L	0.7 (g)	-	-	-	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Bis[2-ethylhexyl] Phthalate	117-81-7	ug/L	2 (g)	-	-	400	-	12	0.10	1.7	0.27	**0.17**	**Jb**	**0.10**	**Jb**	**0.10**	**Jb**	**0.15**	**Jb**	**0.19**	**Jb**	**0.14**	**Jb**	**1.7**	-	**0.12**	**Jb**	**0.16**	**Jb**	**0.13**	**Jb**	**0.12**	**Jb**	**0.20**	**Jb**
Butyl Benzyl Phthalate	85-68-7	ug/L	4 (g)	-	-	2944	147	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Diethyl Phthalate	84-66-2	ug/L	1 (g)	-	-	2944	884	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Dimethyl Phthalate	131-11-3	ug/L	1 (g)	-	-	2944	580	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Di-n-butyl Phthalate	84-74-2	ug/L	1 (g)	-	-	2944	NA	12	0.15	0.68	0.28	**0.68**	-	**0.22**	**Jb**	**0.36**	**Jb**	**0.15**	**Jb**	**0.21**	**Jb**	**0.22**	**Jb**	**0.15**	**Jb**	**0.19**	**Jb**	**0.40**	**Jb**	**0.22**	**Jb**	**0.29**	**Jb**	**0.32**	**Jb**
Di-n-octyl Phthalate	117-84-0	ug/L	3 (g)	-	-	2944	-	12	0.94	1.0	1.0	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	1.0	Ub	0.94	Ub	1.0	Ub
Hexachlorobenzene	118-74-1	ug/L	0.4 (g)	-	-	160	-	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Hexachlorobutadiene	87-68-3	ug/L	0.9 (g)	-	-	32	0. 32	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Hexachlorocyclopentadiene	77-47-4	ug/L	3.0 (g)	-	-	7	0. 07	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Hexachloroethane	67-72-1	ug/L	0.9 (g)	-	-	940	9.4	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Isophorone	78-59-1	ug/L	1	-	-	12900	1290	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Nitrobenzene	98-95-3	ug/L	0.9 (g)	-	-	6680	66.8	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
N-Nitrosodimethylamine	62-75-9	ug/L	3.1 (g)	-	-	-	330000	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
N-Nitrosodi-n-propylamine	621-64-7	ug/L	0.9 (g)	-	-	-	120	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
N-Nitrosodiphenylamine	86-30-6	ug/L	2.1 (g)	-	-	3300000	330000	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
Pentachlorophenol	87-86-5	ug/L	50	15.1	13	13	9.6	12	1.9	2.1	2.0	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.0	Ub	2.1	Ub	2.0	Ub	2.0	Ub	2.02	Ub	2.1	Ub	1.9	Ub	2.0	Ub
Phenol	108-95-2	ug/L	10	-	-	5800	5500	12	0.47	0.52	0.50	0.50	Ub	0.51	Ub	0.50	Ub	0.51	Ub	0.50	Ub	0.52	Ub	0.50	Ub	0.51	Ub	0.51	Ub	0.52	Ub	0.47	Ub	0.50	Ub
PAHs (d)																																	
Acenaphthene	83-32-9	ug/L	0.75 (g)	-	-	970	40.4	12	0.0099	5.9	0.85	**0.061**	-	**0.59**	-	**0.0099**	-	**0.68**	-	**0.18**	-	**0.060**	-	**0.47**	-	**1.3**	-	**5.9**	-	**0.58**	-	**0.17**	-	**0.17**	-
Acenaphthylene	208-96-8	ug/L	1.0 (g)	-	-	300	-	12	0.0033	0.087	0.021	**0.0033**	**Jb**	**0.087**	-	0.0094	Ub	**0.024**	-	**0.012**	-	**0.0066**	**Jb**	**0.017**	-	**0.029**	-	**0.029**	-	**0.011**	-	**0.015**	-	**0.0056**	**Jb**
Anthracene	120-12-7	ug/L	0.6 (g)	-	-	300	0. 18	12	0.0045	0.85	0.17	**0.011**	-	**0.079**	-	**0.0045**	**Jb**	**0.15**	-	**0.037**	-	**0.013**	-	**0.096**	-	**0.62**	-	**0.85**	-	**0.10**	-	**0.013**	-	**0.057**	-
Benzo(a)anthracene	56-55-3	ug/L	0.4 (g)	-	-	300	-	12	0.0022	0.029	0.014	**0.0022**	**Jb**	**0.0062**	**Jb**	0.0094	Ub	**0.021**	-	**0.0091**	**Jb**	**0.013**	-	**0.022**	-	**0.026**	-	**0.029**	-	**0.012**	-	**0.014**	-	**0.0066**	**Jb**
Benzo(a)pyrene	50-32-8	ug/L	0.3 (g)	-	-	300	-	12	0.0012	0.010	0.0043	**0.0012**	**Jb**	**0.0019**	**Jb**	0.0094	Ub	**0.0044**	**Jb**	**0.0028**	**Jb**	**0.0036**	**Jb**	**0.0056**	**Jb**	**0.0033**	**Jb**	**0.0032**	**Jb**	**0.0022**	**Jb**	**0.0035**	**Jb**	0.010	Ub
Benzo(b)fluoranthene	205-99-2	ug/L	0.6 (g)	-	-	300	-	12	0.0027	0.010	0.0059	0.0099	Ub	0.010	Ub	0.0094	Ub	**0.0041**	**Jb**	**0.0030**	**Jb**	**0.0045**	**Jb**	**0.0072**	**Jb**	**0.0033**	**Jb**	**0.0034**	**Jb**	**0.0027**	**Jb**	**0.0039**	**Jb**	0.010	Ub
Benzo(e)pyrene	192-97-2	ug/L	-	-	-	-	-	12	0.0018	0.010	0.0047	**0.0018**	**Jb**	**0.0020**	**Jb**	0.0094	Ub	**0.0051**	**Jb**	**0.0035**	**Jb**	**0.0046**	**Jb**	**0.0068**	**Jb**	**0.0035**	**Jb**	**0.0034**	**Jb**	**0.0026**	**Jb**	**0.0038**	**Jb**	0.010	Ub
Benzo[g,h,i]perylene	191-24-2	ug/L	1.2 (g)	-	-	300	-	12	0.0017	0.010	0.0055	**0.0017**	**Jb**	**0.0024**	**Jb**	0.0094	Ub	**0.0026**	**Jb**	**0.0021**	**Jb**	**0.0024**	**Jb**	**0.0031**	**Jb**	0.0099	Ub	0.010	Ub	0.010	Ub	**0.0022**	**Jb**	0.010	Ub
Benzo(k)fluoranthene	207-08-9	ug/L	0.6 (g)	-	-	300	-	12	0.0018	0.010	0.0050	0.0099	Ub	0.010	Ub	0.0094	Ub	**0.0021**	**Jb**	**0.0022**	**Jb**	**0.0024**	**Jb**	**0.0040**	**Jb**	**0.0026**	**Jb**	**0.0024**	**Jb**	**0.0018**	**Jb**	**0.0030**	**Jb**	0.010	Ub
Chrysene	218-01-9	ug/L	0.3 (g)	-	-	300	-	12	0.0014	0.026	0.014	**0.0029**	**Jb**	**0.0075**	**Jb**	**0.0014**	**Jb**	**0.022**	-	**0.012**	-	**0.017**	-	**0.026**	-	**0.025**	-	**0.026**	-	**0.013**	-	**0.015**	-	**0.0067**	**Jb**
Dibenzo[a,h]anthracene	53-70-3	ug/L	1.3 (g)	-	-	300	-	12	0.00076	0.010	0.0092	0.0099	Ub	0.010	Ub	0.0094	Ub	0.010	Ub	0.0099	Ub	0.010	Ub	**0.00076**	**Jb**	0.0099	Ub	0.010	Ub	0.010	Ub	0.010	Ub	0.010	Ub
Fluoranthene	206-44-0	ug/L	0.9 (g)	-	-	40	2.96	12	0.017	0.61	0.21	**0.021**	-	**0.26**	-	**0.017**	-	**0.26**	-	**0.085**	-	**0.12**	-	**0.25**	-	**0.48**	-	**0.61**	-	**0.20**	-	**0.14**	-	**0.10**	-
Fluorene	86-73-7	ug/L	0.6 (g)	-	-	300	50	12	0.0060	3.8	0.60	**0.035**	-	**0.30**	-	**0.0060**	**Jb**	**0.53**	-	**0.15**	-	**0.023**	-	**0.36**	-	**1.4**	-	**3.8**	-	**0.44**	-	**0.041**	-	**0.12**	-
Indeno[1,2,3-c,d]pyrene	193-39-5	ug/L	1.2 (g)			300	-	12	0.0052	0.0077	0.0063	**0.0059**	**Jb**	**0.0060**	**Jb**	**0.0052**	**Jb**	**0.0064**	**Jb**	**0.0068**	**Jb**	**0.0070**	**Jb**	**0.0077**	**Jb**	**0.0061**	**Jb**	**0.0060**	**Jb**	**0.0063**	**Jb**	**0.0068**	**Jb**	**0.0055**	**Jb**
Naphthalene	91-20-3	ug/L	0.8 (g)	-	-	-	250	12	0.0029	0.52	0.072	**0.0065**	**Jb**	**0.52**	-	**0.0058**	**Jb**	**0.010**	**Jb**	**0.0094**	**Jb**	**0.0059**	**Jb**	**0.048**	-	**0.053**	-	**0.098**	-	**0.097**	-	**0.0029**	**Jb**	**0.011**	-
Phenanthrene	85-01-8	ug/L	0.5 (g)	7.7	-	7.7	4.6	12	0.0050	3.8	0.67	**0.036**	-	**0.46**	-	**0.0067**	**Jb**	**0.91**	-	**0.20**	-	**0.0050**	**Jb**	**0.43**	-	**1.6**	-	**3.8**	-	**0.38**	-	**0.0068**	**Jb**	**0.14**	-
Pyrene	129-00-0	ug/L	1.5 (g)	-	-	300	0. 24	12	0.017	0.33	0.14	**0.023**	-	**0.33**	-	**0.017**	-	**0.20**	-	**0.067**	-	**0.092**	-	**0.13**	-	**0.25**	-	**0.28**	-	**0.10**	-	**0.092**	-	**0.074**	-
PAHs (Total) calculated (e)	130498-29-2	ug/L	-	-	-	-	-	12	0.073	16	2.8	**0.21**	-	**2.7**	-	**0.073**	**J**	**2.8**	-	**0.77**	-	**0.38**	-	**1.9**	-	**5.8**	-	**16**	-	**2.0**	-	**0.52**	-	**0.70**	-
Pesticides																																	
4,4′-DDD	72-54-8	ug/L	0.1	-	-	3.6	0. 025	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
4,4′-DDE	72-55-9	ug/L	0.1	-	-	14	0. 14	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
4,4′-DDT	50-29-3	ug/L	0.1	0.13	0.13 (G, ii)	0.065	0. 001	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Aldrin	309-00-2	ug/L	0.03 (g)	1.3	1.3 (G)	0.65	0. 13	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Alpha-BHC	319-84-6	ug/L	0.03	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Beta-BHC	319-85-7	ug/L	0.03	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Delta-BHC	319-86-8	ug/L	0.03	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Dieldrin	60-57-1	ug/L	0.03	0.71	0.71 (G)	0.355	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endosulfan I	959-98-8	ug/L	0.1	0.034	0.034 (G, Y)	0.017	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endosulfan II	33213-65-9	ug/L	0.1	0.034	0.034 (G, Y)	0.017	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endosulfan Sulfate	1031-07-8	ug/L	0.1	0.034	0.034 (G, Y)	0.017	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endrin	72-20-8	ug/L	0.1	0.037	0.037 (G)	0.0185	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Endrin Aldehyde	7421-93-4	ug/L	0.1	-	0.037 (G)	0.0185	0. 002	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Gamma-BHC (lindane)	58-89-9	ug/L	0.1	-	0.16 (G)	0.08	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U

Table 5F: Modified Elutriate Testing Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria				No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-EL		HSCNew-NMP-02-EL		HSCNew-NMP-03-EL		HSCNew-NMP-04-EL		HSCNew-NMP-05-EL		HSCNew-NMP-06-EL		HSCNew-NMP-07-EL		HSCNew-NMP-08-EL		HSCNew-NMP-09-EL		HSCNew-NMP-10-EL		HSCNew-NMP-11-EL		HSCNew-NMP-03-EL-Field Dup	
				TSWQS (Acute) (b)	EPA WQC (Acute) (o)	NOAA (Marine Acute) (p)	Region 6 (Marine Chronic) (q)					10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018	
Heptachlor	76-44-8	ug/L	0.1	0.053	0.053 (G)	0.0265	0. 004	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	**0.0060**	-	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Heptachlor Epoxide	1024-57-3	ug/L	0.1	-	0.053 (G)	0.0265	0. 004	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Toxaphene	8001-35-2	ug/L	0.5	0.21	0.21	0.21	0. 0002	12	0.30	0.30	0.30	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U
alpha-Chlordane	5103-71-9	ug/L	0.03 (g)	0.09	0.09 (G)	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
gamma-Chlordane	5566-34-7	ug/L	0.03 (g)	0.09	0.09 (G)	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
Oxychlordane	26880-48-8	ug/L	0.03 (g)	0.09	0.09 (G)	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
cis-Nonachlor	510-37-31	ug/L	0.03 (g)	0.09	0.09 (G)	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
trans-Nonachlor	39765-80-5	ug/L	0.03 (g)	0.09	0.09 (G)	-	-	12	0.0060	0.0060	0.0060	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
PCBs																																	
PCB 101	37680-73-2	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 105	32598-14-4	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 118	31508-00-6	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 126	57465-28-8	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 128	38380-07-3	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 138	35065-28-2	ug/L	-	-	-	-	-	12	0.010	0.010	0.010	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U
PCB 153	35065-27-1	ug/L	-	-	-	-	-	12	0.0020	0.0060	0.0057	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	**0.0020**	**H, Z-03, J**	0.0060	H, Z-03, U
PCB 169	32774-16-6	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 170	35065-30-6	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 18	37680-65-2	ug/L	-	-	-	-	-	12	0.010	0.010	0.010	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U
PCB 180	35065-29-3	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 187	52663-68-0	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 28	7012-37-5	ug/L	-	-	-	-	-	12	0.010	0.010	0.010	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U
PCB 44	41464-39-5	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 52	35693-99-3	ug/L	-	-	-	-	-	12	0.0040	0.0060	0.0058	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	**0.0040**	**H, Z-03, J**	0.0060	H, Z-03, U
PCB 66	32598-10-0	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 77	32598-13-3	ug/L	-	-	-	-	-	12	0.0060	0.0060	0.0060	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U	0.0060	H, Z-03, U
PCB 8	34883-43-7	ug/L	-	-	-	-	-	12	0.010	0.010	0.010	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U	0.010	H, Z-03, U
Total PCB Congeners calculated (f)	NA	ug/L	0.01	-	-	0.033	-	12	0	0.006	0.0005	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	0	H, Z-03, U	**0.0060**	H, Z-03, U	0	H, Z-03, U
Dioxins and Furans																																	
Total TEQ (j)			-	-	-	-	-	12	0	10	1.5	**0.062**	**j**	**0.52**	**j**	0	-	**10**	**j**	**0.42**	**j**	0	**j**	**3.3**	**j**	**0.0035**	-	0	-	0	-	0	-	**3.1**	**j**
Metals (l, m)																																	
Antimony	7440-36-0	ug/L	3 (0.03) (h)	-	-	1500	500	12	1.1	5.7	3.0	**5.7**	-	**3.4**	**J**	**1.1**	**J**	**3.7**	**J**	**2.6**	**J**	**2.7**	**J**	**4**	**J**	**2.1**	**J**	**3.4**	**J**	**3.4**	**J**	**2.7**	**J**	**1.1**	**J**
Arsenic	7440-38-2	ug/L	1 (0.011) (h)	149	69 (A, D)	69	78	12	1.7	5.1	2.7	**5.1**	-	**1.7**	**J**	**2.7**	**J**	**4.1**	**J**	**2.2**	**J**	**2.8**	**J**	**3.6**	**J**	**1.7**	**J**	**1.8**	**J**	**2.3**	**J**	**2.5**	**J**	**2.1**	**J**
Barium	7440-39-3	ug/L	-	-	-	1000	-	12	161	951	322	**265**	-	**167**	-	**215**	-	**189**	-	**189**	-	**186**	-	**161**	-	**288**	-	**951**	-	**532**	-	**340**	-	**386**	-
Beryllium	7440-41-7	ug/L	0.2	-	-	1500	-	12	0.20	5.0	3.8	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**0.20**	**J**	**0.20**	**J**	**0.70**	**J**	5.0	U
Cadmium	7440-43-9	ug/L	1 (0.01) (h)	40	40 (D)	40	-	12	5.0	5.0	5.0	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chromium (total)	7440-47-3	ug/L	1	-	-	-	103	12	5.0	5.0	5.0	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chromium (3+)	7440-47-3 (III)	ug/L	1	-	-	103000	-	12	8.0	8.0	8.0	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U
Chromium (6+) (n)	7440-47-3 (Cr6+)	ug/L	1	1090	1,100 (D)	1100	49.6	12	3.0	3.0	3.0	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Copper	7440-50-8	ug/L	1 (0.1) (h)	13.5	4.8 (D, cc)	4.8	3.6	12	0.60	5.0	4.0	5.0	U	5.0	U	**1.5**	**J**	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**0.70**	**J**	**0.60**	**J**	5.0	U
Lead	7439-92-1	ug/L	1 (0.03) (h)	133	210 (D)	210	5.3	12	5.0	16	5.9	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**16**	-	5.0	U	5.0	U
Mercury	7439-97-6	ug/L	0.2 (0.0003) (h)	2.1	-	1.8	1.1	12	0.0020	0.052	0.022	**0.022**	-	**0.016**	**J**	**0.0050**	**J**	**0.051**	-	**0.0050**	**J**	**0.031**	-	**0.039**	-	**0.052**	-	**0.0060**	**J**	**0.0090**	**J**	**0.0020**	**J**	0.020	U
Nickel	7440-02-0	ug/L	1 (0.1) (h)	118	74 (D)	74	13.1	12	1.4	2.5	1.8	**1.9**	**J**	**2.4**	**J**	**2.5**	**J**	**2.3**	**J**	**1.5**	**J**	**1.5**	**J**	**1.5**	**J**	**1.5**	**J**	**1.4**	**J**	**1.7**	**J**	**1.5**	**J**	**1.5**	**J**
Selenium	7782-49-2	ug/L	2	564	290 (D, dd)	290	136	12	1.5	10	8.6	10	U	10	U	10	U	10	U	10	U	10	U	10	U	**1.5**	**J**	**1.8**	**J**	10	U	10	U	10	U
Silver	7440-22-4	ug/L	1 (0.1) (h)	2	1.9 (D)	0.95	-	12	1.1	8.8	4.2	**8.8**	-	**1.4**	**J**	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**3.2**	**J**	**1.2**	**J**	5.0	U	**1.1**	**J**
Thallium	7440-28-0	ug/L	1 (0.03) (h)	-	-	2130	21.3	12	5.0	5.0	5.0	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Zinc	7440-66-6	ug/L	1 (0.5) (h)	92.7	90 (D)	90	84.2	12	44	184	84	**46**	-	**50**	-	**44**	-	**44**	-	**69**	-	**71**	-	**66**	-	**162**	-	**47**	-	**73**	-	**149**	-	**184**	-
Miscellaneous Parameters																																	
Cyanide	57-12-5	ug/L	100 (i)	-	1 (Q)	1	5.6	12	10	10	10	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U	10	Cl, U
DOC rep1	NA	%	-	-	-	-	-	12	0.0035	0.010	0.0090	**0.0035**	**J**	0.010	U	**0.0040**	**J**	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
DOC rep2	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0091	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0036**	**J**	**0.0053**	**J**	0.010	U	0.010	U
DOC rep3	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0089	**0.0036**	**J**	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0036**	**J**	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
DOC rep4	NA	%	-	-	-	-	-	12	0.0038	0.010	0.0085	0.010	U	0.010	U	**0.0044**	**J**	0.010	U	0.010	U	0.010	U	**0.0038**	**J**	0.010	U	**0.0041**	**J**	0.010	U	0.010	U	0.010	U
Dissolved Organic Carbon	NA	%	0.1	-	-	-	-	12	0.0035	0.010	0.0095	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.0035**	**J**	0.010	U	0.010	U	0.010	U
Total Suspended Solids	NA	ug/L	NA	-	-	-	-	12	5710	43000	16784	**22500**	-	**8000**	-	**10600**	-	**43000**	-	**23000**	-	**12800**	-	**13300**	-	**10000**	-	**19500**	-	**19000**	-	**5710**	-	**14000**	-
TOC rep1	NA	%	-	-	-	-	-	12	0.0038	0.010	0.0085	0.010	U	0.010	U	0.010	U	**0.0042**	**J**	0.010	U	0.010	U	**0.0038**	**J**	0.010	U	0.010	U	0.010	U	**0.0043**	**J**	0.010	U
TOC rep2	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0079	**0.0036**	**J**	0.010	U	0.010	U	**0.0038**	**J**	0.010	U	0.010	U	**0.0036**	**J**	0.010	U	0.010	U	0.010	U	**0.0037**	**J**	0.010	U
TOC rep3	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0067	**0.0058**	**J**	0.010	U	**0.0036**	**J**	**0.0045**	**J**	0.010	U	0.010	U	**0.0044**	**J**	0.010	U	**0.0037**	**J**	**0.0037**	**J**	**0.0041**	**J**	0.010	U
TOC rep4	NA	%	-	-	-	-	-	12	0.0036	0.010	0.0045	**0.0045**	**J**	**0.0036**	**J**	**0.0038**	**J**	**0.0047**	**J**	**0.0042**	**J**	0.010	U	**0.0038**	**J**	**0.0038**	**J**	**0.0040**	**J**	**0.0041**	**J**	**0.0042**	**J**	**0.0036**	**J**
Total Organic Carbon	NA	%	0.1	-	-	-	-	12	0.0035	0.010	0.0070	**0.0043**	**J**	0.010	U	0.010	U	**0.0043**	**J**	0.010	U	0.010	U	**0.0039**	**J**	**0.0035**	**J**	**0.0036**	**J**	0.010	U	**0.0041**	**J**	0.010	U
Ammonia as N, filtered	7664-41-7	ug/L	30	-	-	-	-	12	1530	27800	13599	**21400**	-	**8590**	-	**1530**	-	**17200**	-	**13300**	-	**14100**	-	**27800**	-	**14000**	-	**10600**	-	**15900**	-	**15800**	-	**2970**	-
Sulfide	184-96-258	ug/L	1	-	-	-	-	12	3.0	10	9.0	10	U	10	U	10	U	**4.4**	**J**	10	U	10	U	**3.0**	**J**	10	U	10	U	10	U	10	U	10	U
Petroleum Hydrocarbons																																	
>C12-C28	NA	ug/L	-	-	-	-	-	12	4400	4900	4683	4800	Uc	4900	Uc	4700	Uc	4800	Uc	4800	Uc	4600	Uc	4600	Uc	4700	Uc	4900	Uc	4400	Uc	4600	Uc	4400	Uc

Table 5F: Modified Elutriate Testing Analytical Results and Screening[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	Target Detection Limit (TDL)	Marine Water Screening Criteria				No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-EL		HSCNew-NMP-02-EL		HSCNew-NMP-03-EL		HSCNew-NMP-04-EL		HSCNew-NMP-05-EL		HSCNew-NMP-06-EL		HSCNew-NMP-07-EL		HSCNew-NMP-08-EL		HSCNew-NMP-09-EL		HSCNew-NMP-10-EL		HSCNew-NMP-11-EL		HSCNew-NMP-03-EL-Field Dup	
				TSWQS (Acute) (b)	EPA WQC (Acute) (o)	NOAA (Marine Acute) (p)	Region 6 (Marine Chronic) (q)					10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018	
>C28-C35	NA	ug/L	-	-	-	-	-	12	4400	4900	4683	4800	Uc	4900	Uc	4700	Uc	4800	Uc	4800	Uc	4600	Uc	4600	Uc	4700	Uc	4900	Uc	4400	Uc	4600	Uc	4400	Uc
C6-C12	NA	ug/L	-	-	-	-	-	12	4400	4900	4683	4800	Uc	4900	Uc	4700	Uc	4800	Uc	4800	Uc	4600	Uc	4600	Uc	4700	Uc	4900	Uc	4400	Uc	4600	Uc	4400	Uc
C6-C35	NA	ug/L	-	-	-	-	-	12	8800	9800	9358	9500	Uc	9800	Uc	9400	Uc	9600	Uc	9600	Uc	9200	Uc	9200	Uc	9300	Uc	9800	Uc	8900	Uc	9200	Uc	8800	Uc
Total Petroleum Hydrocarbons	8012-95-1		100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FOOTNOTES- lowercase footnotes were created by the table generator

a) The primary sources for this table were: TDLs - EPA 823-B-95-001, QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations. USEPA/USACE, Regional Implementation Agreement, July 2003; US EPA SW-846 http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm;

b) TSWQS Rule 307.6- (2014) https://www.tceq.texas.gov/waterquality/standards ; **NOTE**2018 TSWQSs were adopted by the commision on February 7, 2018, these Standards are effective for all state permits; however, until approved by USEPA, the 2014 Standards apply to federal permits.

c) Azobenzene is reported by the laboratory instead of 1,2-diphenylhydrazine. 1,2-diphenylhydrazine is rapidly oxidized into azobenzene during analysis.

d) PAHs methylnapthalene and 2-methylnapthalene were not analyzed for by the laboratory

e) PAHs did not have any elevated RL. PAH (total) calculated was determined by summing all non-U qualified data.

f) Total PCBs were not calculated since all analytes were nondetect, U qualified, and there were no elevated RL. Except for Sample HSCNew-NMP-011-EL which had detected concentrations of PCBs amd were

g) These values are based on recommendations from the EPA Region 6 laboratory in Houston; these values were based on data or other technical basis;

h) The values in parentheses are based on EPA "clean techniques", (EPA 1600 series methods) which are applicable in instances where other TDLs are inadequate to assess EPA water quality criteria;

i) This value recommended by Houston lab using colorimetric method. This value is based upon FREE cyanide, not complexed as the method is designed to analyze for. If free cyanide is expected, consult the laboratory as to the best method for quantifying free cyanide;

j) Total TEQ was calculated using 2005 WHO TEF values from Van den Berg et al; 2006 (doi:10.1093/toxsci/kfl055) and https://clu-in.org/download/contaminantfocus/dioxins/Dioxin_TEFs_for_TEQs.pdf. Total TEQ was calculacted by summing all non-U qualified data. Total TEQ does not include J qualified result for Total Hepta CDD, Total Hepta CDF, Total Tetra CDD, and Total Tetra CDF since there is no reported TEF for Total Hepta CDD, Total Hepta CDF, Total Tetra CDD, and Total Tetra CDF.

l) Metals are expressed as Dissolved values in water samples, except for mercury and selenium, which shall be reported as Total Recoverable Concentrations;

m) Samples for metals analysis were diluted 10X for antimony, arsenic, barium, beryllium, cadmium, chromium (total), copper, lead, nickel, selenium, silver, thallium and zinc, 1X for chromium (3+), 2X for chromium (6+) and mercury

n) 6010/6020 are not suitable Methods for Cr+6. If Cr+6 is suspected from past dredging history or industrial landuse in the vicinity, US EPA SW-846 Method 7199 (modified);
o) EPA WQC- http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm; see EPA footnote section below for individual EPA value footnotes

p) NOAA- http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html
q) Region 6 screening benchmarks come from TCEQ's ecological benchmarks for water,

EPA WQC footnotes- uppercase and double-lettered footnotes are directly from the NRWQC footnotes; only footnotes for constituents of concern are retained in this table

A) This recommended water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive. Please consult the criteria document for details.
D) Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column. See "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic life Metals Criteria (PDF)," (49 pp, 3MB) October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available on NSCEP's web site and 40CFR§131.36(b)(1). Conversion Factors applied in the table can be found in Appendix A to the Preamble-Conversion Factors for Dissolved Metals.

G) This Criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (PDF) (153 pp, 7.3MB) (EPA 440/5-80-019), Chlordane (PDF) (68 pp, 3.1MB) (EPA 440/5-80-027), DDT (PDF) (175 pp, 8.3MB) (EPA 440/5-80-038), Endosulfan (PDF) (155 pp, 7.3MB) (EPA 440/5-80-046), Endrin (PDF) (103 pp, 4.6MB) (EPA 440/5-80-047), Heptachlor (PDF) (114 pp, 5.4MB) (EPA 440/5-80-052), Hexachlorocyclohexane (PDF) (109 pp, 4.8MB) (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines (PDF) (104 pp, 3.3MB). If evaluation is to be done using an averaging period, the acute criteria values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

Q) This recommended water quality criterion is expressed as ug free cyanide (as CN)/l.
Y) This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.
cc) When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be appropriate.
dd) Selenium criteria document (EPA 440/5-87-006, September 1987)states that if selenium is as toxic to saltwater fishes in the field as it is to freshwater fishes in the field, the status of the fish community should be monitored whenever the conc.of selenium exceeds 5.0 µg/l in salt water because the saltwater CCC does not take into account uptake via the food chain.
ii)This criterion applies to DDT and its metabolites (i.e., the total conc. DDT plus metabolites should not exceed this value).

Laboratory Qualifiers

CCV-L	The CCV was below acceptable limits leading to negative bias in the results for this analyte.
Cl	Residual Chlorine or other oxidizing agent was detected in the container used to analyze this sample.
E	Reported concentration exceeds the calibration range of the instrument for that specific analysis for organics. Reported value is estimated due to the presence of an interference for inorganics
H	This sample was extracted and/or analyzed outside of the EPA recommended holding time.
J	Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.
Ja	Estimated concentration between the EDL and RDL
Jb	Estimated value less than RL
Jc	The reported result is an estimated value.
N	Spiked sample recovery not within control limits
Q	Value is outside of acceptance limits.
QM-07	The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
S-GC	Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate/s.
U	Analyte included in the analysis, but not detected
Ua	Analyte included in the analysis, but not detected at or above the Reporting Limit
Ub	Compound was analyzed for but was not detected (non-detect)
Uc	Indicates the compound was analyzed for but not detected above the specified level.
Ud	Undetected at the limit of quantitation.
Z-03	See case narrative.

Samples with Detections are BOLD

One or more sample concentrations exceed screening criteria
Sample concentration exceeds criteria

Table 5G: Modified Elutriate Testing Analytical Results for Dioxins and Furans[a]
Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point
Houston Ship Channel, TX

Analyte	CAS No.	Units	No. of Samples	Sample Min	Sample Max	Sample Mean	HSCNew-NMP-01-EL				HSCNew-NMP-02-EL				HSCNew-NMP-03-EL				HSCNew-NMP-04-EL				HSCNew-NMP-05-EL				HSCNew-NMP-06-EL				HSCNew-NMP-07-EL				HSCNew-NMP-08-EL				HSCNew-NMP-09-EL				HSCNew-NMP-10-EL				HSCNew-NMP-11-EL				HSCNew-NMP-03-EL-Field			
							10/29/2018		TEF	TEQ	10/29/2018		TEF	TEQ	10/29/2018		TEF	TEQ	10/29/2018		TEF	TEQ	10/29/2018		TEF	TEQ	10/29/2018		TEF	TEQ	10/29/2018		REF	TEQ	10/29/2018		TEF	TEQ	10/29/2018		TEF	TEQ	10/29/2018		TEF	TEQ	10/29/2018		TEF	TEQ	10/29/2018		TEF	TEQ
1,2,3,4,6,7,8-Hepta CDD	35822-46-9	pg/L	12	5.6	51	43	**6.2**	**Ja**	0.01	**0.062**	50	Ud	0.01	0.50	50	Ud	0.01	0.50	51	Ud	0.01	0.51	50	Ud	0.01	0.50	50	A4910, U	0.01	0.50	**5.6**	**Ja**	0.01	**0.056**	50	Ud	0.01	0.50	50	Ud	0.01	0.50	51	Ud	0.01	0.51	48	Ud	0.01	0.48	50	Ud	0.01	0.50
1,2,3,4,6,7,8-Hepta CDF	67562-39-4	pg/L	12	47	51	50	51	Ud	0.01	0.51	50	Ud	0.01	0.50	50	Ud	0.01	0.50	51	Ud	0.01	0.51	50	Ud	0.01	0.50	50	Ud	0.01	0.50	47	Ud	0.01	0.47	50	Ud	0.01	0.50	50	Ud	0.01	0.50	51	Ud	0.01	0.51	48	Ud	0.01	0.48	50	Ud	0.01	0.50
1,2,3,4,7,8,9-Hepta CDF	55673-89-7	pg/L	12	47	51	50	51	Ud	0.01	0.51	50	Ud	0.01	0.50	50	Ud	0.01	0.50	51	Ud	0.01	0.51	50	Ud	0.01	0.50	50	Ud	0.01	0.50	47	Ud	0.01	0.47	50	Ud	0.01	0.50	50	Ud	0.01	0.50	51	Ud	0.01	0.51	48	Ud	0.01	0.48	50	Ud	0.01	0.50
1,2,3,4,7,8-Hexa CDD	39227-28-6	pg/L	12	47	51	50	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	47	Ud	0.1	4.7	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	48	Ud	0.1	4.8	50	Ud	0.1	5.0
1,2,3,4,7,8-Hexa CDF	70648-26-9	pg/L	12	47	51	50	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	47	Ud	0.1	4.7	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	48	Ud	0.1	4.8	50	Ud	0.1	5.0
1,2,3,6,7,8-Hexa CDD	57653-85-7	pg/L	12	47	51	50	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	47	Ud	0.1	4.7	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	48	Ud	0.1	4.8	50	Ud	0.1	5.0
1,2,3,6,7,8-Hexa CDF	57117-44-9	pg/L	12	47	51	50	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	47	Ud	0.1	4.7	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	48	Ud	0.1	4.8	50	Ud	0.1	5.0
1,2,3,7,8,9-Hexa CDD	19408-74-3	pg/L	12	47	51	50	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	47	Ud	0.1	4.7	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	48	Ud	0.1	4.8	50	Ud	0.1	5.0
1,2,3,7,8,9-Hexa CDF	72918-21-9	pg/L	12	47	51	50	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	47	Ud	0.1	4.7	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	48	Ud	0.1	4.8	50	Ud	0.1	5.0
1,2,3,7,8-Penta CDD	40321-76-4	pg/L	12	47	51	50	51	Ud	1	51	50	Ud	1	50	50	Ud	1	50	51	Ud	1	51	50	Ud	1	50	50	Ud	1	50	47	Ud	1	47	50	Ud	1	50	50	Ud	1	50	51	Ud	1	51	48	Ud	1	48	50	Ud	1	50
1,2,3,7,8-Penta CDF	57117-41-6	pg/L	12	47	51	50	51	Ud	0.03	1.5	50	Ud	0.03	1.5	50	Ud	0.03	1.5	51	Ud	0.03	1.5	50	Ud	0.03	1.5	50	Ud	0.03	1.5	47	Ud	0.03	1.4	50	Ud	0.03	1.5	50	Ud	0.03	1.5	51	Ud	0.03	1.5	48	Ud	0.03	1.4	50	Ud	0.03	1.5
2,3,4,6,7,8-Hexa CDF	60851-34-5	pg/L	12	47	51	50	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	50	Ud	0.1	5.0	50	Ud	0.1	5.0	47	Ud	0.1	4.7	50	Ud	0.1	5.0	50	Ud	0.1	5.0	51	Ud	0.1	5.1	48	Ud	0.1	4.8	50	Ud	0.1	5.0
2,3,4,7,8-Penta CDF	57117-31-4	pg/L	12	47	51	50	51	Ud	0.3	15	50	Ud	0.3	15	50	Ud	0.3	15	51	Ud	0.3	15	50	Ud	0.3	15	50	Ud	0.3	15	47	Ud	0.3	14	50	Ud	0.3	15	50	Ud	0.3	15	51	Ud	0.3	15	48	Ud	0.3	14	50	Ud	0.3	15
2,3,7,8-Tetra CDD	1746-01-6	pg/L	12	2.5	10	8.6	10	Ud	1	10	10	Ud	1	10	10	Ud	1	10	**7.9**	**Ja**	1	**7.9**	10	A4910, U	1	10	10	Ud	1	10	**2.5**	**Ja**	1	**2.5**	10	Ud	1	10	10	Ud	1	10	10	Ud	1	10	9.5	Ud	1	9.5	**2.5**	**Ja**	1	**2.5**
2,3,7,8-Tetra CDF	51207-31-9	pg/L	12	4.1	22	9.4	10	Ud	0.1	1.0	**5.2**	**Ja**	0.1	**0.52**	10	Ud	0.1	1.0	**22**	-	0.1	**2.2**	**4.1**	**Ja**	0.1	**0.41**	10	A3470, U	0.1	1.0	**6.1**	**Ja**	0.1	**0.61**	10	Ud	0.1	1.0	10	Ud	0.1	1.0	10	Ud	0.1	1.0	9.5	Ud	0.1	0.95	**5.7**	**Ja**	0.1	**0.57**
OCDD	3268-87-9	pg/L	12	11	101	85	101	A3470, U	0.0003	0.030	100	Ud	0.0003	0.030	100	Ud	0.0003	0.030	101	Ud	0.0003	0.030	**11**	**Ja**	0.0003	**0.0034**	100	A3470, U	0.0003	0.030	94	A3470, U	0.0003	0.028	**12**	**Ja**	0.0003	**0.0035**	100	A3470, U	0.0003	0.030	101	A4997, U	0.0003	0.030	95	A3470, U	0.0003	0.029	100	A3470, U	0.0003	0.030
OCDF	39001-02-0	pg/L	12	11	101	92	**11**	**Ja**	0.0003	**0.00321**	100	Ud	0.0003	0.030	100	Ud	0.0003	0.030	101	Ud	0.0003	0.030	100	Ud	0.0003	0.030	100	Ud	0.0003	0.030	94	Ud	0.0003	0.028	100	Ud	0.0003	0.030	100	Ud	0.0003	0.030	101	Ud	0.0003	0.030	95	Ud	0.0003	0.029	100	Ud	0.0003	0.030
Total Hepta CDD	37871-00-4	pg/L	12	3.6	51	41	**23**	**Ja**	(f)		50	Ud			50	Ud			51	Ud			50	Ud			**3.6**	**Ja**	(f)		**12**	**Ja**	(f)		50	Ud			50	Ud			51	Ud			48	A4997, U			50	Ud		
Total Hepta CDF	38998-75-3	pg/L	12	2.7	51	46	51	Ud			50	Ud			50	Ud			51	Ud			50	Ud			50	Ud			**2.7**	**Ja**	(g)		50	Ud			50	Ud			51	Ud			48	Ud			50	Ud		
Total Hexa CDD	34465-46-8	pg/L	12	47	51	50	51	Ud			50	Ud			50	Ud			51	Ud			50	Ud			50	Ud			47	Ud			50	Ud			50	Ud			51	Ud			48	Ud			50	Ud		
Total Hexa CDF	55684-94-1	pg/L	12	47	51	50	51	Ud			50	Ud			50	Ud			51	Ud			50	Ud			50	Ud			47	Ud			50	Ud			50	Ud			51	Ud			48	Ud			50	Ud		
Total Penta CDD	36088-22-9	pg/L	12	47	51	50	51	Ud			50	Ud			50	Ud			51	Ud			50	Ud			50	Ud			47	Ud			50	Ud			50	Ud			51	Ud			48	Ud			50	Ud		
Total Penta CDF	30402-15-4	pg/L	12	47	51	50	51	Ud			50	Ud			50	Ud			51	Ud			50	Ud			50	Ud			47	Ud			50	Ud			50	Ud			51	Ud			48	Ud			50	Ud		
Total Tetra CDD	41903-57-5	pg/L	12	2.5	10	8.6	10	Ud			10	Ud			10	Ud			**7.9**	**Ja**	(e)		10	A4910, U			10	Ud			**2.5**	**Ja**	(e)		10	Ud			10	Ud			10	Ud			9.5	Ud			**2.5**	**Ja**	(e)	
Total Tetra CDF	55722-27-5	pg/L	12	5.9	34	11	10	Ud			**7.7**	**Ja**	(d)		10	Ud			**34**	-	(d)		**5.9**	**Ja**	(d)		10	A3470, U			**9.2**	**Ja**	(d)		10	Ud			10	Ud			10	Ud			9.5	Ud			**8.8**	**Ja**	(d)	
Total TEQ (c)		pg/L								**0.062**				**0.52**				0				**10**				**0.42**				0				**3.1**				**0.0035**				0				0				0				**3.1**

a) The primary sources for this table were: TDLs - EPA 823-B-95-001, QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations. USEPA/USACE, Regional Implementation Agreement, July 2003; US EPA SW-846 http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm;

b) TSWQS Rule 307.6- (2014) https://www.tceq.texas.gov/waterquality/standards ; **NOTE**2018 TSWQSs were adopted by the commision on February 7, 2018, these Standards are effective for all state permits; however, until approved by USEPA, the 2014 Standards apply to federal permits.

c) Total TEQ was calculated using 2005 WHO TEF values from Van den Berg et al; 2006 (doi:10.1093/toxsci/kfl055) and https://clu-in.org/download/contaminantfocus/dioxins/Dioxin_TEFs_for_TEQs.pdf. Total TEQ was calculacted by summing all non-U qualified data.

d) Total TEQ does not include J qualified result for Total Tetra CDF since there is no reported TEF for Total Tetra CDF.

e) Total TEQ does not include J qualified result for Total Tetra CDD since there is no reported TEF for Total Tetra CDD.

f) Total TEQ does not include J qualified result for Total Hepta CDD since there is no reported TEF for Total Hepta CDD.

g) Total TEQ does not include J qualified result for Total Hepta CDF since there is no reported TEF for Total Hepta CDF.

Laboratory Qualifer

*	Duplicate analysis not within control limits
A3470	RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds
A4997	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.BT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds
Ja	Estimated concentration between the EDL and RDL
Ud	Undetected at the limit of quantitation.

Samples with Detections are BOLD

Appendix 6: Analytical Laboratory Reports

Analytical Reports: Site Water

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

22 May 2019

Cheryl Montgomery
ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg, MS 39180

RE: Houston Ship Channel-North of Morgan's Point

Enclosed are the results of analyses for samples received by the laboratory on 22-Oct-2018. The samples associated with this report will be held for 90 days from the date of this report. The raw data associated with this report will be held for 5 years from the date of this report. If you need us to hold onto the samples or the data longer then these specified times, you will need to notify us in writing at least 30 days before the expiration dates. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jenifer Milam
Database Manager

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

WORK ORDER SUMMARY

Sample ID	Laboratory ID	Matrix	Date Sampled	Date of Work Order
HSCNew-NMP-01-SW	18J0401-01	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-02-SW	18J0401-02	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-03-SW	18J0401-03	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-04-SW	18J0401-04	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-05-SW	18J0401-05	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-06-SW	18J0401-06	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-07-SW	18J0401-07	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-08-SW	18J0401-08	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-09-SW	18J0401-09	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-10-SW	18J0401-10	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-11-SW	18J0401-11	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-03-SW-Field DUP	18J0401-13	Water	22-Oct-2018	22-Oct-2018
HSCNew-NMP-EQPB	18J0401-14	Water	06-Oct-2018	22-Oct-2018
HSCNew-NMP-EQPB	18J0401-15	Water	22-Oct-2018	22-Oct-2018

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Case Narrative

No issues were experienced during the analysis of Work Order 18J0401 unless specified below.
SVOC/PAH/PCP- SVOC/PAH/PCP- The RL of 20 ug/L exceeded the TDL of 1 ug/L for benzidine for all the samples. Benzidine was not detected in any of the samples. Azobenzene was reported instead of 1,2-phenylhydrazine due to the degradation of 1,2-phenylhydrazine in the injection port of the GC/MS. The WG 1167814-3 LCD recovery, associated with HSCNew-NMP-EQPPB (L1841553-01), was below the acceptance criteria for benzidine (9%); however, it has been identified as a "difficult" analyte. The results of the associated samples are reported. The WG 1167722-1 method blank has concentrations above the reporting limit for several compounds. The results of the original analysis are reported and are qualified with a "B" for any associated sample concentrations that are less than 10x the blank concentration for this analyte. For HSCNew-NMP-07-SW (L1843397-07) and HSCNew-NMP-11-SW (L1843397-11), the surrogate recoveries were outside the acceptance criteria for 2-fluorophenol (13%) and phenol-d5 (12%) (Project Limits=30-150); however, re-extraction could not be performed due to lack of additional sample. The results of the original analysis are reported; however, all associated compounds are considered to have a potential low bias. The WG 1173490-2/-3 LCS/LCSD recoveries, associated with all of the samples were below the acceptance criteria for benzoic acid (5%/4%); however, it has been identified as a "difficult" analyte. The results of the associated samples are reported. The matrix spike/matrix spike duplicate (MS/MSD) was not performed on the SVOC/PAH/PCP due to insufficient sample volume.
Pests- The equipment rinsate, HSCNew-NMP-EQPB, was extracted five days outside of holding time due to a laboratory processing error. One of the continuing calibration verification (CCV) standards had low recoveries of 83.3 and 82.9% for 4,4'-DDT and oxychlordane, respectively (Project Limits 85-115%); however, the recoveries were within the DOD QSM 5.1 limits of 80-120%. The initial calibrating verification (ICV) standard had an elevated recovery of 127% (Project Limits=80-120%) for delta-BHC. The results of toxaphene for the ICV was not reportable. The ICV it is a second source standard that did not match the pattern of the standard used for the calibration. SW846 states that some toxaphene components, particularly the more heavily chlorinated components, are subject to dechlorination reactions. As a result, standards from different vendors may exhibit differences, which could lead to possible false negative results or large differences in quantitative results. No bias was observed for the pesticide results based on the quality control samples.
PCBs- The laboratory control sample/laboratory control duplicate (LCS/LCD) and MS/MSD had elevated recoveries ranging from 156-177% (Project Limits=50-150%) for PCB 170. The MS/MSD had elevated recoveries ranging from 160 and 167%, respectively, (Project Limits=50-150%) for PCB 153. No bias was observed for the PCB congener results based on the quality control samples.
VOCs- The chain of custody did not request VOCs for the sediment equipment rinsate, HSCNew-NMP-EQPB. The LCS had an elevated recovery of 157% (Laboratory Limits=45-150%) for tetrachloroethylene but the MS/MSD had acceptable recoveries based on laboratory limits of 45-150%. No significant bias was suspected for the VOC results.
TPH- The chain of custody did not request TPH for the sediment equipment rinsate, HSCNew-NMP-EQPB. The RLs ranging from of 5,000-10,000 ug/L exceeded the TDL of 100 µg/L for TPH by TCEQ (TNRRC) 1005. The hydrocarbon ranges were not detected above the RL for all of the samples.
CN- Residual Chlorine or other oxidizing agent was detected in the container of all the site waters. Chlorine is an interference that can decompose cyanides; therefore, the results may have a negative bias.
Metals- The duplicate had an elevated RPD of 72.3% (Project Limits=30%) for antimony; however, the RPD was calculated using estimated concentrations below the RL of 0.005 mg/L. One of the two matrix spike duplicates had a low recovery of 57.8% (Project Limits=70-130%) for zinc. The recoveries for the LCSs and MS and MS/MSD were within the acceptable project limits for zinc. No bias was observed for the metal results based on the quality control samples.

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Notes and Definitions

Jc	The reported result is an estimated value.
*	Duplicate analysis not within control limits
A8644	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
A9428	RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.
	RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds
A9439	RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds
	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
A9441	RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds
A9444	RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.
B	Analyte found in both sample and associated blank
CCV-HA	The CCV was above acceptable limits meaning that the instrument became more sensitve during the analysis. Since the result was non-detect for all analytes, the batch was accepted based on EPA SW-846 criteria.
CCV-L	The CCV was below acceptable limits leading to negative bias in the results for this analyte.
Cl	Residual Chlorine or other oxidizing agent was detected in the container used to analyze this sample.
H	This sample was extracted and/or analyzed outside of the EPA recommended holding time.
J	Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.
Jb	Estimated value less than RL
Z-03	See case narrative.
Jd	Used for Pesticides, PCBs, Herbicides, Formaldehyde, Explosives and Method 504.1 analytes when there is a greater than 40 % difference for detected concentrations between the two GC columns.
L	LCS recovery is outside of established acceptance limits
N	Spiked sample recovery not within control limits
Q	Value is outside of acceptance limits.
QM-07	The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
Q-SURR	Percent Recovery is outside project limits of 30-150% but within laboratory limits of 15-115%.
RPD-01	Analyses are not controlled on RPD values from sample concentrations less than the reporting limit.
U	Analyte included in the analysis, but not detected

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Notes and Definitions

Ua	Analyte included in the analysis, but not detected at or above the Reporting Limit
Ub	Compound was analyzed for but was not detected (non-detect)
Uc	Indicates the compound was analyzed for but not detected above the specified level.
Ud	Undetected at the limit of quantitation.
Ja	Estimated concentration between the EDL and RDL
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SW

18J0401-01 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0046**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0019**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0740**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	**0.0013**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Copper-63 [1]	**0.0025**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	**0.0013**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Nickel-60 [1]	**0.0013**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	**0.0092**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0571**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**0.00050**	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	J
Chromium (VI)	**0.00080**	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, J
Mercury	ND	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	U
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	**0.00382**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SW

18J0401-01 (Water)

ERDC-EL-EP-C

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0674**		*67.4 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0894**		*74.5 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.115**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.077**		*77.3 %*	*30-150*		*26-Oct-2018*	*13-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.091**		*76.0 %*	*30-150*		*26-Oct-2018*	*13-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

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HSCNew-NMP-01-SW

18J0401-01 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.106**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**11.2**	0.400	0.800	2.00	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**10.8**		*54 %*		*15-115*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**10.4**		*52 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**5.26**		*26 %*		*15-150*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	*Q-SURR*
2-Nitrophenol	ND	0.115		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.196**	0.081		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.085		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.18		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SW

18J0401-01 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Di-n-octylphthalate	ND	0.079		1	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**11.1**		*56 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**4.56**		*23 %*		*15-115*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	*Q-SURR*
Surrogate: Terphenyl-d14	**9.68**		*48 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.366**		*73 %*		*30-130*	*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Acenaphthene	ND	0.00161		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Acenaphthylene	ND	0.00177		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Anthracene	ND	0.00194		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benz(a)anthracene	ND	0.00173		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(a)pyrene	ND	0.00084		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(b)fluoranthene	ND	0.00148		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Surrogate: Benzo(b)fluoranthene-d12	**0.431**		*86 %*		*30-130*	*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Benzo(e)pyrene	ND	0.00127		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(g,h,i)perylene	**0.00138**	0.00131		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	ND	0.00117		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Chrysene	ND	0.000936		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Dibenz(a,h)anthracene	ND	0.000685		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Fluoranthene	**0.00231**	0.00149		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Fluorene	ND	0.00173		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.0144**	0.000533		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	
Naphthalene	**0.0238**	0.00177		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	
Phenanthrene	ND	0.00189		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SW

18J0401-01 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.0037**	0.00152		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.421**		*84 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	2.16		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.73		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.72		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.14		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.16		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.17		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.14		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.21		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.03		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.1		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.17		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.17		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	**28.2**	2.6		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ja
Octa CDF	ND	3.16		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	2.16		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SW

18J0401-01 (Water)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hepta CDF	ND	1.72		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.17		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.09		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.14		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.17		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.17		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1540**		*77 %*	*35-197*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1740**		*87 %*	*23-140*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1800**		*90 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1840**		*92 %*	*32-141*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1780**		*89 %*	*26-152*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1740**		*87 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1980**		*99 %*	*28-130*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1820**		*91 %*	*26-123*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1900**		*95 %*	*25-181*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1620**		*81 %*	*24-185*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1780**		*89 %*	*28-136*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1720**		*86 %*	*29-147*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1880**		*94 %*	*21-178*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1740**		*87 %*	*24-164*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1440**		*72 %*	*24-169*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3880**		*97 %*	*17-157*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3500		4500	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3500		4500	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**91.7**		*91.7 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	**2600**	1800		4500	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Jd

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SW

18J0401-01 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Katahdin					
TNRCC 1005									
C6-C35	ND	6200		9000	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**103**		*103 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SW

18J0401-01 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**54.0**		*108 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**45.5**		*91.0 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**51.6**		*103 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**49.2**		*98.4 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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HSCNew-NMP-02-SW

18J0401-02 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0016**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0025**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0802**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	**0.0008**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Copper-63 [1]	**0.0024**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0018**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	**0.0013**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0765**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**0.00030**	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	J
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, U
Mercury	ND	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	U
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-02-SW

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0647**		*64.7 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0942**		*78.5 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.205**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.074**		*73.8 %*	*30-150*		*26-Oct-2018*	*13-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.088**		*73.3 %*	*30-150*		*26-Oct-2018*	*13-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0884**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**7.60**	0.400	0.800	2.00	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.097		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.069		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.079		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.084		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**24.9**		*123 %*	*15-115*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	*N*
2,4,6-Trichlorophenol	ND	0.154		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.101		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.243		2.02	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.735		5.05	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.165		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.17		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.091		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.092		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**18.7**		*92 %*	*30-130*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**10.6**		*52 %*	*15-150*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
2-Nitrophenol	ND	0.116		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.195		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.515		2.02	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.101		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.104		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.08		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.596		2.52	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Azobenzene	ND	0.129		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Benzidine	ND	0.469		20.2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.086		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.094		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.109		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.188**	0.082		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.086		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.182		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.118		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-02-SW

18J0401-02 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	ND	0.101		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Di-n-octylphthalate	ND	0.079		1.01	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.123		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.154		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.103		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Isophorone	ND	0.127		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.103		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**20.8**		*103 %*	*30-130*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.073		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.124		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.073		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.434		2.02	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Phenol	ND	0.052		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**8.63**		*43 %*	*15-115*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**20**		*99 %*	*30-130*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.362**		*72 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Acenaphthene	ND	0.00161		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Acenaphthylene	ND	0.00177		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Anthracene	ND	0.00194		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benz(a)anthracene	ND	0.00173		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(a)pyrene	ND	0.00084		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(b)fluoranthene	ND	0.00148		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Surrogate: Benzo(b)fluoranthene-d12	**0.458**		*92 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Benzo(e)pyrene	ND	0.00127		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(g,h,i)perylene	ND	0.00131		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(k)fluoranthene	ND	0.00117		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Chrysene	ND	0.000936		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Dibenz(a,h)anthracene	ND	0.000685		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Fluoranthene	**0.00196**	0.00149		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Fluorene	ND	0.00173		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.00739**	0.000533		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Naphthalene	**0.0117**	0.00177		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	
Phenanthrene	ND	0.00189		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-02 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.0024**	0.00152		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.428**		*86 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	2.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.27		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.26		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.02		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.04		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.19		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.04		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.19		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.05		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.19		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.03		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	16.9		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A9441, U
Octa CDF	ND	2.8		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	2.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud

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18J0401-02 (Water)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hepta CDF	ND	1.26		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.05		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.13		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.19		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.09		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.19		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.03		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1540**		*77 %*		*35-197*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1660**		*83 %*		*23-140*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1760**		*88 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1740**		*87 %*		*32-141*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1740**		*87 %*		*26-152*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1660**		*83 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1900**		*95 %*		*28-130*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1780**		*89 %*		*26-123*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1980**		*99 %*		*25-181*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1680**		*84 %*		*24-185*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1680**		*84 %*		*28-136*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1640**		*82 %*		*29-147*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**2060**		*103 %*		*21-178*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1620**		*81 %*		*24-164*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1440**		*72 %*		*24-169*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3680**		*92 %*		*17-157*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**105**		*105 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Katahdin					
TNRCC 1005									
C6-C35	ND	6400		9300	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**113**		*113 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	**1.61**	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Chloromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**53.7**		*107 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**47.2**		*94.4 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**53.2**		*106 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**49.7**		*99.4 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	ND	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Arsenic-75 [3]	**0.0021**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0727**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	**0.0011**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Copper-63 [1]	**0.0030**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	**0.0010**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Nickel-60 [1]	**0.0017**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	**0.0009**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0780**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**0.00090**	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	J
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, U
Mercury	ND	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	U
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	**0.00526**	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	J
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	**0.00433**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0691**		*69.1 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0894**		*74.5 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	

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ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.230**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.080**		*80.1 %*	*30-150*		*26-Oct-2018*	*13-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.087**		*72.8 %*	*30-150*		*26-Oct-2018*	*13-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0688**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**8.00**	0.400	0.800	2.00	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**11.9**		*59 %*		*15-115*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**9.66**		*48 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**5.2**		*26 %*		*15-150*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	*Q-SURR*
2-Nitrophenol	ND	0.115		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.174**	0.081		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.085		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.18		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SW

18J0401-03 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Di-n-octylphthalate	ND	0.079		1	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**9.91**		*50 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**4.09**		*20 %*		*15-115*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	*Q-SURR*
Surrogate: Terphenyl-d14	**11.3**		*57 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.288**		*58 %*		*30-130*	*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Acenaphthene	ND	0.00161		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Acenaphthylene	ND	0.00177		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Anthracene	ND	0.00194		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benz(a)anthracene	ND	0.00173		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(a)pyrene	**0.00154**	0.00084		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00264**	0.00148		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.443**		*89 %*		*30-130*	*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00251**	0.00127		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00257**	0.00131		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00197**	0.00117		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Chrysene	**0.00211**	0.000936		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Dibenz(a,h)anthracene	ND	0.000685		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Fluoranthene	**0.00324**	0.00149		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Fluorene	ND	0.00173		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.00876**	0.000533		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Naphthalene	**0.00361**	0.00177		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Phenanthrene	ND	0.00189		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SW

18J0401-03 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.0048**	0.00152		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.417**		*83 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	2.05		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.45		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.44		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.03		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.05		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.19		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.06		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.16		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.06		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.03		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.09		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	40		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A9441, U
Octa CDF	ND	3.06		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	4.19		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A9441, U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SW

18J0401-03 (Water)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hepta CDF	ND	1.45		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.06		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.13		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.03		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.09		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1440**		*72 %*	*35-197*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1660**		*83 %*	*23-140*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1800**		*90 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1760**		*88 %*	*32-141*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1760**		*88 %*	*26-152*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1720**		*86 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1900**		*95 %*	*28-130*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1780**		*89 %*	*26-123*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1920**		*96 %*	*25-181*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1620**		*81 %*	*24-185*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1660**		*83 %*	*28-136*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1620**		*81 %*	*29-147*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1940**		*97 %*	*21-178*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1660**		*83 %*	*24-164*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1420**		*71 %*	*24-169*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3640**		*91 %*	*17-157*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**103**		*103 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-03 (Water)

Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
C6-C35	ND	6300		9100	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**112**		*112 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	**0.95**	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Chloromethane	**2.26**	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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18J0401-03 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**53.0**		*106 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**47.3**		*94.6 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**50.2**		*100 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**49.2**		*98.4 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	ND	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Arsenic-75 [3]	**0.0031**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0724**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	**0.0022**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0013**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0792**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, U
Mercury	ND	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	U
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	**0.00388**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0607**		*60.7 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0984**		*82.0 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.320**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.078**		*78.2 %*		*30-150*	*26-Oct-2018*	*13-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.090**		*75.0 %*		*30-150*	*26-Oct-2018*	*13-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0788**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**6.40**	0.400	0.800	2.00	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**11.1**		*55 %*		*15-115*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**9.16**		*46 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**4.78**		*24 %*		*15-150*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	*Q-SURR*
2-Nitrophenol	ND	0.115		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.207**	0.081		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.085		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.18		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Di-n-octylphthalate	ND	0.079		1	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**10**		*50 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**3.96**		*20 %*		*15-115*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	*Q-SURR*
Surrogate: Terphenyl-d14	**9.5**		*48 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.348**		*70 %*		*30-130*	*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Acenaphthene	**0.002**	0.00161		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Acenaphthylene	ND	0.00177		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Anthracene	ND	0.00194		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benz(a)anthracene	ND	0.00173		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(a)pyrene	ND	0.00084		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(b)fluoranthene	ND	0.00148		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Surrogate: Benzo(b)fluoranthene-d12	**0.452**		*90 %*		*30-130*	*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Benzo(e)pyrene	ND	0.00127		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(g,h,i)perylene	ND	0.00131		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(k)fluoranthene	ND	0.00117		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Chrysene	**0.00125**	0.000936		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Dibenz(a,h)anthracene	ND	0.000685		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Fluoranthene	**0.00242**	0.00149		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Fluorene	ND	0.00173		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.00769**	0.000533		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Naphthalene	**0.00762**	0.00177		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Phenanthrene	ND	0.00189		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-04 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.0028**	0.00152		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.423**		*85 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	2.32		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.5		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.49		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.04		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.24		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.06		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.33		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.29		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.25		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.19		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.2		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.08		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.12		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.1		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	17.2		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A9444, U
Octa CDF	ND	3.09		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	2.32		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud

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MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hepta CDF	ND	1.5		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.26		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.25		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.14		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.12		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.1		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1460**		*73 %*		*35-197*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1880**		*94 %*		*23-140*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**2000**		*100 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**2100**		*105 %*		*32-141*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1980**		*99 %*		*26-152*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1960**		*98 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2120**		*106 %*		*28-130*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**2020**		*101 %*		*26-123*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1920**		*96 %*		*25-181*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1640**		*82 %*		*24-185*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1880**		*94 %*		*28-136*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1860**		*93 %*		*29-147*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**2040**		*102 %*		*21-178*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1640**		*82 %*		*24-164*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1400**		*70 %*		*24-169*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**4280**		*107 %*		*17-157*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**96.7**		*96.7 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
C6-C35	ND	6300		9100	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**106**		*106 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	**0.58**	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	**1.70**	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Chloromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua

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18J0401-04 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**54.4**		*109 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**45.3**		*90.6 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**54.8**		*110 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**50.4**		*101 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

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ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	ND	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Arsenic-75 [3]	**0.0028**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0741**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	**0.0028**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Copper-63 [1]	**0.0030**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	**0.0010**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Nickel-60 [1]	**0.0025**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0624**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**0.002**	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, U
Mercury	**0.002**	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	J
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	**0.00376**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0658**		*65.8 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0942**		*78.5 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.290**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	13-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.079**		*79.1 %*	*30-150*		*26-Oct-2018*	*13-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.086**		*71.3 %*	*30-150*		*26-Oct-2018*	*13-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0736**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**7.20**	0.400	0.800	2.00	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**11.7**		*59 %*		*15-115*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**9.92**		*50 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**5.88**		*29 %*		*15-150*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	*Q-SURR*
2-Nitrophenol	ND	0.115		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	ND	0.081		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Butylbenzylphthalate	ND	0.085		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.18		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-05-SW

18J0401-05 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	ND	0.1		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Di-n-octylphthalate	ND	0.079		1	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**11.1**		*55 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**4.39**		*22 %*		*15-115*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	*Q-SURR*
Surrogate: Terphenyl-d14	**10.2**		*51 %*		*30-130*	*29-Oct-2018*	*07-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.37**		*74 %*		*30-130*	*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Acenaphthene	ND	0.00161		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Acenaphthylene	ND	0.00177		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Anthracene	ND	0.00194		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benz(a)anthracene	ND	0.00173		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(a)pyrene	**0.00204**	0.00084		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00339**	0.00148		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.449**		*90 %*		*30-130*	*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00307**	0.00127		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00308**	0.00131		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00245**	0.00117		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Chrysene	**0.0027**	0.000936		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Dibenz(a,h)anthracene	ND	0.000685		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Fluoranthene	**0.00444**	0.00149		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Fluorene	ND	0.00173		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.00894**	0.000533		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Naphthalene	**0.00188**	0.00177		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Phenanthrene	ND	0.00189		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.00659**	0.00152		0.01	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.426**		*85 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.41		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	A8644, U
1,2,3,4,6,7,8-Hepta CDF	ND	1.31		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.31		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.03		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	0.729		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.04		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	0.783		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.05		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	0.757		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.72		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	0.924		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	0.705		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	0.841		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.24		10	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	0.869		10	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
Octa CDD	**31.3**	1.65		100	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ja
Octa CDF	ND	1.59		100	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
Total Hepta CDD	**3.3**	1.02		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ja

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MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hepta CDF	ND	1.31		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.05		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	0.742		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.72		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
Total Penta CDF	ND	0.88		50	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.24		10	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	0.869		10	pg/L	28-Nov-2018	02-Dec-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**2020**		*101 %*	*35-197*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**2320**		*116 %*	*23-140*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**2120**		*106 %*	*28-143*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**2340**		*117 %*	*32-141*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**2000**		*100 %*	*26-152*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**2160**		*108 %*	*28-143*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2480**		*124 %*	*28-130*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**2160**		*108 %*	*26-123*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**2340**		*117 %*	*25-181*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1880**		*94 %*	*24-185*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**2100**		*105 %*	*28-136*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**2000**		*100 %*	*29-147*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**2200**		*110 %*	*21-178*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**2300**		*115 %*	*24-164*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**2180**		*109 %*	*24-169*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**5000**		*125 %*	*17-157*		*28-Nov-2018*	*02-Dec-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**91.3**		*91.3 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Katahdin					
TNRCC 1005									
C6-C35	ND	6300		9200	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**100**		*100 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	**1.91**	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Chloromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-05-SW

18J0401-05 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**56.4**		*113 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**45.6**		*91.1 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**52.5**		*105 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**50.2**		*100 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-06 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	ND	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Arsenic-75 [3]	**0.0025**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0643**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	**0.0023**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0014**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0909**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**0.00040**	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	J
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, U
Mercury	**0.013**	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	J
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	**0.00425**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-06-SW

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ERDC-EL-EP-C

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0656**		*65.6 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.102**		*85.0 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	

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ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.290**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.085**		*84.7 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.10**		*85.4 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0643**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**12.7**	0.667	1.33	3.33	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.097		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.069		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.079		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.084		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**10.6**		*52 %*	*15-115*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.154		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.101		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.243		2.02	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.735		5.05	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.165		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.17		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.091		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.092		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**9.63**		*48 %*	*30-130*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**4.51**		*22 %*	*15-150*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	*Q-SURR*
2-Nitrophenol	ND	0.116		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.195		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.515		2.02	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.101		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.104		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.08		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.596		2.52	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Azobenzene	ND	0.129		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Benzidine	ND	0.469		20.2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.086		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.094		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.109		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	ND	0.082		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Butylbenzylphthalate	ND	0.086		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.182		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.118		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-06-SW

18J0401-06 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	**0.116**	0.101		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.079		1.01	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.123		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.154		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.103		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Isophorone	ND	0.127		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.103		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**10.1**		*50 %*	*30-130*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.073		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.124		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.073		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.434		2.02	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Phenol	ND	0.052		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**3.55**		*18 %*	*15-115*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	*Q-SURR*
Surrogate: Terphenyl-d14	**9.43**		*47 %*	*30-130*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.364**		*72 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Acenaphthene	ND	0.00163		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Acenaphthylene	ND	0.00179		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Anthracene	ND	0.00196		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benz(a)anthracene	ND	0.00175		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(a)pyrene	**0.00117**	0.000848		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00189**	0.00149		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.484**		*96 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00178**	0.00128		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00166**	0.00132		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00154**	0.00118		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Chrysene	**0.00173**	0.000945		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Dibenz(a,h)anthracene	ND	0.000692		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Fluoranthene	**0.00306**	0.0015		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Fluorene	ND	0.00175		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.00813**	0.000538		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Naphthalene	**0.00512**	0.00179		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Phenanthrene	ND	0.00191		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-06-SW

18J0401-06 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.00322**	0.00154		0.0101	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.453**		*90 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	2.65		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	2.08		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	2.06		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.12		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.14		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.23		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.19		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.2		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.2		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.09		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.15		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.18		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	**12.5**	1.69		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ja
Octa CDF	ND	3.08		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	2.65		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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18J0401-06 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
MAXXAM ANALYTICS, Mississauga									
EPA 1613B m									
Total Hepta CDF	ND	2.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.17		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.2		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.15		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.18		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1380**		*69 %*		*35-197*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1520**		*76 %*		*23-140*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1620**		*81 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1620**		*81 %*		*32-141*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1720**		*86 %*		*26-152*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1600**		*80 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1720**		*86 %*		*28-130*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1680**		*84 %*		*26-123*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1720**		*86 %*		*25-181*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1440**		*72 %*		*24-185*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1580**		*79 %*		*28-136*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1560**		*78 %*		*29-147*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1760**		*88 %*		*21-178*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1380**		*69 %*		*24-164*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1340**		*67 %*		*24-169*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3320**		*83 %*		*17-157*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**92.3**		*92.3 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-06 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
			Katahdin						
TNRCC 1005									
C6-C35	ND	6300		9100	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**98.4**		*98.4 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	**2.22**	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Chloromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-06 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**57.0**		*114 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**44.5**		*88.9 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**54.4**		*109 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**48.7**		*97.3 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-07 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	ND	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Arsenic-75 [3]	**0.0025**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0674**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	**0.0009**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Copper-63 [1]	**0.0033**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	**0.0011**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Nickel-60 [1]	**0.0017**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0882**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**0.00040**	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	J
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, U
Mercury	ND	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	U
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0622**		*62.2 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0972**		*81.0 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.281**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.067**		*67.2 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.081**		*67.7 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0774**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**8.80**	0.400	0.800	2.00	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.097		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.069		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.079		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.084		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**7.85**		*39 %*	*15-115*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.154		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.101		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.243		2.02	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.735		5.05	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.165		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.17		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.091		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.092		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**7.56**		*37 %*	*30-130*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**2.58**		*13 %*	*15-150*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	*N*
2-Nitrophenol	ND	0.116		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.195		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.515		2.02	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.101		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.104		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.08		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.596		2.52	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Azobenzene	ND	0.129		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Benzidine	ND	0.469		20.2	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.086		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.094		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.109		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	ND	0.082		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Butylbenzylphthalate	ND	0.086		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.182		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.118		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	ND	0.101		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Di-n-octylphthalate	ND	0.079		1.01	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.123		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.154		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.103		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Isophorone	ND	0.127		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.103		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**8.18**		*40 %*	*30-130*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.073		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.124		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.073		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.434		2.02	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Phenol	ND	0.052		0.505	ug/l	29-Oct-2018	07-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**2.37**		*12 %*	*15-115*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	*N*
Surrogate: Terphenyl-d14	**8.95**		*44 %*	*30-130*		*29-Oct-2018*	*07-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.364**		*71 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Acenaphthene	ND	0.00166		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Acenaphthylene	ND	0.00182		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Anthracene	ND	0.002		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benz(a)anthracene	ND	0.00178		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(a)pyrene	**0.00221**	0.000866		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00404**	0.00152		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.462**		*90 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00353**	0.00131		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.0035**	0.00135		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00319**	0.00121		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Chrysene	**0.00321**	0.000965		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Dibenz(a,h)anthracene	ND	0.000706		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Fluoranthene	**0.00596**	0.00154		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Fluorene	ND	0.00178		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.00969**	0.000549		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Naphthalene	**0.00187**	0.00182		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Phenanthrene	**0.00227**	0.00195		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.00793**	0.00157		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.453**		*88 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	2.16		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.06		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.02		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.16		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.03		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.25		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.04		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.21		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.21		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.12		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.1		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.02		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.08		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	**26.7**	1.66		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ja
Octa CDF	ND	2.69		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	4.08		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A8644, U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-07-SW

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MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hepta CDF	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.04		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.18		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.16		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.02		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.08		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1360**		*68 %*		*35-197*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1680**		*84 %*		*23-140*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1760**		*88 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1740**		*87 %*		*32-141*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1760**		*88 %*		*26-152*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1700**		*85 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1860**		*93 %*		*28-130*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1820**		*91 %*		*26-123*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1760**		*88 %*		*25-181*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1500**		*75 %*		*24-185*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1680**		*84 %*		*28-136*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1620**		*81 %*		*29-147*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1720**		*86 %*		*21-178*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1500**		*75 %*		*24-164*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1360**		*68 %*		*24-169*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3600**		*90 %*		*17-157*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3500		4500	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3500		4500	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**91.6**		*91.6 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4500	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
			Katahdin						
TNRCC 1005									
C6-C35	ND	6200		8900	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**97.8**		*97.8 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	**2.19**	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Chloromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-07 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**51.5**		*103 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**45.5**		*91.1 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**52.6**		*105 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**50.4**		*101 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	ND	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Arsenic-75 [3]	**0.0021**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0708**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	**0.0003**	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	**0.0021**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0014**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0831**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, U
Mercury	ND	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	U
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	**0.00550**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	**0.00470**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	**0.00409**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0624**		*62.4 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.116**		*97.0 %*		*25-125*	*26-Oct-2018*	*14-Nov-2018*	*EPA 8081A*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.272**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.080**		*80.1 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.094**		*77.9 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SW

18J0401-08 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0802**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**8.80**	0.400	0.800	2.00	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.098		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.069		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.08		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.085		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**10.6**		*52 %*	*15-115*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.155		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.102		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.246		2.04	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.743		5.1	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.166		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.171		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.092		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.093		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**9.89**		*48 %*	*30-130*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**4.98**		*24 %*	*15-150*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	*Q-SURR*
2-Nitrophenol	ND	0.117		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.197		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.52		2.04	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.102		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.105		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.081		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.602		2.55	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Azobenzene	ND	0.131		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Benzidine	ND	0.473		20.4	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.087		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.095		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.11		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	ND	0.083		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Butylbenzylphthalate	ND	0.087		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.184		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.119		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SW

18J0401-08 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	**0.107**	0.102		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.08		1.02	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.124		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.087		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.156		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.104		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Isophorone	ND	0.128		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.104		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**11.2**		*55 %*	*30-130*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.074		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.126		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.074		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.439		2.04	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Phenol	ND	0.052		0.51	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**3.66**		*18 %*	*15-115*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	*Q-SURR*
Surrogate: Terphenyl-d14	**9.38**		*46 %*	*30-130*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.352**		*68 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Acenaphthene	ND	0.00166		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Acenaphthylene	ND	0.00182		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Anthracene	ND	0.002		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benz(a)anthracene	ND	0.00178		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(a)pyrene	ND	0.000866		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(b)fluoranthene	ND	0.00152		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Surrogate: Benzo(b)fluoranthene-d12	**0.477**		*93 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Benzo(e)pyrene	ND	0.00131		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(g,h,i)perylene	ND	0.00135		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Benzo(k)fluoranthene	ND	0.00121		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Chrysene	**0.00112**	0.000965		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Dibenz(a,h)anthracene	ND	0.000706		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Fluoranthene	**0.00247**	0.00154		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Fluorene	ND	0.00178		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.00789**	0.000549		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Naphthalene	**0.00606**	0.00182		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Phenanthrene	ND	0.00195		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SW

18J0401-08 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.00264**	0.00157		0.0103	ug/l	27-Oct-2018	09-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.449**		*87 %*	*30-130*		*27-Oct-2018*	*09-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.23		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.18		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.17		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.1		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.05		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.12		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.13		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.13		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.09		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.16		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.12		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.02		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.02		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.1		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.05		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	**10.6**	2.23		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ja
Octa CDF	ND	2.41		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	1.23		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SW

18J0401-08 (Water)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hepta CDF	ND	1.17		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.13		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.16		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.1		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.05		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1320**		*66 %*	*35-197*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1800**		*90 %*	*23-140*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1840**		*92 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1840**		*92 %*	*32-141*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1940**		*97 %*	*26-152*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1800**		*90 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2020**		*101 %*	*28-130*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1840**		*92 %*	*26-123*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1800**		*90 %*	*25-181*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1480**		*74 %*	*24-185*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1740**		*87 %*	*28-136*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1720**		*86 %*	*29-147*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1720**		*86 %*	*21-178*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1500**		*75 %*	*24-164*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1320**		*66 %*	*24-169*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3880**		*97 %*	*17-157*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**95.1**		*95.1 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SW

18J0401-08 (Water)

Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
C6-C35	ND	6300		9200	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**103**		*103 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	**2.24**	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Chloromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-08 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**55.0**		*110 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**45.7**		*91.4 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**53.4**		*107 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**50.7**		*101 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0012**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0032**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0768**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	**0.0002**	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	**0.0012**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Copper-63 [1]	**0.0034**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	**0.0012**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Nickel-60 [1]	**0.0014**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	**0.0031**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0580**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**0.00070**	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	J
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, U
Mercury	ND	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	U
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	**0.00389**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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18J0401-09 (Water)

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0624**		*62.4 %*		*25-125*	*26-Oct-2018*	*15-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0936**		*78.0 %*		*25-125*	*26-Oct-2018*	*15-Nov-2018*	*EPA 8081A*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.266**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.073**		*72.8 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.084**		*69.7 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0777**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**9.20**	0.400	0.800	2.00	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**9.84**		*49 %*		*15-115*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**9.9**		*49 %*		*30-130*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**4.52**		*23 %*		*15-150*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	*Q-SURR*
2-Nitrophenol	ND	0.115		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	ND	0.081		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Butylbenzylphthalate	ND	0.085		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.18		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Di-n-octylphthalate	ND	0.079		1	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**11.1**		*55 %*	*30-130*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**3.62**		*18 %*	*15-115*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	*Q-SURR*
Surrogate: Terphenyl-d14	**9.99**		*50 %*	*30-130*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.342**		*68 %*	*30-130*		*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Acenaphthene	ND	0.00163		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Acenaphthylene	ND	0.00179		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Anthracene	ND	0.00196		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Benz(a)anthracene	**0.00178**	0.00175		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(a)pyrene	**0.00259**	0.000848		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00449**	0.00149		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.444**		*88 %*	*30-130*		*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00401**	0.00128		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00394**	0.00132		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00344**	0.00118		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Chrysene	**0.00375**	0.000945		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Dibenz(a,h)anthracene	ND	0.000692		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Fluoranthene	**0.00485**	0.0015		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Fluorene	ND	0.00175		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.00961**	0.000538		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Naphthalene	ND	0.00179		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Phenanthrene	**0.00215**	0.00191		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.00705**	0.00154		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.431**		*85 %*	*30-130*		*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	2.49		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A8644, U
1,2,3,4,6,7,8-Hepta CDF	ND	1.18		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.18		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.05		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.1		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.18		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.08		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.14		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.03		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.2		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.06		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.09		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.1		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.02		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	48.5		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A9441, U
Octa CDF	ND	2.39		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	**4.69**	1.98		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ja

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
MAXXAM ANALYTICS, Mississauga									
EPA 1613B m									
Total Hepta CDF	ND	1.18		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.08		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.12		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.03		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.1		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.02		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1580**		*79 %*		*35-197*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**2080**		*104 %*		*23-140*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**2220**		*111 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**2200**		*110 %*		*32-141*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**2340**		*117 %*		*26-152*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**2040**		*102 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2340**		*117 %*		*28-130*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**2180**		*109 %*		*26-123*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**2120**		*106 %*		*25-181*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1720**		*86 %*		*24-185*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**2040**		*102 %*		*28-136*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**2020**		*101 %*		*29-147*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**2000**		*100 %*		*21-178*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1760**		*88 %*		*24-164*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1600**		*80 %*		*24-169*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**4480**		*112 %*		*17-157*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**89.1**		*89.1 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
			Katahdin						
TNRCC 1005									
C6-C35	ND	6300		9100	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**95.6**		*95.6 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	**1.93**	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Chloromethane	**1.93**	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	

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Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**54.2**		*108 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**45.4**		*90.9 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**52.6**		*105 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**50.6**		*101 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	ND	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Arsenic-75 [3]	**0.0023**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0791**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	**0.0008**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Copper-63 [1]	**0.0025**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	**0.00089**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Nickel-60 [1]	**0.0018**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	**0.0012**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0653**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**0.00030**	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	J
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, U
Mercury	**0.003**	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	J
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	U
TOC rep1	**0.00461**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	**0.00356**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep4	**0.00408**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	**0.00380**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SW

18J0401-10 (Water)

ERDC-EL-EP-C

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0606**		*60.6 %*		*25-125*	*26-Oct-2018*	*15-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0882**		*73.5 %*		*25-125*	*26-Oct-2018*	*15-Nov-2018*	*EPA 8081A*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.272**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.074**		*74.5 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.087**		*72.2 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0748**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**17.3**	0.667	1.33	3.33	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**7.9**		*39 %*		*15-115*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**9.03**		*45 %*		*30-130*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**3.52**		*18 %*		*15-150*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	*Q-SURR*
2-Nitrophenol	ND	0.115		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	ND	0.081		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Butylbenzylphthalate	ND	0.085		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.18		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub

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ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SW

18J0401-10 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Di-n-octylphthalate	ND	0.079		1	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**10.3**		*52 %*	*30-130*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**3.02**		*15 %*	*15-115*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	*Q-SURR*
Surrogate: Terphenyl-d14	**7.04**		*35 %*	*30-130*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.288**		*57 %*	*30-130*		*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Acenaphthene	ND	0.00163		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Acenaphthylene	ND	0.00179		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Anthracene	ND	0.00196		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Benz(a)anthracene	**0.00182**	0.00175		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(a)pyrene	**0.00238**	0.000848		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00402**	0.00149		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.459**		*91 %*	*30-130*		*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00354**	0.00128		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00341**	0.00132		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00263**	0.00118		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Chrysene	**0.00331**	0.000945		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Dibenz(a,h)anthracene	ND	0.000692		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Fluoranthene	**0.00527**	0.0015		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Fluorene	ND	0.00175		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.00953**	0.000538		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Naphthalene	ND	0.00179		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Phenanthrene	**0.002**	0.00191		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SW

18J0401-10 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.00684**	0.00154		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.421**		*83 %*	*30-130*		*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.62		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.18		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.17		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.1		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.12		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.14		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.13		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.06		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.03		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	0.962		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.09		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.1		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	**33.4**	2.48		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ja
Octa CDF	ND	2.01		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	1.62		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud

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MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hepta CDF	ND	1.17		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.13		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.09		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.01		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.09		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.1		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1260**		*63 %*		*35-197*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1880**		*94 %*		*23-140*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1940**		*97 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1880**		*94 %*		*32-141*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1960**		*98 %*		*26-152*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1880**		*94 %*		*28-143*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2160**		*108 %*		*28-130*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1960**		*98 %*		*26-123*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1760**		*88 %*		*25-181*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1440**		*72 %*		*24-185*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1820**		*91 %*		*28-136*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1800**		*90 %*		*29-147*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1780**		*89 %*		*21-178*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1420**		*71 %*		*24-164*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1320**		*66 %*		*24-169*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**4160**		*104 %*		*17-157*	*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**90.8**		*90.8 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	**1900**	1800		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Jd

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SW

18J0401-10 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
			Katahdin						
TNRCC 1005									
C6-C35	ND	6300		9200	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**95.6**		*95.6 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	**2.03**	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Chloromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**53.2**		*106 %*		*70-120*	*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**43.6**		*87.2 %*		*75-120*	*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**54.4**		*109 %*		*70-130*	*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**49.0**		*98.1 %*		*70-130*	*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	ND	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Arsenic-75 [3]	**0.0023**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0729**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	**0.0003**	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	**0.0016**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Copper-63 [1]	**0.0046**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	**0.0015**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Nickel-60 [1]	**0.0026**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0856**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**0.001**	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, U
Mercury	ND	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	U
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	**0.00437**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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ERDC-EL-EP-C

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0626**		*62.6 %*		*25-125*	*26-Oct-2018*	*15-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0966**		*80.5 %*		*25-125*	*26-Oct-2018*	*15-Nov-2018*	*EPA 8081A*	

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18J0401-11 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.302**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	14-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.074**		*73.8 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.084**		*70.3 %*	*30-150*		*26-Oct-2018*	*14-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0838**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**18.7**	0.667	1.33	3.33	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.097		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.069		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.079		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.084		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**7.11**		*35 %*	*15-115*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.154		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.101		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.243		2.02	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.735		5.05	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.165		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.17		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.091		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.092		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**7.75**		*38 %*	*30-130*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**2.63**		*13 %*	*15-150*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	*N*
2-Nitrophenol	ND	0.116		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.195		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.515		2.02	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.101		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.104		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.08		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.596		2.52	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Azobenzene	ND	0.129		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Benzidine	ND	0.469		20.2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.086		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.094		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.109		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	ND	0.082		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Butylbenzylphthalate	ND	0.086		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.182		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.118		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-11-SW

18J0401-11 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	ND	0.101		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Di-n-octylphthalate	ND	0.079		1.01	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.123		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.154		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.103		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Isophorone	ND	0.127		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.103		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**8.9**		*44 %*	*30-130*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.073		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.124		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.073		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.434		2.02	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Phenol	ND	0.052		0.505	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**2.43**		*12 %*	*15-115*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	*N*
Surrogate: Terphenyl-d14	**6.09**		*30 %*	*30-130*		*29-Oct-2018*	*08-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.35**		*70 %*	*30-130*		*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Acenaphthene	ND	0.00161		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Acenaphthylene	ND	0.00177		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Anthracene	ND	0.00194		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Benz(a)anthracene	**0.00192**	0.00173		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(a)pyrene	**0.00274**	0.00084		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00598**	0.00148		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.452**		*90 %*	*30-130*		*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00454**	0.00127		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00438**	0.00131		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00346**	0.00117		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Chrysene	**0.00453**	0.000936		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Dibenz(a,h)anthracene	ND	0.000685		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Fluoranthene	**0.00826**	0.00149		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Fluorene	ND	0.00173		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.0102**	0.000533		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	
Naphthalene	**0.00321**	0.00177		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Phenanthrene	**0.00189**	0.00189		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-11-SW

18J0401-11 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.00774**	0.00152		0.01	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.424**		*85 %*	*30-130*		*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**9.35**	1.47		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ja
1,2,3,4,6,7,8-Hepta CDF	ND	2.62		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A8644, U
1,2,3,4,7,8,9-Hepta CDF	ND	1.39		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.3		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.09		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.39		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.1		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.35		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.14		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.78		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.25		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.62		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.19		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.05		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	73.3		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A9441, U
Octa CDF	ND	4.22		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A9428, U
Total Hepta CDD	**18.7**	1.47		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ja

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-11 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
MAXXAM ANALYTICS, Mississauga									
EPA 1613B m									
Total Hepta CDF	ND	2.95		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A8644, U
Total Hexa CDD	ND	1.1		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	**1.35**	1.32		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ja
Total Penta CDD	ND	1.14		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.7		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.19		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.65		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A8644, U
Surrogate: 37CL4 2378 Tetra CDD	**1060**		*53 %*	*35-197*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1860**		*93 %*	*23-140*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1900**		*95 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1920**		*96 %*	*32-141*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1880**		*94 %*	*26-152*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1860**		*93 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2000**		*100 %*	*28-130*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1880**		*94 %*	*26-123*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1700**		*85 %*	*25-181*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1280**		*64 %*	*24-185*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1760**		*88 %*	*28-136*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1800**		*90 %*	*29-147*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1620**		*81 %*	*21-178*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1140**		*57 %*	*24-164*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1100**		*55 %*	*24-169*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**4040**		*101 %*	*17-157*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**105**		*105 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-11 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
			Katahdin						
TNRCC 1005									
C6-C35	ND	6300		9200	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**111**		*111 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	**2.23**	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Chloromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-11 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**52.3**		*105 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**45.1**		*90.3 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**53.5**		*107 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**50.4**		*101 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SW-Field DUP

18J0401-13 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	ND	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Arsenic-75 [3]	**0.0031**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.0823**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	**0.0014**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Copper-63 [1]	**0.0032**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	**0.0008**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Nickel-60 [1]	**0.0021**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	**0.0013**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0680**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**0.00090**	0.00030	0.00050	0.001	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	J
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L	23-Oct-2018	23-Oct-2018	EPA 7199M	Z-03, U
Mercury	**0.003**	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	J
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	**0.00262**	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	J
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	**0.00436**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0637**		*63.7 %*		*25-125*	*26-Oct-2018*	*15-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0906**		*75.5 %*		*25-125*	*26-Oct-2018*	*15-Nov-2018*	*EPA 8081A*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**0.207**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	25-Oct-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.080**		*79.6 %*		*30-150*	*26-Oct-2018*	*16-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.077**		*64.5 %*		*30-150*	*26-Oct-2018*	*16-Nov-2018*	*EPA 8082*	
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-13 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0653**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**9.60**	0.400	0.800	2.00	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**8.73**		*44 %*		*15-115*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**8.54**		*43 %*		*30-130*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**3.83**		*19 %*		*15-150*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	*Q-SURR*
2-Nitrophenol	ND	0.115		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	ND	0.081		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Butylbenzylphthalate	ND	0.085		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Diethylphthalate	ND	0.18		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Di-n-butylphthalate	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Di-n-octylphthalate	ND	0.079		1	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**10.1**		*50 %*		*30-130*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**3.64**		*18 %*		*15-115*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	*Q-SURR*
Surrogate: Terphenyl-d14	**6.76**		*34 %*		*30-130*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.372**		*72 %*		*30-130*	*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Acenaphthene	ND	0.00166		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Acenaphthylene	ND	0.00182		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Anthracene	ND	0.002		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Benz(a)anthracene	ND	0.00178		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Benzo(a)pyrene	**0.000932**	0.000866		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00154**	0.00152		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.455**		*88 %*		*30-130*	*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00148**	0.00131		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00138**	0.00135		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	ND	0.00121		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Chrysene	**0.0012**	0.000965		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Dibenz(a,h)anthracene	ND	0.000706		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Fluoranthene	**0.00239**	0.00154		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Fluorene	ND	0.00178		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.00818**	0.000549		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Naphthalene	**0.00768**	0.00182		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Phenanthrene	**0.00202**	0.00195		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SW-Field DUP

18J0401-13 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Pyrene	**0.00347**	0.00157		0.0103	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.431**		*84 %*	*30-130*		*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.62		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A8644, U
1,2,3,4,6,7,8-Hepta CDF	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.1		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.13		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.15		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.14		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.24		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.03		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.13		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.13		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.08		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	24.8		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A9441, U
Octa CDF	ND	2.12		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	2.74		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	A8644, Ud

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hepta CDF	ND	1.1		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.14		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.09		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.18		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.13		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.08		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1420**		*71 %*	*35-197*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1820**		*91 %*	*23-140*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1880**		*94 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**2060**		*103 %*	*32-141*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1920**		*96 %*	*26-152*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1880**		*94 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2000**		*100 %*	*28-130*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1900**		*95 %*	*26-123*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1800**		*90 %*	*25-181*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1460**		*73 %*	*24-185*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1860**		*93 %*	*28-136*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1800**		*90 %*	*29-147*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1820**		*91 %*	*21-178*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1560**		*78 %*	*24-164*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1500**		*75 %*	*24-169*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**4040**		*101 %*	*17-157*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
TNRCC 1005									
>C12-C28	ND	3500		4500	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3500		4500	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**102**		*102 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	**2200**	1800		4500	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Jd

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
			Katahdin						
TNRCC 1005									
C6-C35	ND	6200		9000	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**104**		*104 %*	*70-130*		*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	**1.53**	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
Chloromethane	**1.50**	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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18J0401-13 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**56.6**		*113 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**45.2**		*90.5 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**54.2**		*108 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**51.6**		*103 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

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HSCNew-NMP-EQPB

18J0401-14 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Mercury	**0.005**	0.002	0.010	0.020	ug/L	16-Oct-2018	17-Oct-2018	EPA 7474	J
Selenium	ND	0.0015	0.0050	0.0100	mg/L	19-Nov-2018	26-Nov-2018	GF-AAS 7000 Series	U
Antimony-121 [1]	**0.0037**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	J
Arsenic-75 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Barium-135 [1]	ND	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Copper-63 [1]	**0.0008**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	J
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Nickel-60 [1]	ND	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Silver-107 [1]	**0.0033**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	J
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Zinc-66 [1]	**0.0599**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
Sulfide	**0.0198**	0.00150	0.00500	0.0100	mg/L	15-Oct-2018	15-Oct-2018	EPA 376	H, Z-03
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	H, Z-03, U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	H, Z-03, U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	H, Z-03, U
TOC rep4	**0.00413**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	H, Z-03, J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	H, Z-03, U
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	ND	0.00060	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
4,4´-DDE	ND	0.0005	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
4,4´-DDT	ND	0.0005	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
Aldrin	ND	0.0005	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
alpha-BHC	ND	0.0004	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
alpha-Chlordane	ND	0.00080	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
beta-BHC	ND	0.0007	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
cis-Nonachlor	ND	0.0004	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
delta-BHC	ND	0.0004	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
Dieldrin	ND	0.0005	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
Endosulfan I	ND	0.001	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
Endosulfan II	ND	0.0003	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U

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18J0401-14 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.0005	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
Endrin	ND	0.0007	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
Endrin aldehyde	ND	0.00040	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
gamma-BHC (Lindane)	ND	0.0005	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
gamma-Chlordane	ND	0.0005	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
Heptachlor	ND	0.0006	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
Heptachlor epoxide	ND	0.0005	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
Oxychlordane	ND	0.0007	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
Toxaphene	ND	0.049	0.066	0.200	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
trans-Nonachlor	ND	0.0006	0.001	0.004	ug/L	18-Oct-2018	21-Nov-2018	EPA 8081A	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0660**		*55.0 %*		*25-125*	*18-Oct-2018*	*21-Nov-2018*	*EPA 8081A*	*H, Z-03*
Surrogate: PCB 198	**0.102**		*84.7 %*		*25-125*	*18-Oct-2018*	*21-Nov-2018*	*EPA 8081A*	*H, Z-03*
Nutrients									
Ammonia as N	ND	0.00880	0.0100	0.0200	mg/L	15-Oct-2018	16-Oct-2018	EPA 350.1	U
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 126	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.13**		*134 %*		*30-150*	*26-Oct-2018*	*16-Nov-2018*	*EPA 8082*	*H*
Surrogate: PCB 198	**0.10**		*84.0 %*		*30-150*	*26-Oct-2018*	*16-Nov-2018*	*EPA 8082*	*H*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-EQPB

18J0401-14 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	H, U
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0339**	0.0237		0.170	ug/L	13-Oct-2018	26-Oct-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	ND	0.400	0.800	2.00	mg/L	04-Oct-2018	04-Oct-2018	EPA 160.2	H, Z-03, U
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**10.6**		*53 %*		*30-130*	*13-Oct-2018*	*02-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**5.07**		*25 %*		*15-115*	*13-Oct-2018*	*02-Nov-2018*	*8270D*	*Q-SURR*
2-Nitrophenol	ND	0.115		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	ND	0.081		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Butylbenzylphthalate	ND	0.085		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-EQPB

18J0401-14 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
			Alpha						
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.18		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.29**	0.1		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.079		1	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**12.1**		*60 %*		*30-130*	*13-Oct-2018*	*02-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	13-Oct-2018	02-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**3.77**		*19 %*		*15-115*	*13-Oct-2018*	*02-Nov-2018*	*8270D*	*Q-SURR*
Surrogate: Terphenyl-d14	**14.7**		*74 %*		*30-130*	*13-Oct-2018*	*02-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**307**		*61 %*		*30-130*	*13-Oct-2018*	*26-Oct-2018*	*8270D*	
Acenaphthene	ND	0.00161		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	Ub
Acenaphthylene	ND	0.00177		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	Ub
Anthracene	ND	0.00194		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	Ub
Benz(a)anthracene	**0.018**	0.00173		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	B
Benzo(a)pyrene	**0.0237**	0.00084		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	B
Benzo(b)fluoranthene	**0.0245**	0.00148		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	B
Surrogate: Benzo(b)fluoranthene-d12	**457**		*91 %*		*30-130*	*13-Oct-2018*	*26-Oct-2018*	*8270D*	
Benzo(e)pyrene	**18.3**	0.00127		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	B
Benzo(g,h,i)perylene	**0.0188**	0.00131		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	B
Benzo(k)fluoranthene	**0.0204**	0.00117		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	B
Chrysene	**0.0195**	0.000936		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	B
Dibenz(a,h)anthracene	**0.00416**	0.000685		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	Jb
Fluoranthene	**0.0241**	0.00149		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	B
Fluorene	ND	0.00173		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**0.0192**	0.000533		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	B

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-EQPB

18J0401-14 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
			Alpha						
PAHs by GC/MS SIM									
Naphthalene	**0.00977**	0.00177		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	Jb
Phenanthrene	**0.0109**	0.00189		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	B
Pyrene	**0.0213**	0.00152		0.01	ug/l	13-Oct-2018	26-Oct-2018	8270D	B
Surrogate: Pyrene-d10	**441**		*88 %*		*30-130*	*13-Oct-2018*	*26-Oct-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/l	19-Oct-2018	19-Oct-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.61		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.46		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.45		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.44		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.31		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.47		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.41		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.48		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.36		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.45		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.29		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.26		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.17		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.42		10	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.4		10	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
Octa CDD	ND	1.85		100	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
Octa CDF	ND	1.67		100	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud

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ERDC -- Vicksburg (EL) ERDC, 3909 Halls Ferry Road Vicksburg MS, 39180	Project: Houston Ship Channel-North of Morgan's Point Project Manager: Cheryl Montgomery	**Reported:** 22-May-2019

HSCNew-NMP-EQPB

18J0401-14 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Total Hepta CDD	ND	1.61		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
Total Hepta CDF	ND	1.46		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.48		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.33		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.45		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.23		50	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.42		10	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.4		10	pg/L	24-Oct-2018	29-Oct-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1660**		*83 %*	*35-197*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1600**		*80 %*	*23-140*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1860**		*93 %*	*28-143*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1840**		*92 %*	*32-141*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**2180**		*109 %*	*26-152*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1500**		*75 %*	*28-143*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2300**		*115 %*	*28-130*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**2360**		*118 %*	*26-123*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1900**		*95 %*	*25-181*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1800**		*90 %*	*24-185*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1780**		*89 %*	*28-136*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1940**		*97 %*	*29-147*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1900**		*95 %*	*21-178*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1980**		*99 %*	*24-164*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1680**		*84 %*	*24-169*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**2600**		*65 %*	*17-157*		*24-Oct-2018*	*29-Oct-2018*	*EPA 1613B m*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-EQPB

18J0401-15 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Mercury	ND	0.002	0.010	0.020	ug/L	24-Oct-2018	25-Oct-2018	EPA 7474	U
Selenium	ND	0.0003	0.0010	0.0020	mg/L	29-Oct-2018	29-Oct-2018	GF-AAS 7000 Series	U
Antimony-121 [1]	**0.0018**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	J
Arsenic-75 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Barium-135 [1]	**0.0023**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	J
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Copper-63 [1]	**0.0017**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	J
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Nickel-60 [1]	ND	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Silver-107 [1]	**0.0013**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	J
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	U
Zinc-66 [1]	**0.0653**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	EPA 6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	24-Oct-2018	24-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-EQPB

18J0401-15 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	26-Oct-2018	15-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0699**		*69.9 %*		*25-125*	*26-Oct-2018*	*15-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0834**		*69.5 %*		*25-125*	*26-Oct-2018*	*15-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**0.0355**	0.00440	0.00500	0.0100	mg/L	25-Oct-2018	26-Oct-2018	EPA 350.1	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 105	ND	0.00030	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 118	ND	0.0008	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 126	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 128	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 138	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 153	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 169	ND	0.0002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 170	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 18	ND	0.004	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 180	ND	0.001	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 187	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 28	ND	0.005	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 44	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 52	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 66	ND	0.0007	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 77	ND	0.002	0.003	0.006	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
PCB 8	ND	0.006	0.006	0.012	ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.093**		*93.1 %*		*30-150*	*26-Oct-2018*	*16-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**0.074**		*61.9 %*		*30-150*	*26-Oct-2018*	*16-Nov-2018*	*EPA 8082*	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-EQPB

18J0401-15 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	0.00				ug/L	26-Oct-2018	16-Nov-2018	EPA 8082	U
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.149**	0.0237		0.170	ug/L	27-Oct-2018	09-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	ND	0.400	0.800	2.00	mg/L	24-Oct-2018	24-Oct-2018	EPA 160.2	U
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**10.6**		*53 %*		*15-115*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**8.82**		*44 %*		*30-130*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**4.15**		*21 %*		*15-150*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	*Q-SURR*
2-Nitrophenol	ND	0.115		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.109**	0.081		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Jb

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-EQPB

18J0401-15 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Butylbenzylphthalate	ND	0.085		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Diethylphthalate	**0.493**	0.18		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Jb
Dimethylphthalate	ND	0.117		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Di-n-butylphthalate	ND	0.1		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Di-n-octylphthalate	ND	0.079		1	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**10.2**		*51 %*		*30-130*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	29-Oct-2018	08-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**3.22**		*16 %*		*15-115*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	*Q-SURR*
Surrogate: Terphenyl-d14	**9.57**		*48 %*		*30-130*	*29-Oct-2018*	*08-Nov-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.36**		*71 %*		*30-130*	*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Acenaphthene	**0.00572**	0.00163		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Acenaphthylene	**0.00415**	0.00179		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Anthracene	ND	0.00196		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Benz(a)anthracene	ND	0.00175		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Benzo(a)pyrene	**0.00139**	0.000848		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.0022**	0.00149		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.459**		*91 %*		*30-130*	*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00144**	0.00128		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00138**	0.00132		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00133**	0.00118		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Chrysene	**0.0016**	0.000945		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Dibenz(a,h)anthracene	ND	0.000692		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Ub
Fluoranthene	**0.00303**	0.0015		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Fluorene	**0.014**	0.00175		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-EQPB

18J0401-15 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Indeno(1,2,3-cd)pyrene	**0.00809**	0.000538		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Naphthalene	**0.0754**	0.00179		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	
Phenanthrene	**0.0113**	0.00191		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	
Pyrene	**0.00277**	0.00154		0.0101	ug/l	27-Oct-2018	10-Nov-2018	8270D	Jb
Surrogate: Pyrene-d10	**0.438**		*87 %*	*30-130*		*27-Oct-2018*	*10-Nov-2018*	*8270D*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	01-Nov-2018	01-Nov-2018	SW9012B	Cl, U
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.49		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.19		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.18		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.03		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.03		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.05		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.1		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.06		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.07		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.09		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.22		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	0.992		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.11		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.18		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	0.76		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	2.36		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL) ERDC, 3909 Halls Ferry Road Vicksburg MS, 39180	Project: Houston Ship Channel-North of Morgan's Point Project Manager: Cheryl Montgomery	**Reported:** 22-May-2019

HSCNew-NMP-EQPB

18J0401-15 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	2.26		100	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	1.49		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hepta CDF	ND	1.18		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.06		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.04		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.09		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.16		50	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.18		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	0.76		10	pg/L	24-Oct-2018	06-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1400**		*70 %*	*35-197*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**2020**		*101 %*	*23-140*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**2020**		*101 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**2200**		*110 %*	*32-141*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**2080**		*104 %*	*26-152*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1940**		*97 %*	*28-143*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2200**		*110 %*	*28-130*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**2080**		*104 %*	*26-123*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1920**		*96 %*	*25-181*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1600**		*80 %*	*24-185*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1900**		*95 %*	*28-136*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1920**		*96 %*	*29-147*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1960**		*98 %*	*21-178*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1560**		*78 %*	*24-164*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1420**		*71 %*	*24-169*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**4240**		*106 %*	*17-157*		*24-Oct-2018*	*06-Nov-2018*	*EPA 1613B m*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-EQPB

18J0401-15 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
			Katahdin						
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**95.1**		*95.1 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
C6-C12	**1900**	1800		4600	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Jd
C6-C35	ND	6400		9200	ug/L	25-Oct-2018	31-Oct-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**96.8**		*96.8 %*		*70-130*	*25-Oct-2018*	*31-Oct-2018*	*TNRCC 1005*	
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		100	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Acetone	**9.53**	7.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Jc
Benzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-EQPB

18J0401-15 (Water)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Carbon disulfide	ND	1.00		10.0	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Chloromethane	**1.92**	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	29-Oct-2018	29-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**53.4**		*107 %*	*70-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**44.7**		*89.5 %*	*75-120*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**52.0**		*104 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**50.2**		*100 %*	*70-130*		*29-Oct-2018*	*29-Oct-2018*	*SW8260B*	

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC/MS Selective Ion Monitoring - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0004 - B18K006												
Calibration Check (18K0004-CCV1)						Prepared & Analyzed: 15-Nov-2018						
Phenanthrene	510				ug/L	500.0		102	85-115			
Surrogate: 2-Fluorobiphenyl	*430*				*ug/L*	*500.0*		*86.4*	*85-115*			
Surrogate: Terphenyl-dl4	*540*				*ug/L*	*500.0*		*107*	*85-115*			

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Semivolatile Organics by GC/MS Selective Ion Monitoring - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0004 - B18K006												
Calibration Check (18K0004-CCV2)						Prepared: 15-Nov-2018 Analyzed: 12-Dec-2018						
Pentachlorophenol	820				ug/L	750.0		110	80-120			

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Semivolatile Organics by GC/MS Selective Ion Monitoring - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0004 - B18K006												
Calibration Check (18K0004-CCV3)						Prepared & Analyzed: 15-Nov-2018						
Phenanthrene	510				ug/L	500.0		102	85-115			
Surrogate: 2-Fluorobiphenyl	*470*				*ug/L*	*500.0*		*94.6*	*85-115*			
Surrogate: Terphenyl-dl4	*550*				*ug/L*	*500.0*		*110*	*85-115*			

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC/MS Selective Ion Monitoring - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0004 - B18K006												
Calibration Check (18K0004-CCV4)						Prepared: 15-Nov-2018 Analyzed: 12-Dec-2018						
Pentachlorophenol	700				ug/L	750.0		92.9	80-120			

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC/MS Selective Ion Monitoring - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0004 - B18K006												
Initial Cal Blank (18K0004-ICB1)						Prepared & Analyzed: 15-Nov-2018						
Pentachlorophenol	0.0				ug/L							U
Phenanthrene	0.0				ug/L							U
Surrogate: 2-Fluorobiphenyl	*0.0*				*ug/L*				*30-150*			*U*
Surrogate: Terphenyl-dl4	*0.0*				*ug/L*				*30-150*			*U*

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Semivolatile Organics by GC/MS Selective Ion Monitoring - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0004 - B18K006												
Initial Cal Check (18K0004-ICV1)						Prepared & Analyzed: 15-Nov-2018						
Phenanthrene	200				ug/L	200.0		97.5	80-120			

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Semivolatile Organics by GC/MS Selective Ion Monitoring - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0004 - B18K006												
Initial Cal Check (18K0004-ICV2)						Prepared: 15-Nov-2018 Analyzed: 12-Dec-2018						
Pentachlorophenol	720				ug/L	750.0		95.5	80-120			

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Semivolatile Organics by GC/MS Selective Ion Monitoring - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes

Batch B18K085 - Default Prep Metals

Blank (B18K085-BLK1) Prepared & Analyzed: 15-Nov-2018

Antimony-121 [1]	0.00012	0.00007	0.00025	0.0005	mg/L							J
Arsenic-75 [3]	ND	0.00006	0.00025	0.0005	mg/L							U
Barium-135 [1]	ND	0.0002	0.00025	0.0005	mg/L							U
Beryllium-9 [1]	ND	0.00002	0.00025	0.0005	mg/L							U
Cadmium-111 [1]	ND	0.00003	0.00025	0.0005	mg/L							U
Chromium-52 [1]	ND	0.00006	0.00025	0.0005	mg/L							U
Copper-63 [1]	ND	0.00006	0.00025	0.0005	mg/L							U
Lead-206 [1]	ND	0.00008	0.00025	0.0005	mg/L							U
Nickel-60 [1]	ND	0.00005	0.00025	0.0005	mg/L							U
Silver-107 [1]	0.0001	0.00008	0.00025	0.0005	mg/L							J
Thallium-203 [1]	ND	0.00003	0.00025	0.0005	mg/L							U
Zinc-66 [1]	ND	0.0001	0.00025	0.0005	mg/L							U

Blank (B18K085-BLK2) Prepared & Analyzed: 15-Nov-2018

Antimony-121 [1]	0.0001	0.00007	0.00025	0.0005	mg/L							J
Arsenic-75 [3]	ND	0.00006	0.00025	0.0005	mg/L							U
Barium-135 [1]	ND	0.0002	0.00025	0.0005	mg/L							U
Beryllium-9 [1]	0.00002	0.00002	0.00025	0.0005	mg/L							J
Cadmium-111 [1]	ND	0.00003	0.00025	0.0005	mg/L							U
Chromium-52 [1]	ND	0.00006	0.00025	0.0005	mg/L							U
Copper-63 [1]	ND	0.00006	0.00025	0.0005	mg/L							U
Lead-206 [1]	ND	0.00008	0.00025	0.0005	mg/L							U
Nickel-60 [1]	ND	0.00005	0.00025	0.0005	mg/L							U
Silver-107 [1]	0.0001	0.00008	0.00025	0.0005	mg/L							J
Thallium-203 [1]	ND	0.00003	0.00025	0.0005	mg/L							U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Blank (B18K085-BLK2)						Prepared & Analyzed: 15-Nov-2018						
Zinc-66 [1]	ND	0.0001	0.00025	0.0005	mg/L							U
LCS (B18K085-BS1)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0397	0.00007	0.00025	0.0005	mg/L	0.04000		99.2	70-130			
Arsenic-75 [3]	0.0368	0.00006	0.00025	0.0005	mg/L	0.04000		92.0	70-130			
Barium-135 [1]	0.0399	0.0002	0.00025	0.0005	mg/L	0.04000		99.7	70-130			
Beryllium-9 [1]	0.0385	0.00002	0.00025	0.0005	mg/L	0.04000		96.2	70-130			
Cadmium-111 [1]	0.0400	0.00003	0.00025	0.0005	mg/L	0.04000		100	70-130			
Chromium-52 [1]	0.0398	0.00006	0.00025	0.0005	mg/L	0.04000		99.5	70-130			
Copper-63 [1]	0.0408	0.00006	0.00025	0.0005	mg/L	0.04000		102	70-130			
Lead-206 [1]	0.0383	0.00008	0.00025	0.0005	mg/L	0.04000		95.6	70-130			
Nickel-60 [1]	0.0400	0.00005	0.00025	0.0005	mg/L	0.04000		99.9	70-130			
Silver-107 [1]	0.0384	0.00008	0.00025	0.0005	mg/L	0.04000		96.0	70-130			
Thallium-203 [1]	0.0395	0.00003	0.00025	0.0005	mg/L	0.04000		98.7	70-130			
Zinc-66 [1]	0.0450	0.0001	0.00025	0.0005	mg/L	0.04000		113	70-130			
LCS (B18K085-BS2)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0390	0.00007	0.00025	0.0005	mg/L	0.04000		97.6	70-130			
Arsenic-75 [3]	0.0392	0.00006	0.00025	0.0005	mg/L	0.04000		98.1	70-130			
Barium-135 [1]	0.0405	0.0002	0.00025	0.0005	mg/L	0.04000		101	70-130			
Beryllium-9 [1]	0.0416	0.00002	0.00025	0.0005	mg/L	0.04000		104	70-130			
Cadmium-111 [1]	0.0405	0.00003	0.00025	0.0005	mg/L	0.04000		101	70-130			
Chromium-52 [1]	0.0408	0.00006	0.00025	0.0005	mg/L	0.04000		102	70-130			
Copper-63 [1]	0.0408	0.00006	0.00025	0.0005	mg/L	0.04000		102	70-130			
Lead-206 [1]	0.0393	0.00008	0.00025	0.0005	mg/L	0.04000		98.2	70-130			
Nickel-60 [1]	0.0403	0.00005	0.00025	0.0005	mg/L	0.04000		101	70-130			
Silver-107 [1]	0.0379	0.00008	0.00025	0.0005	mg/L	0.04000		94.8	70-130			
Thallium-203 [1]	0.0397	0.00003	0.00025	0.0005	mg/L	0.04000		99.2	70-130			
Zinc-66 [1]	0.0474	0.0001	0.00025	0.0005	mg/L	0.04000		119	70-130			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Calibration Check (B18K085-CCV1)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0428	0.00007	0.00025	0.0005	mg/L	0.04000		107	90-110			
Arsenic-75 [3]	0.0386	0.00006	0.00025	0.0005	mg/L	0.04000		96.4	90-110			
Barium-135 [1]	0.0382	0.0002	0.00025	0.0005	mg/L	0.04000		95.6	90-110			
Beryllium-9 [1]	0.0373	0.00002	0.00025	0.0005	mg/L	0.04000		93.3	90-110			
Cadmium-111 [1]	0.0409	0.00003	0.00025	0.0005	mg/L	0.04000		102	90-110			
Chromium-52 [1]	0.0385	0.00006	0.00025	0.0005	mg/L	0.04000		96.2	90-110			
Copper-63 [1]	0.0383	0.00006	0.00025	0.0005	mg/L	0.04000		95.8	90-110			
Lead-206 [1]	0.0376	0.00008	0.00025	0.0005	mg/L	0.04000		93.9	90-110			
Nickel-60 [1]	0.0398	0.00005	0.00025	0.0005	mg/L	0.04000		99.6	90-110			
Silver-107 [1]	0.0422	0.00008	0.00025	0.0005	mg/L	0.04000		105	90-110			
Thallium-203 [1]	0.0387	0.00003	0.00025	0.0005	mg/L	0.04000		96.6	90-110			
Zinc-66 [1]	0.0389	0.0001	0.00025	0.0005	mg/L	0.04000		97.1	90-110			
Calibration Check (B18K085-CCV2)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0508	0.00007	0.00025	0.0005	mg/L	0.05000		102	90-110			
Arsenic-75 [3]	0.0464	0.00006	0.00025	0.0005	mg/L	0.05000		92.9	90-110			
Barium-135 [1]	0.0492	0.0002	0.00025	0.0005	mg/L	0.05000		98.4	90-110			
Beryllium-9 [1]	0.0462	0.00002	0.00025	0.0005	mg/L	0.05000		92.3	90-110			
Cadmium-111 [1]	0.0496	0.00003	0.00025	0.0005	mg/L	0.05000		99.1	90-110			
Chromium-52 [1]	0.0491	0.00006	0.00025	0.0005	mg/L	0.05000		98.2	90-110			
Copper-63 [1]	0.0492	0.00006	0.00025	0.0005	mg/L	0.05000		98.5	90-110			
Lead-206 [1]	0.0485	0.00008	0.00025	0.0005	mg/L	0.05000		97.0	90-110			
Nickel-60 [1]	0.0466	0.00005	0.00025	0.0005	mg/L	0.05000		93.1	90-110			
Silver-107 [1]	0.0481	0.00008	0.00025	0.0005	mg/L	0.05000		96.1	90-110			
Thallium-203 [1]	0.0497	0.00003	0.00025	0.0005	mg/L	0.05000		99.4	90-110			
Zinc-66 [1]	0.0477	0.0001	0.00025	0.0005	mg/L	0.05000		95.3	90-110			
Calibration Check (B18K085-CCV3)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0487	0.00007	0.00025	0.0005	mg/L	0.05000		97.3	90-110			
Arsenic-75 [3]	0.0479	0.00006	0.00025	0.0005	mg/L	0.05000		95.9	90-110			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Calibration Check (B18K085-CCV3)						Prepared & Analyzed: 15-Nov-2018						
Barium-135 [1]	0.0509	0.0002	0.00025	0.0005	mg/L	0.05000		102	90-110			
Beryllium-9 [1]	0.0478	0.00002	0.00025	0.0005	mg/L	0.05000		95.6	90-110			
Cadmium-111 [1]	0.0523	0.00003	0.00025	0.0005	mg/L	0.05000		105	90-110			
Chromium-52 [1]	0.0484	0.00006	0.00025	0.0005	mg/L	0.05000		96.9	90-110			
Copper-63 [1]	0.0501	0.00006	0.00025	0.0005	mg/L	0.05000		100	90-110			
Lead-206 [1]	0.0477	0.00008	0.00025	0.0005	mg/L	0.05000		95.4	90-110			
Nickel-60 [1]	0.0469	0.00005	0.00025	0.0005	mg/L	0.05000		93.8	90-110			
Silver-107 [1]	0.0483	0.00008	0.00025	0.0005	mg/L	0.05000		96.5	90-110			
Thallium-203 [1]	0.0486	0.00003	0.00025	0.0005	mg/L	0.05000		97.3	90-110			
Zinc-66 [1]	0.0490	0.0001	0.00025	0.0005	mg/L	0.05000		98.0	90-110			
Calibration Check (B18K085-CCV4)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0517	0.00007	0.00025	0.0005	mg/L	0.05000		103	90-110			
Arsenic-75 [3]	0.0490	0.00006	0.00025	0.0005	mg/L	0.05000		97.9	90-110			
Barium-135 [1]	0.0497	0.0002	0.00025	0.0005	mg/L	0.05000		99.5	90-110			
Beryllium-9 [1]	0.0497	0.00002	0.00025	0.0005	mg/L	0.05000		99.4	90-110			
Cadmium-111 [1]	0.0519	0.00003	0.00025	0.0005	mg/L	0.05000		104	90-110			
Chromium-52 [1]	0.0509	0.00006	0.00025	0.0005	mg/L	0.05000		102	90-110			
Copper-63 [1]	0.0521	0.00006	0.00025	0.0005	mg/L	0.05000		104	90-110			
Lead-206 [1]	0.0510	0.00008	0.00025	0.0005	mg/L	0.05000		102	90-110			
Nickel-60 [1]	0.0526	0.00005	0.00025	0.0005	mg/L	0.05000		105	90-110			
Silver-107 [1]	0.0498	0.00008	0.00025	0.0005	mg/L	0.05000		99.6	90-110			
Thallium-203 [1]	0.0510	0.00003	0.00025	0.0005	mg/L	0.05000		102	90-110			
Zinc-66 [1]	0.0516	0.0001	0.00025	0.0005	mg/L	0.05000		103	90-110			
Calibration Check (B18K085-CCV5)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0490	0.00007	0.00025	0.0005	mg/L	0.05000		98.0	90-110			
Arsenic-75 [3]	0.0473	0.00006	0.00025	0.0005	mg/L	0.05000		94.5	90-110			
Barium-135 [1]	0.0487	0.0002	0.00025	0.0005	mg/L	0.05000		97.5	90-110			
Beryllium-9 [1]	0.0476	0.00002	0.00025	0.0005	mg/L	0.05000		95.1	90-110			

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Calibration Check (B18K085-CCV5)						Prepared & Analyzed: 15-Nov-2018						
Cadmium-111 [1]	0.0503	0.00003	0.00025	0.0005	mg/L	0.05000		101	90-110			
Chromium-52 [1]	0.0486	0.00006	0.00025	0.0005	mg/L	0.05000		97.3	90-110			
Copper-63 [1]	0.0492	0.00006	0.00025	0.0005	mg/L	0.05000		98.4	90-110			
Lead-206 [1]	0.0490	0.00008	0.00025	0.0005	mg/L	0.05000		98.0	90-110			
Nickel-60 [1]	0.0484	0.00005	0.00025	0.0005	mg/L	0.05000		96.9	90-110			
Silver-107 [1]	0.0480	0.00008	0.00025	0.0005	mg/L	0.05000		95.9	90-110			
Thallium-203 [1]	0.0493	0.00003	0.00025	0.0005	mg/L	0.05000		98.5	90-110			
Zinc-66 [1]	0.0504	0.0001	0.00025	0.0005	mg/L	0.05000		101	90-110			
Calibration Check (B18K085-CCV6)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0531	0.00007	0.00025	0.0005	mg/L	0.05000		106	90-110			
Arsenic-75 [3]	0.0471	0.00006	0.00025	0.0005	mg/L	0.05000		94.1	90-110			
Barium-135 [1]	0.0482	0.0002	0.00025	0.0005	mg/L	0.05000		96.3	90-110			
Beryllium-9 [1]	0.0482	0.00002	0.00025	0.0005	mg/L	0.05000		96.4	90-110			
Cadmium-111 [1]	0.0524	0.00003	0.00025	0.0005	mg/L	0.05000		105	90-110			
Chromium-52 [1]	0.0486	0.00006	0.00025	0.0005	mg/L	0.05000		97.3	90-110			
Copper-63 [1]	0.0491	0.00006	0.00025	0.0005	mg/L	0.05000		98.2	90-110			
Lead-206 [1]	0.0479	0.00008	0.00025	0.0005	mg/L	0.05000		95.9	90-110			
Nickel-60 [1]	0.0480	0.00005	0.00025	0.0005	mg/L	0.05000		96.0	90-110			
Silver-107 [1]	0.0503	0.00008	0.00025	0.0005	mg/L	0.05000		101	90-110			
Thallium-203 [1]	0.0496	0.00003	0.00025	0.0005	mg/L	0.05000		99.3	90-110			
Zinc-66 [1]	0.0491	0.0001	0.00025	0.0005	mg/L	0.05000		98.3	90-110			
Duplicate (B18K085-DUP1)			**Source: 18J0401-13**			Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	ND	0.0007	0.0025	0.0050	mg/L		ND				30	U
Arsenic-75 [3]	0.0029	0.0006	0.0025	0.0050	mg/L		0.0031			5.99	30	J
Barium-135 [1]	0.0745	0.0020	0.0025	0.0050	mg/L		0.0823			9.97	30	
Beryllium-9 [1]	0.0002	0.00015	0.0025	0.0050	mg/L		ND				30	J
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L		ND				30	U
Chromium-52 [1]	0.0012	0.0006	0.0025	0.0050	mg/L		0.0014			13.5	30	J

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Duplicate (B18K085-DUP1)		**Source: 18J0401-13**				Prepared & Analyzed: 15-Nov-2018						
Copper-63 [1]	0.0034	0.0006	0.0025	0.0050	mg/L		0.0032			6.39	30	J
Lead-206 [1]	0.00089	0.0008	0.0025	0.0050	mg/L		0.0008			6.15	30	J
Nickel-60 [1]	0.0021	0.0005	0.0025	0.0050	mg/L		0.0021			4.29	30	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L		0.0013				30	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L		ND				30	U
Zinc-66 [1]	0.0653	0.0010	0.0025	0.0050	mg/L		0.0680			3.97	30	
Duplicate (B18K085-DUP2)		**Source: 18J0403-12**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0009	0.0007	0.0025	0.0050	mg/L		0.0011			17.6	30	J
Arsenic-75 [3]	0.0017	0.0006	0.0025	0.0050	mg/L		0.0021			16.5	30	J
Barium-135 [1]	0.367	0.0020	0.0025	0.0050	mg/L		0.386			4.95	30	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L		ND				30	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L		ND				30	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L		ND				30	U
Copper-63 [1]	ND	0.0006	0.0025	0.0050	mg/L		ND				30	U
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L		ND				30	U
Nickel-60 [1]	0.0017	0.0005	0.0025	0.0050	mg/L		0.0015			13.3	30	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L		0.0011				30	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L		ND				30	U
Zinc-66 [1]	0.182	0.0010	0.0025	0.0050	mg/L		0.184			1.09	30	
Matrix Spike (B18K085-MS1)		**Source: 18J0401-13**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.436	0.0007	0.0025	0.0050	mg/L	0.4000	ND	109	70-130			
Arsenic-75 [3]	0.431	0.0006	0.0025	0.0050	mg/L	0.4000	0.0031	107	70-130			
Barium-135 [1]	0.455	0.0020	0.0025	0.0050	mg/L	0.4000	0.0823	93.3	70-130			
Beryllium-9 [1]	0.403	0.00015	0.0025	0.0050	mg/L	0.4000	ND	101	70-130			
Cadmium-111 [1]	0.407	0.0003	0.0025	0.0050	mg/L	0.4000	ND	102	70-130			
Chromium-52 [1]	0.382	0.0006	0.0025	0.0050	mg/L	0.4000	0.0014	95.3	70-130			
Copper-63 [1]	0.347	0.0006	0.0025	0.0050	mg/L	0.4000	0.0032	85.9	70-130			
Lead-206 [1]	0.404	0.0008	0.0025	0.0050	mg/L	0.4000	0.0008	101	70-130			

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
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Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Matrix Spike (B18K085-MS1)		**Source: 18J0401-13**				Prepared & Analyzed: 15-Nov-2018						
Nickel-60 [1]	0.375	0.0005	0.0025	0.0050	mg/L	0.4000	0.0021	93.2	70-130			
Silver-107 [1]	0.360	0.0008	0.0025	0.0050	mg/L	0.4000	0.0013	89.7	70-130			
Thallium-203 [1]	0.414	0.0003	0.0025	0.0050	mg/L	0.4000	ND	103	70-130			
Zinc-66 [1]	0.460	0.0010	0.0025	0.0050	mg/L	0.4000	0.0680	98.0	70-130			
Matrix Spike (B18K085-MS2)		**Source: 18J0403-12**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.436	0.0007	0.0025	0.0050	mg/L	0.4000	0.0011	109	70-130			
Arsenic-75 [3]	0.442	0.0006	0.0025	0.0050	mg/L	0.4000	0.0021	110	70-130			
Barium-135 [1]	0.792	0.0020	0.0025	0.0050	mg/L	0.4000	0.386	101	70-130			
Beryllium-9 [1]	0.403	0.00015	0.0025	0.0050	mg/L	0.4000	ND	101	70-130			
Cadmium-111 [1]	0.407	0.0003	0.0025	0.0050	mg/L	0.4000	ND	102	70-130			
Chromium-52 [1]	0.382	0.0006	0.0025	0.0050	mg/L	0.4000	ND	95.6	70-130			
Copper-63 [1]	0.359	0.0006	0.0025	0.0050	mg/L	0.4000	ND	89.6	70-130			
Lead-206 [1]	0.404	0.0008	0.0025	0.0050	mg/L	0.4000	ND	101	70-130			
Nickel-60 [1]	0.375	0.0005	0.0025	0.0050	mg/L	0.4000	0.0015	93.3	70-130			
Silver-107 [1]	0.362	0.0008	0.0025	0.0050	mg/L	0.4000	0.0011	90.2	70-130			
Thallium-203 [1]	0.426	0.0003	0.0025	0.0050	mg/L	0.4000	ND	106	70-130			
Zinc-66 [1]	0.469	0.0010	0.0025	0.0050	mg/L	0.4000	0.184	71.3	70-130			
Matrix Spike Dup (B18K085-MSD1)		**Source: 18J0401-13**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.445	0.0007	0.0025	0.0050	mg/L	0.4000	ND	111	70-130	1.99	30	
Arsenic-75 [3]	0.428	0.0006	0.0025	0.0050	mg/L	0.4000	0.0031	106	70-130	0.746	30	
Barium-135 [1]	0.471	0.0020	0.0025	0.0050	mg/L	0.4000	0.0823	97.3	70-130	4.23	30	
Beryllium-9 [1]	0.404	0.00015	0.0025	0.0050	mg/L	0.4000	ND	101	70-130	0.218	30	
Cadmium-111 [1]	0.412	0.0003	0.0025	0.0050	mg/L	0.4000	ND	103	70-130	1.28	30	
Chromium-52 [1]	0.386	0.0006	0.0025	0.0050	mg/L	0.4000	0.0014	96.1	70-130	0.862	30	
Copper-63 [1]	0.363	0.0006	0.0025	0.0050	mg/L	0.4000	0.0032	89.9	70-130	4.62	30	
Lead-206 [1]	0.402	0.0008	0.0025	0.0050	mg/L	0.4000	0.0008	100	70-130	0.452	30	
Nickel-60 [1]	0.365	0.0005	0.0025	0.0050	mg/L	0.4000	0.0021	90.8	70-130	2.55	30	
Silver-107 [1]	0.368	0.0008	0.0025	0.0050	mg/L	0.4000	0.0013	91.6	70-130	2.19	30	

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Matrix Spike Dup (B18K085-MSD1)		**Source: 18J0401-13**				Prepared & Analyzed: 15-Nov-2018						
Thallium-203 [1]	0.417	0.0003	0.0025	0.0050	mg/L	0.4000	ND	104	70-130	0.842	30	
Zinc-66 [1]	0.442	0.0010	0.0025	0.0050	mg/L	0.4000	0.0680	93.6	70-130	4.65	30	
Matrix Spike Dup (B18K085-MSD2)		**Source: 18J0403-12**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.446	0.0007	0.0025	0.0050	mg/L	0.4000	0.0011	111	70-130	2.18	30	
Arsenic-75 [3]	0.464	0.0006	0.0025	0.0050	mg/L	0.4000	0.0021	115	70-130	4.76	30	
Barium-135 [1]	0.818	0.0020	0.0025	0.0050	mg/L	0.4000	0.386	108	70-130	6.36	30	
Beryllium-9 [1]	0.409	0.00015	0.0025	0.0050	mg/L	0.4000	ND	102	70-130	1.36	30	
Cadmium-111 [1]	0.427	0.0003	0.0025	0.0050	mg/L	0.4000	ND	107	70-130	4.91	30	
Chromium-52 [1]	0.386	0.0006	0.0025	0.0050	mg/L	0.4000	ND	96.5	70-130	0.867	30	
Copper-63 [1]	0.363	0.0006	0.0025	0.0050	mg/L	0.4000	ND	90.6	70-130	1.11	30	
Lead-206 [1]	0.405	0.0008	0.0025	0.0050	mg/L	0.4000	ND	101	70-130	0.248	30	
Nickel-60 [1]	0.371	0.0005	0.0025	0.0050	mg/L	0.4000	0.0015	92.4	70-130	0.949	30	
Silver-107 [1]	0.373	0.0008	0.0025	0.0050	mg/L	0.4000	0.0011	93.0	70-130	3.15	30	
Thallium-203 [1]	0.424	0.0003	0.0025	0.0050	mg/L	0.4000	ND	106	70-130	0.517	30	
Zinc-66 [1]	0.415	0.0010	0.0025	0.0050	mg/L	0.4000	0.184	57.9	70-130	20.8	30	QM-07
Reference (B18K085-SRM1)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.599	0.0014	0.0050	0.0100	mg/L	0.6160		97.3	70-130			
Arsenic-75 [3]	0.644	0.0011	0.0050	0.0100	mg/L	0.6880		93.6	70-130			
Barium-135 [1]	0.465	0.0040	0.0050	0.0100	mg/L	0.5000		93.0	70-130			
Beryllium-9 [1]	0.236	0.0003	0.0050	0.0100	mg/L	0.2530		93.5	70-130			
Cadmium-111 [1]	0.133	0.00069	0.0050	0.0100	mg/L	0.1320		101	70-130			
Chromium-52 [1]	0.897	0.0013	0.0050	0.0100	mg/L	0.8910		101	70-130			
Copper-63 [1]	0.902	0.0011	0.0050	0.0100	mg/L	0.8790		103	70-130			
Lead-206 [1]	0.528	0.0016	0.0050	0.0100	mg/L	0.5460		96.7	70-130			
Nickel-60 [1]	0.816	0.0010	0.0050	0.0100	mg/L	0.8010		102	70-130			
Silver-107 [1]	0.865	0.0016	0.0050	0.0100	mg/L	0.9170		94.3	70-130			
Thallium-203 [1]	0.765	0.0006	0.0050	0.0100	mg/L	0.7750		98.7	70-130			
Zinc-66 [1]	1.16	0.0020	0.0050	0.0100	mg/L	1.250		93.0	70-130			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J140 - *												
Blank (B18J140-BLK1)						Prepared: 16-Oct-2018 Analyzed: 17-Oct-2018						
Mercury	0.004	0.002	0.005	0.010	ug/L							J
LCS (B18J140-BS1)						Prepared: 16-Oct-2018 Analyzed: 17-Oct-2018						
Mercury	0.366	0.002	0.005	0.010	ug/L	0.4000		91.5	75-125			
Duplicate (B18J140-DUP1)			**Source: 18J0401-14**			Prepared: 16-Oct-2018 Analyzed: 17-Oct-2018						
Mercury	0.007	0.004	0.010	0.020	ug/L		0.005			28.1	25	RPD-01, J
Matrix Spike (B18J140-MS1)			**Source: 18J0401-14**			Prepared: 16-Oct-2018 Analyzed: 17-Oct-2018						
Mercury	0.401	0.004	0.010	0.020	ug/L	0.4000	0.005	99.0	75-125			
Matrix Spike Dup (B18J140-MSD1)			**Source: 18J0401-14**			Prepared: 16-Oct-2018 Analyzed: 17-Oct-2018						
Mercury	0.407	0.004	0.010	0.020	ug/L	0.4000	0.005	101	75-125	1.59	25	
Reference (B18J140-SRM1)						Prepared: 16-Oct-2018 Analyzed: 29-Nov-2018						
Mercury	22.3	0.002	0.005	0.010	ug/L	22.60		98.6	80-120			
Batch B18J220 - *												
Blank (B18J220-BLK1)						Prepared: 24-Oct-2018 Analyzed: 25-Oct-2018						
Mercury	ND	0.002	0.005	0.010	ug/L							U
LCS (B18J220-BS1)						Prepared: 24-Oct-2018 Analyzed: 25-Oct-2018						
Mercury	0.184	0.002	0.005	0.010	ug/L	0.2000		91.8	75-125			
Calibration Check (B18J220-CCV1)						Prepared: 24-Oct-2018 Analyzed: 25-Oct-2018						
Mercury	0.368	0.004	0.010	0.020	ug/L	0.4000		92.1	90-110			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J220 - *												
Calibration Check (B18J220-CCV2)						Prepared: 24-Oct-2018 Analyzed: 25-Oct-2018						
Mercury	0.369	0.004	0.010	0.020	ug/L	0.4000		92.2	90-110			
Calibration Check (B18J220-CCV3)						Prepared: 24-Oct-2018 Analyzed: 25-Oct-2018						
Mercury	0.186	0.004	0.010	0.020	ug/L	0.2000		93.1	90-110			
Calibration Check (B18J220-CCV4)						Prepared: 24-Oct-2018 Analyzed: 25-Oct-2018						
Mercury	0.199	0.004	0.010	0.020	ug/L	0.2000		99.3	90-110			
Duplicate (B18J220-DUP1)			**Source: 18J0401-02**			Prepared: 24-Oct-2018 Analyzed: 25-Oct-2018						
Mercury	ND	0.004	0.010	0.020	ug/L		ND				25	U
Matrix Spike (B18J220-MS1)			**Source: 18J0401-02**			Prepared: 24-Oct-2018 Analyzed: 25-Oct-2018						
Mercury	0.379	0.004	0.010	0.020	ug/L	0.4000	ND	94.7	75-125			
Matrix Spike Dup (B18J220-MSD1)			**Source: 18J0401-02**			Prepared: 24-Oct-2018 Analyzed: 25-Oct-2018						
Mercury	0.380	0.004	0.010	0.020	ug/L	0.4000	ND	94.9	75-125	0.162	25	
Reference (B18J220-SRM1)						Prepared: 24-Oct-2018 Analyzed: 29-Nov-2018						
Mercury	23.7	0.002	0.005	0.010	ug/L	22.60		105	80-120			
Batch B18K086 - Default Prep Metals												
Blank (B18K086-BLK1)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.00012	0.00007	0.00025	0.0005	mg/L							J
Arsenic-75 [1]	ND	0.00006	0.00025	0.0005	mg/L							U
Barium-135 [1]	ND	0.0002	0.00025	0.0005	mg/L							U
Beryllium-9 [1]	ND	0.00015	0.00025	0.0005	mg/L							U
Cadmium-111 [1]	ND	0.00003	0.00025	0.0005	mg/L							U
Chromium-52 [1]	ND	0.00006	0.00025	0.0005	mg/L							U
Copper-63 [1]	ND	0.00006	0.00025	0.0005	mg/L							U
Lead-206 [1]	ND	0.00008	0.00025	0.0005	mg/L							U
Nickel-60 [1]	ND	0.00005	0.00025	0.0005	mg/L							U
Silver-107 [1]	0.0001	0.00008	0.00025	0.0005	mg/L							J
Thallium-203 [1]	ND	0.00003	0.00025	0.0005	mg/L							U
Zinc-66 [1]	ND	0.0001	0.00025	0.0005	mg/L							U

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Metals by EPA 6000/7000 Series Methods - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K086 - Default Prep Metals												
LCS (B18K086-BS1)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0397	0.00007	0.00025	0.0005	mg/L	0.04000		99.2	70-130			
Arsenic-75 [1]	0.0372	0.00006	0.00025	0.0005	mg/L	0.04000		93.0	80-120			
Barium-135 [1]	0.0399	0.0002	0.00025	0.0005	mg/L	0.04000		99.7	80-120			
Beryllium-9 [1]	0.0385	0.00015	0.00025	0.0005	mg/L	0.04000		96.2	80-120			
Cadmium-111 [1]	0.0400	0.00003	0.00025	0.0005	mg/L	0.04000		100	80-120			
Chromium-52 [1]	0.0398	0.00006	0.00025	0.0005	mg/L	0.04000		99.5	80-120			
Copper-63 [1]	0.0408	0.00006	0.00025	0.0005	mg/L	0.04000		102	80-120			
Lead-206 [1]	0.0383	0.00008	0.00025	0.0005	mg/L	0.04000		95.6	80-120			
Nickel-60 [1]	0.0400	0.00005	0.00025	0.0005	mg/L	0.04000		99.9	80-120			
Silver-107 [1]	0.0384	0.00008	0.00025	0.0005	mg/L	0.04000		96.0	80-120			
Thallium-203 [1]	0.0395	0.00003	0.00025	0.0005	mg/L	0.04000		98.7	80-120			
Zinc-66 [1]	0.0450	0.0001	0.00025	0.0005	mg/L	0.04000		113	80-120			
Calibration Check (B18K086-CCV1)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0428	0.00007	0.00025	0.0005	mg/L	0.04000		107	90-110			
Arsenic-75 [1]	0.0380	0.00006	0.00025	0.0005	mg/L	0.04000		95.1	90-110			
Barium-135 [1]	0.0382	0.0002	0.00025	0.0005	mg/L	0.04000		95.6	90-110			
Beryllium-9 [1]	0.0373	0.00015	0.00025	0.0005	mg/L	0.04000		93.3	90-110			
Cadmium-111 [1]	0.0409	0.00003	0.00025	0.0005	mg/L	0.04000		102	90-110			J
Chromium-52 [1]	0.0385	0.00006	0.00025	0.0005	mg/L	0.04000		96.2	90-110			
Copper-63 [1]	0.0383	0.00006	0.00025	0.0005	mg/L	0.04000		95.8	90-110			
Lead-206 [1]	0.0376	0.00008	0.00025	0.0005	mg/L	0.04000		93.9	90-110			
Nickel-60 [1]	0.0398	0.00005	0.00025	0.0005	mg/L	0.04000		99.6	90-110			
Silver-107 [1]	0.0422	0.00008	0.00025	0.0005	mg/L	0.04000		105	90-110			
Thallium-203 [1]	0.0387	0.00003	0.00025	0.0005	mg/L	0.04000		96.6	90-110			J
Zinc-66 [1]	0.0389	0.0001	0.00025	0.0005	mg/L	0.04000		97.1	90-110			
Calibration Check (B18K086-CCV2)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0487	0.00007	0.00025	0.0005	mg/L	0.05000		97.3	90-110			
Arsenic-75 [1]	0.0478	0.00006	0.00025	0.0005	mg/L	0.05000		95.6	90-110			

USACE ERDC-EP-C
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Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K086 - Default Prep Metals												
Calibration Check (B18K086-CCV2)						Prepared & Analyzed: 15-Nov-2018						
Barium-135 [1]	0.0509	0.0002	0.00025	0.0005	mg/L	0.05000		102	90-110			
Beryllium-9 [1]	0.0488	0.00015	0.00025	0.0005	mg/L	0.05000		97.6	90-110			
Cadmium-111 [1]	0.0523	0.00003	0.00025	0.0005	mg/L	0.05000		105	90-110			J
Chromium-52 [1]	0.0484	0.00006	0.00025	0.0005	mg/L	0.05000		96.9	90-110			
Copper-63 [1]	0.0501	0.00006	0.00025	0.0005	mg/L	0.05000		100	90-110			
Lead-206 [1]	0.0477	0.00008	0.00025	0.0005	mg/L	0.05000		95.4	90-110			
Nickel-60 [1]	0.0469	0.00005	0.00025	0.0005	mg/L	0.05000		93.8	90-110			
Silver-107 [1]	0.0483	0.00008	0.00025	0.0005	mg/L	0.05000		96.5	90-110			
Thallium-203 [1]	0.0486	0.00003	0.00025	0.0005	mg/L	0.05000		97.3	90-110			J
Zinc-66 [1]	0.0477	0.0001	0.00025	0.0005	mg/L	0.05000		95.3	90-110			
Calibration Check (B18K086-CCV3)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0500	0.00007	0.00025	0.0005	mg/L	0.05000		100	90-110			
Arsenic-75 [1]	0.0487	0.00006	0.00025	0.0005	mg/L	0.05000		97.4	90-110			
Barium-135 [1]	0.0472	0.0002	0.00025	0.0005	mg/L	0.05000		94.3	90-110			
Beryllium-9 [1]	0.0488	0.00015	0.00025	0.0005	mg/L	0.05000		97.6	90-110			
Cadmium-111 [1]	0.0496	0.00003	0.00025	0.0005	mg/L	0.05000		99.3	90-110			J
Chromium-52 [1]	0.0493	0.00006	0.00025	0.0005	mg/L	0.05000		98.6	90-110			
Copper-63 [1]	0.0512	0.00006	0.00025	0.0005	mg/L	0.05000		102	90-110			
Lead-206 [1]	0.0478	0.00008	0.00025	0.0005	mg/L	0.05000		95.6	90-110			
Nickel-60 [1]	0.0517	0.00005	0.00025	0.0005	mg/L	0.05000		103	90-110			J
Silver-107 [1]	0.0484	0.00008	0.00025	0.0005	mg/L	0.05000		96.7	90-110			
Thallium-203 [1]	0.0484	0.00003	0.00025	0.0005	mg/L	0.05000		96.7	90-110			J
Thallium-205 [1]	0.0492	0.00003	0.00025	0.0005	mg/L	0.05000		98.5	90-110			J
Zinc-66 [1]	0.0487	0.0001	0.00025	0.0005	mg/L	0.05000		97.4	90-110			
Duplicate (B18K086-DUP1)			**Source: 18J0401-15**			Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0008	0.0007	0.0025	0.0050	mg/L		0.0018			72.3	30	RPD-01, J
Arsenic-75 [1]	ND	0.0006	0.0025	0.0050	mg/L		ND				20	U
Barium-135 [1]	ND	0.0020	0.0025	0.0050	mg/L		0.0023				20	U

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)
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Project Manager: Cheryl Montgomery

Reported:
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Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K086 - Default Prep Metals												
Duplicate (B18K086-DUP1)		**Source: 18J0401-15**				Prepared & Analyzed: 15-Nov-2018						
Beryllium-9 [1]	ND	0.0015	0.0025	0.0050	mg/L		ND				20	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L		ND				20	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L		ND				20	U
Copper-63 [1]	0.0016	0.0006	0.0025	0.0050	mg/L		0.0017			5.13	20	J
Lead-206 [1]	0.0018	0.0008	0.0025	0.0050	mg/L		ND				20	J
Nickel-60 [1]	ND	0.0005	0.0025	0.0050	mg/L		ND				20	U
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L		0.0013				20	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L		ND				20	U
Zinc-66 [1]	0.0674	0.0010	0.0025	0.0050	mg/L		0.0653			3.21	20	
Matrix Spike (B18K086-MS1)		**Source: 18J0401-15**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.404	0.0007	0.0025	0.0050	mg/L	0.4000	0.0018	100	70-130			
Arsenic-75 [1]	0.387	0.0006	0.0025	0.0050	mg/L	0.4000	ND	96.7	80-120			
Barium-135 [1]	0.378	0.0020	0.0025	0.0050	mg/L	0.4000	0.0023	93.9	80-120			
Beryllium-9 [1]	0.411	0.0015	0.0025	0.0050	mg/L	0.4000	ND	103	80-120			
Cadmium-111 [1]	0.426	0.0003	0.0025	0.0050	mg/L	0.4000	ND	106	80-120			
Chromium-52 [1]	0.392	0.0006	0.0025	0.0050	mg/L	0.4000	ND	98.0	80-120			
Copper-63 [1]	0.395	0.0006	0.0025	0.0050	mg/L	0.4000	0.0017	98.4	80-120			
Lead-206 [1]	0.387	0.0008	0.0025	0.0050	mg/L	0.4000	ND	96.8	80-120			
Nickel-60 [1]	0.387	0.0005	0.0025	0.0050	mg/L	0.4000	ND	96.7	80-120			
Silver-107 [1]	0.387	0.0008	0.0025	0.0050	mg/L	0.4000	0.0013	96.4	80-120			
Thallium-203 [1]	0.390	0.0003	0.0025	0.0050	mg/L	0.4000	ND	97.6	80-120			
Zinc-66 [1]	0.494	0.0010	0.0025	0.0050	mg/L	0.4000	0.0653	107	80-120			
Matrix Spike Dup (B18K086-MSD1)		**Source: 18J0401-15**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.407	0.0007	0.0025	0.0050	mg/L	0.4000	0.0018	101	70-130	0.872	30	
Arsenic-75 [1]	0.389	0.0006	0.0025	0.0050	mg/L	0.4000	ND	97.3	80-120	0.628	20	
Barium-135 [1]	0.403	0.0020	0.0025	0.0050	mg/L	0.4000	0.0023	100	80-120	6.60	20	
Beryllium-9 [1]	0.390	0.0015	0.0025	0.0050	mg/L	0.4000	ND	97.4	80-120	5.38	20	
Cadmium-111 [1]	0.400	0.0003	0.0025	0.0050	mg/L	0.4000	ND	100	80-120	6.11	20	

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K086 - Default Prep Metals												
Matrix Spike Dup (B18K086-MSD1)		**Source: 18J0401-15**				Prepared & Analyzed: 15-Nov-2018						
Chromium-52 [1]	0.414	0.0006	0.0025	0.0050	mg/L	0.4000	ND	103	80-120	5.39	20	
Copper-63 [1]	0.413	0.0006	0.0025	0.0050	mg/L	0.4000	0.0017	103	80-120	4.38	20	
Lead-206 [1]	0.386	0.0008	0.0025	0.0050	mg/L	0.4000	ND	96.5	80-120	0.313	20	
Nickel-60 [1]	0.408	0.0005	0.0025	0.0050	mg/L	0.4000	ND	102	80-120	5.41	20	
Silver-107 [1]	0.387	0.0008	0.0025	0.0050	mg/L	0.4000	0.0013	96.5	80-120	0.0675	20	
Thallium-203 [1]	0.396	0.0003	0.0025	0.0050	mg/L	0.4000	ND	99.0	80-120	1.48	20	
Zinc-66 [1]	0.469	0.0010	0.0025	0.0050	mg/L	0.4000	0.0653	101	80-120	6.04	20	
Reference (B18K086-SRM1)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.599	0.0007	0.0025	0.0050	mg/L	0.6160		97.3	70-130			
Arsenic-75 [1]	0.669	0.0006	0.0025	0.0050	mg/L	0.6880		97.3	70-130			
Barium-135 [1]	0.465	0.0020	0.0025	0.0050	mg/L	0.5000		93.0	70-130			
Beryllium-9 [1]	0.236	0.0015	0.0025	0.0050	mg/L	0.2530		93.5	70-130			
Cadmium-111 [1]	0.133	0.0003	0.0025	0.0050	mg/L	0.1320		101	70-130			
Chromium-52 [1]	0.897	0.0006	0.0025	0.0050	mg/L	0.8910		101	70-130			
Copper-63 [1]	0.902	0.0006	0.0025	0.0050	mg/L	0.8790		103	70-130			
Lead-206 [1]	0.528	0.0008	0.0025	0.0050	mg/L	0.5460		96.7	70-130			
Nickel-60 [1]	0.816	0.0005	0.0025	0.0050	mg/L	0.8010		102	70-130			
Silver-107 [1]	0.865	0.0008	0.0025	0.0050	mg/L	0.9170		94.3	70-130			
Thallium-203 [1]	0.765	0.0003	0.0025	0.0050	mg/L	0.7750		98.7	70-130			
Zinc-66 [1]	1.16	0.0020	0.0050	0.0100	mg/L	1.250		93.0	70-130			
Batch B18K100 - Default Prep Metals												
Blank (B18K100-BLK1)						Prepared: 19-Nov-2018 Analyzed: 26-Nov-2018						
Selenium	ND	0.00015	0.0005	0.0010	mg/L							U

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K100 - Default Prep Metals												
LCS (B18K100-BS1)						Prepared: 19-Nov-2018 Analyzed: 26-Nov-2018						
Selenium	0.263	0.0015	0.0050	0.0100	mg/L	0.2500		105	80-120			
Calibration Check (B18K100-CCV1)						Prepared: 19-Nov-2018 Analyzed: 26-Nov-2018						
Selenium	0.0403	0.00015	0.0005	0.0010	mg/L	0.04000		101	90-110			
Calibration Check (B18K100-CCV2)						Prepared: 19-Nov-2018 Analyzed: 27-Nov-2018						
Selenium	0.0497	0.00015	0.0005	0.0010	mg/L	0.05000		99.4	90-110			
Calibration Check (B18K100-CCV3)						Prepared: 19-Nov-2018 Analyzed: 27-Nov-2018						
Selenium	0.0488	0.00015	0.0005	0.0010	mg/L	0.05000		97.6	90-110			
Calibration Check (B18K100-CCV4)						Prepared: 19-Nov-2018 Analyzed: 26-Nov-2018						
Selenium	0.0473	0.00015	0.0005	0.0010	mg/L	0.05000		94.5	90-110			
Duplicate (B18K100-DUP1)			**Source: 18J0401-13**			Prepared: 19-Nov-2018 Analyzed: 26-Nov-2018						
Selenium	ND	0.0015	0.0050	0.0100	mg/L		ND				20	U
Matrix Spike (B18K100-MS1)			**Source: 18J0401-13**			Prepared: 19-Nov-2018 Analyzed: 26-Nov-2018						
Selenium	0.249	0.0015	0.0050	0.0100	mg/L	0.2500	ND	99.4	80-120			
Matrix Spike Dup (B18K100-MSD1)			**Source: 18J0401-13**			Prepared: 19-Nov-2018 Analyzed: 26-Nov-2018						
Selenium	0.252	0.0015	0.0050	0.0100	mg/L	0.2500	ND	101	80-120	1.28	20	
Reference (B18K100-SRM1)						Prepared: 19-Nov-2018 Analyzed: 27-Nov-2018						
Selenium	0.935	0.0015	0.0050	0.0100	mg/L	0.9170		102	80-120			
Batch B18K121 - Default Prep Metals												
Blank (B18K121-BLK1)						Prepared & Analyzed: 29-Oct-2018						
Selenium	ND	0.00015	0.0005	0.0010	mg/L							U

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K121 - Default Prep Metals												
LCS (B18K121-BS1)						Prepared & Analyzed: 29-Oct-2018						
Selenium	0.0242	0.00015	0.0005	0.0010	mg/L	0.02500		96.6	80-120			
Duplicate (B18K121-DUP1)			Source: 18J0401-15			Prepared & Analyzed: 29-Oct-2018						
Selenium	ND	0.0003	0.0010	0.0020	mg/L		ND				20	U
Matrix Spike (B18K121-MS1)			Source: 18J0401-15			Prepared & Analyzed: 29-Oct-2018						
Selenium	0.0475	0.0003	0.0010	0.0020	mg/L	0.04000	ND	119	80-120			
Matrix Spike Dup (B18K121-MSD1)			Source: 18J0401-15			Prepared & Analyzed: 29-Oct-2018						
Selenium	0.0478	0.0003	0.0010	0.0020	mg/L	0.04000	ND	120	80-120	0.646	20	
Reference (B18K121-SRM1)						Prepared & Analyzed: 29-Oct-2018						
Selenium	0.972	0.0015	0.0050	0.0100	mg/L	0.9170		106	80-120			
Batch B18L036 - Default Prep Metals												
Blank (B18L036-BLK1)						Prepared & Analyzed: 23-Oct-2018						
Chromium (VI)	ND	0.00030	0.00050	0.001	mg/L							U
LCS (B18L036-BS1)						Prepared & Analyzed: 23-Oct-2018						
Chromium (VI)	0.050	0.00030	0.00050	0.001	mg/L	0.05000		99.0	80-120			
Calibration Check (B18L036-CCV1)						Prepared & Analyzed: 23-Oct-2018						
Chromium (VI)	0.056	0.00030	0.00050	0.001	mg/L	0.05000		112	85-115			
Calibration Check (B18L036-CCV2)						Prepared & Analyzed: 23-Oct-2018						
Chromium (VI)	0.050	0.00030	0.00050	0.001	mg/L	0.05000		99.0	85-115			

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18L036 - Default Prep Metals												
Calibration Check (B18L036-CCV3)						Prepared & Analyzed: 23-Oct-2018						
Chromium (VI)	0.050	0.00030	0.00050	0.001	mg/L	0.05000		101	85-115			
Calibration Check (B18L036-CCV4)						Prepared & Analyzed: 23-Oct-2018						
Chromium (VI)	0.051	0.00030	0.00050	0.001	mg/L	0.05000		102	85-115			
Calibration Check (B18L036-CCV5)						Prepared & Analyzed: 23-Oct-2018						
Chromium (VI)	0.052	0.00030	0.00050	0.001	mg/L	0.05000		105	85-115			
Duplicate (B18L036-DUP1)			**Source: 18J0401-13**			Prepared & Analyzed: 23-Oct-2018						
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L		ND				20	U
Matrix Spike (B18L036-MS1)			**Source: 18J0401-13**			Prepared & Analyzed: 23-Oct-2018						
Chromium (VI)	0.053	0.00060	0.001	0.002	mg/L	0.05000	ND	106	80-120			
Matrix Spike Dup (B18L036-MSD1)			**Source: 18J0401-13**			Prepared & Analyzed: 23-Oct-2018						
Chromium (VI)	0.052	0.00060	0.001	0.002	mg/L	0.05000	ND	103	80-120	2.86	20	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0024 - B18K009												
Initial Cal Check (18K0024-ICV1)						Prepared & Analyzed: 19-Nov-2018						
Dissolved Organic Carbon	9.89				mg/L	10.00		98.9	90-110			
DOC rep1	9.81				mg/L	10.00		98.1	90-110			
DOC rep2	9.86				mg/L	10.00		98.6	90-110			
DOC rep3	9.95				mg/L	10.00		99.5	90-110			
DOC rep4	9.96				mg/L	10.00		99.6	90-110			
TOC rep1	9.81				mg/L	10.00		98.1	80-120			
TOC rep2	9.86				mg/L	10.00		98.6	80-120			
TOC rep3	9.95				mg/L	10.00		99.5	80-120			
TOC rep4	9.96				mg/L	10.00		99.6	80-120			
Total Organic Carbon	9.89				mg/L	10.00		98.9	80-120			
Batch B18J124 - Default Prep Metals												
Blank (B18J124-BLK1)						Prepared & Analyzed: 15-Oct-2018						
Sulfide	0.00970	0.00150	0.00500	0.0100	mg/L							J
LCS (B18J124-BS1)						Prepared & Analyzed: 15-Oct-2018						
Sulfide	0.484	0.00150	0.00500	0.0100	mg/L	0.5000		96.8	80-120			
Calibration Check (B18J124-CCV1)						Prepared & Analyzed: 15-Oct-2018						
Sulfide	0.547	0.00150	0.00500	0.0100	mg/L	0.5000		109	85-115			
Calibration Check (B18J124-CCV2)						Prepared & Analyzed: 15-Oct-2018						
Sulfide	0.495	0.00150	0.00500	0.0100	mg/L	0.5000		99.0	85-115			
Calibration Check (B18J124-CCV3)						Prepared & Analyzed: 15-Oct-2018						
Sulfide	0.498	0.00150	0.00500	0.0100	mg/L	0.5000		99.6	85-115			

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J124 - Default Prep Metals												
Duplicate (B18J124-DUP1)			**Source: 18J0401-14**			Prepared & Analyzed: 15-Oct-2018						
Sulfide	0.0182	0.00150	0.00500	0.0100	mg/L		0.0198			8.42	20	
Matrix Spike (B18J124-MS1)			**Source: 18J0401-14**			Prepared & Analyzed: 15-Oct-2018						
Sulfide	0.192	0.00150	0.00500	0.0100	mg/L	0.2000	0.0198	86.1	80-120			
Matrix Spike Dup (B18J124-MSD1)			**Source: 18J0401-14**			Prepared & Analyzed: 15-Oct-2018						
Sulfide	0.197	0.00150	0.00500	0.0100	mg/L	0.2000	0.0198	88.6	80-120	2.57	20	
Batch B18J214 - *												
Blank (B18J214-BLK1)						Prepared & Analyzed: 24-Oct-2018						
Sulfide	0.00646	0.00150	0.00500	0.0100	mg/L							J
LCS (B18J214-BS1)						Prepared & Analyzed: 24-Oct-2018						
Sulfide	0.194	0.00150	0.00500	0.0100	mg/L	0.2000		97.0	80-120			
Calibration Check (B18J214-CCV1)						Prepared & Analyzed: 24-Oct-2018						
Sulfide	0.192	0.00150	0.00500	0.0100	mg/L	0.2000		96.0	85-115			
Calibration Check (B18J214-CCV2)						Prepared & Analyzed: 24-Oct-2018						
Sulfide	0.496	0.00150	0.00500	0.0100	mg/L	0.5000		99.2	85-115			
Calibration Check (B18J214-CCV3)						Prepared & Analyzed: 24-Oct-2018						
Sulfide	0.495	0.00150	0.00500	0.0100	mg/L	0.5000		99.0	85-115			
Calibration Check (B18J214-CCV4)						Prepared & Analyzed: 24-Oct-2018						
Sulfide	0.492	0.00150	0.00500	0.0100	mg/L	0.5000		98.4	85-115			

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Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J214 - *												
Duplicate (B18J214-DUP1)			**Source: 18J0401-02**			Prepared & Analyzed: 24-Oct-2018						
Sulfide	0.00182	0.00150	0.00500	0.0100	mg/L		ND				20	J
Matrix Spike (B18J214-MS1)			**Source: 18J0401-02**			Prepared & Analyzed: 24-Oct-2018						
Sulfide	0.190	0.00150	0.00500	0.0100	mg/L	0.2000	ND	95.0	80-120			
Matrix Spike Dup (B18J214-MSD1)			**Source: 18J0401-02**			Prepared & Analyzed: 24-Oct-2018						
Sulfide	0.194	0.00150	0.00500	0.0100	mg/L	0.2000	ND	97.0	80-120	2.08	20	
Batch B18K009 - * DEFAULT PREP *** **												
Blank (B18K009-BLK1)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK2)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK3)						Prepared: 05-Nov-2018 Analyzed: 19-Nov-2018						
Dissolved Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *****												
Blank (B18K009-BLK4)						Prepared: 05-Nov-2018 Analyzed: 19-Nov-2018						
Dissolved Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK5)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Total Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK6)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Total Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK7)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Total Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK8)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	4.96E-5	3.50E-5	5.00E-5	1.00E-4	%							J
TOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep3	3.90E-5	3.50E-5	5.00E-5	1.00E-4	%							J
TOC rep4	3.87E-5	3.50E-5	5.00E-5	1.00E-4	%							J

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Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *****												
Blank (B18K009-BLK8)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Total Organic Carbon	4.04E-5	3.50E-5	5.00E-5	1.00E-4	%							J
LCS (B18K009-BS1)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	9.65E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		96.5	80-120			
DOC rep1	9.55E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		95.5	80-120			
DOC rep2	9.64E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		96.4	80-120			
DOC rep3	9.67E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		96.7	80-120			
DOC rep4	9.75E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		97.5	80-120			
LCS (B18K009-BS2)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	9.13E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		91.3	80-120			
DOC rep1	9.15E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		91.5	80-120			
DOC rep2	9.21E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		92.1	80-120			
DOC rep3	9.27E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		92.7	80-120			
DOC rep4	8.90E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		89.0	80-120			
LCS (B18K009-BS3)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	9.94E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		99.4	80-120			
TOC rep2	0.00101	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		101	80-120			
TOC rep3	0.00101	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		101	80-120			
TOC rep4	0.00101	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		101	80-120			
Total Organic Carbon	0.00101	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		101	80-120			
LCS (B18K009-BS4)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	9.67E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		96.7	80-120			
TOC rep2	9.73E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		97.3	80-120			
TOC rep3	9.76E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		97.6	80-120			
TOC rep4	9.74E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		97.4	80-120			
Total Organic Carbon	9.73E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		97.3	80-120			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *** **												
Calibration Check (B18K009-CCV1)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	4.97E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		99.4	90-110			
DOC rep1	4.84E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		96.8	90-110			
DOC rep2	4.94E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		98.8	90-110			
DOC rep3	5.05E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		101	90-110			
DOC rep4	5.01E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		100	90-110			
Calibration Check (B18K009-CCV2)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	5.03E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		101	90-110			
DOC rep1	4.87E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		97.4	90-110			
DOC rep2	4.89E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		97.8	90-110			
DOC rep3	4.95E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		99.0	90-110			
DOC rep4	5.42E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		108	90-110			
Calibration Check (B18K009-CCV3)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	5.08E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
DOC rep1	5.03E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		101	90-110			
DOC rep2	5.08E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
DOC rep3	5.11E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
DOC rep4	5.11E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
Calibration Check (B18K009-CCV4)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	5.16E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
DOC rep1	5.14E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
DOC rep2	5.14E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
DOC rep3	5.17E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
DOC rep4	5.20E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		104	90-110			
Calibration Check (B18K009-CCV5)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	5.11E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
TOC rep2	5.16E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
TOC rep3	5.18E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		104	90-110			
TOC rep4	5.27E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		105	90-110			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *****												
Calibration Check (B18K009-CCV5)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Total Organic Carbon	5.18E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		104	90-110			
Calibration Check (B18K009-CCV6)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	5.08E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
TOC rep2	5.16E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
TOC rep3	5.20E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		104	90-110			
TOC rep4	5.24E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		105	90-110			
Total Organic Carbon	5.17E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
Calibration Check (B18K009-CCV7)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	5.15E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
TOC rep2	5.21E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		104	90-110			
TOC rep3	5.27E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		105	90-110			
TOC rep4	5.42E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		108	90-110			
Total Organic Carbon	5.26E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		105	90-110			
Calibration Check (B18K009-CCV8)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	5.39E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		108	90-110			
TOC rep2	5.34E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		107	90-110			
TOC rep3	5.34E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		107	90-110			
TOC rep4	5.36E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		107	90-110			
Total Organic Carbon	5.36E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		107	90-110			
Duplicate (B18K009-DUP1)			**Source: 18J0401-13**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep1	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep2	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep3	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep4	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep1	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep2	ND	0.00350	0.00500	0.0100	%		0.00436				20	U
TOC rep3	ND	0.00350	0.00500	0.0100	%		ND				20	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *** **												
Duplicate (B18K009-DUP1)		**Source: 18J0401-13**				Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep4	ND	0.00350	0.00500	0.0100	%		ND				20	U
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%		ND				20	U
Duplicate (B18K009-DUP2)		**Source: 18J0403-12**				Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep1	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep2	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep3	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep4	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep1	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep2	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep3	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep4	0.00372	0.00350	0.00500	0.0100	%		0.00359			3.64	20	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%		ND				20	U
Matrix Spike (B18K009-MS1)		**Source: 18J0401-13**				Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	0.0951	0.00350	0.00500	0.0100	%	0.1000	ND	95.1	70-130			
DOC rep1	0.0942	0.00350	0.00500	0.0100	%	0.1000	ND	94.2	70-130			
DOC rep2	0.0948	0.00350	0.00500	0.0100	%	0.1000	ND	94.8	70-130			
DOC rep3	0.0953	0.00350	0.00500	0.0100	%	0.1000	ND	95.3	70-130			
DOC rep4	0.0960	0.00350	0.00500	0.0100	%	0.1000	ND	96.0	70-130			
Matrix Spike (B18K009-MS2)		**Source: 18J0403-12**				Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	0.0958	0.00350	0.00500	0.0100	%	0.1000	ND	95.8	70-130			
DOC rep1	0.0947	0.00350	0.00500	0.0100	%	0.1000	ND	94.7	70-130			
DOC rep2	0.0958	0.00350	0.00500	0.0100	%	0.1000	ND	95.8	70-130			
DOC rep3	0.0966	0.00350	0.00500	0.0100	%	0.1000	ND	96.6	70-130			
DOC rep4	0.0962	0.00350	0.00500	0.0100	%	0.1000	ND	96.2	70-130			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *** **												
Matrix Spike (B18K009-MS3)			**Source: 18J0401-13**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	0.0956	0.00350	0.00500	0.0100	%	0.1000	ND	95.6	70-130			
TOC rep2	0.0966	0.00350	0.00500	0.0100	%	0.1000	0.00436	92.2	70-130			
TOC rep3	0.0970	0.00350	0.00500	0.0100	%	0.1000	ND	97.0	70-130			
TOC rep4	0.0972	0.00350	0.00500	0.0100	%	0.1000	ND	97.2	70-130			
Total Organic Carbon	0.0966	0.00350	0.00500	0.0100	%	0.1000	ND	96.6	70-130			
Matrix Spike (B18K009-MS4)			**Source: 18J0403-12**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	0.0970	0.00350	0.00500	0.0100	%	0.1000	ND	97.0	70-130			
TOC rep2	0.0978	0.00350	0.00500	0.0100	%	0.1000	ND	97.8	70-130			
TOC rep3	0.0985	0.00350	0.00500	0.0100	%	0.1000	ND	98.5	70-130			
Total Organic Carbon	0.0978	0.00350	0.00500	0.0100	%	0.1000	ND	97.8	70-130			
Matrix Spike Dup (B18K009-MSD1)			**Source: 18J0401-13**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	0.0974	0.00350	0.00500	0.0100	%	0.1000	ND	97.4	70-130	2.39	20	
DOC rep1	0.0968	0.00350	0.00500	0.0100	%	0.1000	ND	96.8	70-130	2.72	20	
DOC rep2	0.0972	0.00350	0.00500	0.0100	%	0.1000	ND	97.2	70-130	2.50	20	
DOC rep3	0.0974	0.00350	0.00500	0.0100	%	0.1000	ND	97.4	70-130	2.18	20	
DOC rep4	0.0980	0.00350	0.00500	0.0100	%	0.1000	ND	98.0	70-130	2.06	20	
Matrix Spike Dup (B18K009-MSD2)			**Source: 18J0403-12**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	0.0931	0.00350	0.00500	0.0100	%	0.1000	ND	93.1	70-130	2.86	20	
DOC rep1	0.0925	0.00350	0.00500	0.0100	%	0.1000	ND	92.5	70-130	2.35	20	
DOC rep2	0.0934	0.00350	0.00500	0.0100	%	0.1000	ND	93.4	70-130	2.54	20	
DOC rep3	0.0932	0.00350	0.00500	0.0100	%	0.1000	ND	93.2	70-130	3.58	20	
DOC rep4	0.0933	0.00350	0.00500	0.0100	%	0.1000	ND	93.3	70-130	3.06	20	
Matrix Spike Dup (B18K009-MSD3)			**Source: 18J0401-13**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	0.0961	0.00350	0.00500	0.0100	%	0.1000	ND	96.1	70-130	0.522	20	
TOC rep2	0.0969	0.00350	0.00500	0.0100	%	0.1000	0.00436	92.5	70-130	0.310	20	
TOC rep3	0.0974	0.00350	0.00500	0.0100	%	0.1000	ND	97.4	70-130	0.412	20	
TOC rep4	0.0976	0.00350	0.00500	0.0100	%	0.1000	ND	97.6	70-130	0.411	20	
Total Organic Carbon	0.0970	0.00350	0.00500	0.0100	%	0.1000	ND	97.0	70-130	0.413	20	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *****												
Matrix Spike Dup (B18K009-MSD3)			**Source: 18J0401-13**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Matrix Spike Dup (B18K009-MSD4)			**Source: 18J0403-12**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	0.0972	0.00350	0.00500	0.0100	%	0.1000	ND	97.2	70-130	0.206	20	
TOC rep2	0.0981	0.00350	0.00500	0.0100	%	0.1000	ND	98.1	70-130	0.306	20	
TOC rep3	0.0987	0.00350	0.00500	0.0100	%	0.1000	ND	98.7	70-130	0.203	20	
TOC rep4	0.0984	0.00350	0.00500	0.0100	%	0.1000	0.00359	94.8	70-130		20	
Total Organic Carbon	0.0981	0.00350	0.00500	0.0100	%	0.1000	ND	98.1	70-130	0.306	20	
Reference (B18K009-SRM1)						Prepared: 05-Nov-2018 Analyzed: 19-Nov-2018						
Dissolved Organic Carbon	4.82E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		102	70-130			
DOC rep1	4.85E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		103	70-130			
DOC rep2	4.83E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		103	70-130			
DOC rep3	4.76E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		101	70-130			
DOC rep4	4.83E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		103	70-130			
TOC rep1	4.85E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		103	70-130			
TOC rep2	4.83E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		103	70-130			
TOC rep3	4.76E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		101	70-130			
Total Organic Carbon	4.82E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		102	70-130			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCV1)						Prepared & Analyzed: 14-Nov-2018						
4,4´-DDT	21.2				ug/L	20.00		106	85-150			
Aldrin	22.0				ug/L	20.00		110	85-150			
alpha-BHC	22.3				ug/L	20.00		112	85-150			
alpha-Chlordane	42.8				ug/L	40.00		107	85-150			
beta-BHC	20.5				ug/L	20.00		102	85-150			
cis-Nonachlor	21.1				ug/L	20.00		106	85-150			
delta-BHC	21.1				ug/L	20.00		106	85-150			
Dieldrin	21.7				ug/L	20.00		108	85-150			
Endosulfan I	44.4				ug/L	40.00		111	85-150			
Endosulfan II	21.2				ug/L	20.00		106	85-150			
Endosulfan sulfate	20.4				ug/L	20.00		102	85-150			
Endrin	21.5				ug/L	20.00		108	85-150			
Endrin aldehyde	21.1				ug/L	20.00		106	85-150			
Endrin ketone	19.7				ug/L	20.00		98.5	80-120			
gamma-BHC (Lindane)	20.1				ug/L	20.00		100	85-150			
gamma-Chlordane	21.1				ug/L	20.00		105	85-150			
Heptachlor	21.6				ug/L	20.00		108	85-150			
Heptachlor epoxide	20.8				ug/L	20.00		104	85-150			
Methoxychlor	20.6				ug/L	20.00		103	85-150			
Oxychlordane	20.4				ug/L	20.00		102	85-150			
trans-Nonachlor	42.8				ug/L	40.00		107	85-150			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*20.4*				*ug/L*	*20.00*		*102*	*85-115*			
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*21.1*				*ug/L*	*20.00*		*106*	*85-115*			
Calibration Check (18K0002-CCV2)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	305				ug/L	300.0		102	85-150			

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCV3)						Prepared & Analyzed: 15-Nov-2018						
4,4´-DDT	35.3				ug/L	20.00		176	80-120			
Aldrin	36.8				ug/L	20.00		184	80-120			
alpha-BHC	38.1				ug/L	20.00		190	80-120			
alpha-Chlordane	71.4				ug/L	40.00		179	80-120			
beta-BHC	34.7				ug/L	20.00		173	80-120			
cis-Nonachlor	35.1				ug/L	20.00		176	0-200			
delta-BHC	37.7				ug/L	20.00		189	80-120			
Dieldrin	36.8				ug/L	20.00		184	80-120			
Endosulfan I	35.0				ug/L	40.00		87.5	80-120			
Endosulfan II	74.2				ug/L	20.00		371	80-120			
Endosulfan sulfate	0.00				ug/L	20.00			80-120			U
Endrin	37.6				ug/L	20.00		188	80-120			
Endrin aldehyde	35.0				ug/L	20.00		175	80-120			
Endrin ketone	68.8				ug/L	20.00		344	80-120			
gamma-BHC (Lindane)	35.2				ug/L	20.00		176	80-120			
gamma-Chlordane	36.0				ug/L	20.00		180	80-120			
Heptachlor	37.9				ug/L	20.00		189	80-120			
Heptachlor epoxide	36.2				ug/L	20.00		181	80-120			
Methoxychlor	34.6				ug/L	20.00		173	80-120			
Oxychlordane	35.1				ug/L	20.00		175	0-200			
trans-Nonachlor	71.7				ug/L	40.00		179	0-200			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Calibration Check (18K0002-CCV4)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	309				ug/L	300.0		103	85-150			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCV5)						Prepared: 14-Nov-2018 Analyzed: 15-Nov-2018						
4,4´-DDT	20.0				ug/L	20.00		100	85-150			
Aldrin	21.3				ug/L	20.00		107	85-150			
alpha-BHC	22.0				ug/L	20.00		110	85-150			
alpha-Chlordane	41.4				ug/L	40.00		104	85-150			
beta-BHC	19.7				ug/L	20.00		98.7	85-150			
cis-Nonachlor	20.5				ug/L	20.00		102	85-150			
delta-BHC	21.9				ug/L	20.00		109	85-150			
Dieldrin	20.9				ug/L	20.00		104	85-150			
Endosulfan I	42.9				ug/L	40.00		107	85-150			
Endosulfan II	20.4				ug/L	20.00		102	85-150			
Endosulfan sulfate	20.5				ug/L	20.00		102	85-150			
Endrin	21.3				ug/L	20.00		106	85-150			
Endrin aldehyde	20.2				ug/L	20.00		101	85-150			
Endrin ketone	19.0				ug/L	20.00		95.0	80-120			
gamma-BHC (Lindane)	21.3				ug/L	20.00		106	85-150			
gamma-Chlordane	20.7				ug/L	20.00		103	85-150			
Heptachlor	20.9				ug/L	20.00		105	85-150			
Heptachlor epoxide	21.1				ug/L	20.00		105	85-150			
Methoxychlor	20.2				ug/L	20.00		101	85-150			
Oxychlordane	20.0				ug/L	20.00		100	85-150			
trans-Nonachlor	41.4				ug/L	40.00		104	85-150			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*19.8*				*ug/L*	*20.00*		*99.0*	*85-115*			
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*20.4*				*ug/L*	*20.00*		*102*	*85-115*			
Calibration Check (18K0002-CCV6)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	300				ug/L	300.0		100	85-150			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCV7)						Prepared: 14-Nov-2018 Analyzed: 15-Nov-2018						
4,4´-DDT	16.7				ug/L	20.00		83.3	85-150			CCV-L
Aldrin	17.4				ug/L	20.00		87.1	85-150			
alpha-BHC	17.9				ug/L	20.00		89.3	85-150			
alpha-Chlordane	34.2				ug/L	40.00		85.5	85-150			
beta-BHC	17.1				ug/L	20.00		85.5	85-150			
cis-Nonachlor	17.1				ug/L	20.00		85.5	85-150			
delta-BHC	17.3				ug/L	20.00		86.5	85-150			
Dieldrin	17.1				ug/L	20.00		85.7	85-150			
Endosulfan I	35.3				ug/L	40.00		88.2	85-150			
Endosulfan II	17.2				ug/L	20.00		86.0	85-150			
Endosulfan sulfate	17.9				ug/L	20.00		89.5	85-150			
Endrin	17.5				ug/L	20.00		87.4	85-150			
Endrin aldehyde	17.6				ug/L	20.00		87.9	85-150			
Endrin ketone	17.2				ug/L	20.00		86.0	80-120			
gamma-BHC (Lindane)	17.8				ug/L	20.00		88.9	85-150			
gamma-Chlordane	17.0				ug/L	20.00		85.2	85-150			
Heptachlor	17.2				ug/L	20.00		86.1	85-150			
Heptachlor epoxide	17.1				ug/L	20.00		85.6	85-150			
Methoxychlor	17.2				ug/L	20.00		86.0	85-150			
Oxychlordane	16.6				ug/L	20.00		82.9	85-150			CCV-L
trans-Nonachlor	34.2				ug/L	40.00		85.4	85-150			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*17.4*				*ug/L*	*20.00*		*87.0*	*85-115*			
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*17.1*				*ug/L*	*20.00*		*85.5*	*85-115*			
Calibration Check (18K0002-CCV8)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	262				ug/L	300.0		87.3	85-150			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCV9)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	0.00				ug/L	20.00			80-120			U
Aldrin	0.00				ug/L	20.00			80-120			U
alpha-BHC	0.00				ug/L	20.00			80-120			U
alpha-Chlordane	0.00				ug/L	40.00			80-120			U
beta-BHC	0.00				ug/L	20.00			80-120			U
cis-Nonachlor	0.00				ug/L	20.00			0-200			U
delta-BHC	0.00				ug/L	20.00			80-120			U
Dieldrin	0.00				ug/L	20.00			80-120			U
Endosulfan I	0.00				ug/L	40.00			80-120			U
Endosulfan II	0.00				ug/L	20.00			80-120			U
Endosulfan sulfate	0.00				ug/L	20.00			80-120			U
Endrin	0.00				ug/L	20.00			80-120			U
Endrin aldehyde	0.00				ug/L	20.00			80-120			U
Endrin ketone	0.00				ug/L	20.00			80-120			U
gamma-BHC (Lindane)	0.00				ug/L	20.00			80-120			U
gamma-Chlordane	0.00				ug/L	20.00			80-120			U
Heptachlor	0.00				ug/L	20.00			80-120			U
Heptachlor epoxide	0.00				ug/L	20.00			80-120			U
Methoxychlor	0.00				ug/L	20.00			80-120			U
Oxychlordane	0.00				ug/L	20.00			0-200			U
trans-Nonachlor	0.00				ug/L	40.00			0-200			U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Calibration Check (18K0002-CCVA)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	0.00				ug/L	300.0			80-120			U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCVB)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	0.00				ug/L	20.00			80-120			U
Aldrin	0.00				ug/L	20.00			80-120			U
alpha-BHC	0.00				ug/L	20.00			80-120			U
alpha-Chlordane	0.00				ug/L	40.00			80-120			U
beta-BHC	0.00				ug/L	20.00			80-120			U
cis-Nonachlor	0.00				ug/L	20.00			0-200			U
delta-BHC	0.00				ug/L	20.00			80-120			U
Dieldrin	0.00				ug/L	20.00			80-120			U
Endosulfan I	0.00				ug/L	40.00			80-120			U
Endosulfan II	0.00				ug/L	20.00			80-120			U
Endosulfan sulfate	0.00				ug/L	20.00			80-120			U
Endrin	0.00				ug/L	20.00			80-120			U
Endrin aldehyde	0.00				ug/L	20.00			80-120			U
Endrin ketone	0.00				ug/L	20.00			80-120			U
gamma-BHC (Lindane)	0.00				ug/L	20.00			80-120			U
gamma-Chlordane	0.00				ug/L	20.00			80-120			U
Heptachlor	0.00				ug/L	20.00			80-120			U
Heptachlor epoxide	0.00				ug/L	20.00			80-120			U
Methoxychlor	0.00				ug/L	20.00			80-120			U
Oxychlordane	0.00				ug/L	20.00			0-200			U
trans-Nonachlor	0.00				ug/L	40.00			0-200			U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Calibration Check (18K0002-CCVC)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	0.00				ug/L	300.0			80-120			U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCVD)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	0.00				ug/L	20.00			80-120			U
Aldrin	0.00				ug/L	20.00			80-120			U
alpha-BHC	0.00				ug/L	20.00			80-120			U
alpha-Chlordane	0.00				ug/L	40.00			80-120			U
beta-BHC	0.00				ug/L	20.00			80-120			U
cis-Nonachlor	0.00				ug/L	20.00			0-200			U
delta-BHC	0.00				ug/L	20.00			80-120			U
Dieldrin	0.00				ug/L	20.00			80-120			U
Endosulfan I	0.00				ug/L	40.00			80-120			U
Endosulfan II	0.00				ug/L	20.00			80-120			U
Endosulfan sulfate	0.00				ug/L	20.00			80-120			U
Endrin	0.00				ug/L	20.00			80-120			U
Endrin aldehyde	0.00				ug/L	20.00			80-120			U
Endrin ketone	0.00				ug/L	20.00			80-120			U
gamma-BHC (Lindane)	0.00				ug/L	20.00			80-120			U
gamma-Chlordane	0.00				ug/L	20.00			80-120			U
Heptachlor	0.00				ug/L	20.00			80-120			U
Heptachlor epoxide	0.00				ug/L	20.00			80-120			U
Methoxychlor	0.00				ug/L	20.00			80-120			U
Oxychlordane	0.00				ug/L	20.00			0-200			U
trans-Nonachlor	0.00				ug/L	40.00			0-200			U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Calibration Check (18K0002-CCVE)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	0.00				ug/L	300.0			80-120			U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Initial Cal Blank (18K0002-ICB1)					Prepared & Analyzed: 14-Nov-2018							
4,4´-DDT	0.00				ug/L							U
Aldrin	0.00				ug/L							U
alpha-BHC	0.00				ug/L							U
alpha-Chlordane	0.00				ug/L							U
beta-BHC	0.00				ug/L							U
cis-Nonachlor	0.00				ug/L							U
delta-BHC	0.00				ug/L							U
Dibutyl Chlorendate	0.00				ug/L				45-135			U
Dibutyl Chlorendate [2]	0.00				ug/L				45-135			U
Dieldrin	0.00				ug/L							U
Endosulfan I	0.00				ug/L							U
Endosulfan II	0.00				ug/L							U
Endosulfan sulfate	0.00				ug/L							U
Endrin	0.00				ug/L							U
Endrin aldehyde	0.00				ug/L							U
Endrin ketone	0.00				ug/L							U
gamma-BHC (Lindane)	0.00				ug/L							U
gamma-Chlordane	0.00				ug/L							U
Heptachlor	0.00				ug/L							U
Heptachlor epoxide	0.00				ug/L							U
Hexachlorobenzene [2]	0.00				ug/L							U
Hexachlorocyclopentadiene (2C	0.00				ug/L							U
Methoxychlor	0.00				ug/L							U
Oxychlordane	0.00				ug/L							U
Toxaphene	0.00				ug/L							U
trans-Nonachlor	0.00				ug/L							U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.00*				*ug/L*				*30-125*			*Z-03, U*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Initial Cal Blank (18K0002-ICB1)						Prepared & Analyzed: 14-Nov-2018						
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*				*40-135*			*U*
Surrogate: PCB 198	*0.00*				*ug/L*				*30-125*			*Z-03, U*
Initial Cal Check (18K0002-ICV1)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	20.2				ug/L	20.00		101	80-120			
Aldrin	21.5				ug/L	20.00		108	80-120			
alpha-BHC	21.7				ug/L	20.00		108	80-120			
alpha-Chlordane	40.2				ug/L	40.00		100	80-120			
beta-BHC	19.0				ug/L	20.00		95.0	80-120			
cis-Nonachlor	19.7				ug/L	20.00		98.5	80-120			
delta-BHC	25.4				ug/L	20.00		127	80-120			Q
Dieldrin	21.5				ug/L	20.00		108	80-120			
Endosulfan I	42.7				ug/L	40.00		107	80-120			
Endosulfan II	19.5				ug/L	20.00		97.5	80-120			
Endosulfan sulfate	20.1				ug/L	20.00		100	80-120			
Endrin	21.8				ug/L	20.00		109	80-120			
Endrin aldehyde	19.8				ug/L	20.00		99.0	80-120			
Endrin ketone	19.1				ug/L	20.00		95.5	80-120			Q
gamma-BHC (Lindane)	21.0				ug/L	20.00		105	80-120			
gamma-Chlordane	19.6				ug/L	20.00		98.0	80-120			
Heptachlor	19.9				ug/L	20.00		99.5	80-120			
Heptachlor epoxide	21.0				ug/L	20.00		105	80-120			
Methoxychlor	19.6				ug/L	20.00		98.0	80-120			
Oxychlordane	19.1				ug/L	20.00		95.5	80-120			
trans-Nonachlor	40.2				ug/L	40.00		100	80-120			
Initial Cal Check (18K0002-ICV2)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	0.00				ug/L	300.0			80-120			U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Initial Cal Check (18K0002-ICV3)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	0.00				ug/L	300.0			80-120			Z-03, U
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCVC)						Prepared: 13-Nov-2018 Analyzed: 30-Nov-2018						
4,4´-DDD	24.1				ng/mL	20.00		121	85-115			CCV-HA
4,4´-DDE	51.3				ng/mL	40.00		128	85-115			CCV-HA
4,4´-DDT	24.3				ng/mL	20.00		122	85-115			CCV-HA
Aldrin	25.1				ng/mL	20.00		126	85-115			CCV-HA
alpha-BHC	26.1				ng/mL	20.00		130	85-115			CCV-HA
alpha-Chlordane	48.6				ng/mL	40.00		121	85-115			CCV-HA
beta-BHC	24.0				ng/mL	20.00		120	85-115			CCV-HA
cis-Nonachlor	23.8				ng/mL	20.00		119	85-115			CCV-HA
delta-BHC	25.3				ng/mL	20.00		126	85-115			CCV-HA
Dieldrin	24.4				ng/mL	20.00		122	85-115			CCV-HA
Endosulfan I	51.3				ng/mL	40.00		128	85-115			CCV-HA
Endosulfan II	23.7				ng/mL	20.00		118	85-115			CCV-HA
Endosulfan sulfate	23.5				ng/mL	20.00		118	85-115			CCV-HA
Endrin	24.8				ng/mL	20.00		124	85-115			CCV-HA
Endrin aldehyde	23.8				ng/mL	20.00		119	85-115			CCV-HA
Endrin ketone	24.0				ng/mL	20.00		120	85-115			CCV-HA
gamma-BHC (Lindane)	26.0				ng/mL	20.00		130	85-115			CCV-HA
gamma-Chlordane	24.4				ng/mL	20.00		122	85-115			CCV-HA
Heptachlor	25.3				ng/mL	20.00		127	85-115			CCV-HA
Heptachlor epoxide	24.2				ng/mL	20.00		121	85-115			CCV-HA
Methoxychlor	20.8				ng/mL	20.00		104	85-115			
Oxychlordane	23.8				ng/mL	20.00		119	85-115			CCV-HA
trans-Nonachlor	48.6				ng/mL	40.00		121	85-115			CCV-HA
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*23.8*				*ng/mL*	*20.00*		*119*	*85-115*			*CCV-HA*
Surrogate: PCB 198	*22.2*				*ng/mL*	*20.00*		*111*	*85-115*			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCVD)						Prepared: 13-Nov-2018 Analyzed: 01-Dec-2018						
4,4´-DDD	17.9				ng/mL	20.00		89.5	85-115			
4,4´-DDE	38.5				ng/mL	40.00		96.3	85-115			
4,4´-DDT	19.0				ng/mL	20.00		95.2	85-115			
Aldrin	17.8				ng/mL	20.00		89.2	85-115			
alpha-BHC	18.8				ng/mL	20.00		94.0	85-115			
alpha-Chlordane	36.8				ng/mL	40.00		91.9	85-115			
beta-BHC	17.2				ng/mL	20.00		86.1	85-115			
cis-Nonachlor	18.1				ng/mL	20.00		90.4	85-115			
delta-BHC	17.9				ng/mL	20.00		89.5	85-115			
Dieldrin	18.7				ng/mL	20.00		93.3	85-115			
Endosulfan I	38.5				ng/mL	40.00		96.2	85-115			
Endosulfan II	18.2				ng/mL	20.00		91.0	85-115			
Endosulfan sulfate	17.7				ng/mL	20.00		88.5	85-115			
Endrin	18.6				ng/mL	20.00		93.2	85-115			
Endrin aldehyde	17.9				ng/mL	20.00		89.5	85-115			
Endrin ketone	18.1				ng/mL	20.00		90.6	85-115			
gamma-BHC (Lindane)	18.7				ng/mL	20.00		93.3	85-115			
gamma-Chlordane	18.3				ng/mL	20.00		91.3	85-115			
Heptachlor	17.5				ng/mL	20.00		87.5	85-115			
Heptachlor epoxide	18.2				ng/mL	20.00		91.0	85-115			
Methoxychlor	17.8				ng/mL	20.00		89.0	85-115			
Oxychlordane	17.2				ng/mL	20.00		86.0	85-115			
trans-Nonachlor	36.8				ng/mL	40.00		91.9	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*18.2*				*ng/mL*	*20.00*		*90.8*	*85-115*			
Surrogate: PCB 198	*17.2*				*ng/mL*	*20.00*		*86.2*	*85-115*			
Calibration Check (18K0025-CCVE)						Prepared: 13-Nov-2018 Analyzed: 30-Nov-2018						
Toxaphene	277				ng/mL	300.0		92.3	85-115			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCVF)						Prepared: 13-Nov-2018 Analyzed: 20-Nov-2018						
Toxaphene	288				ng/mL	300.0		96.0	85-115			
Initial Cal Check (18K0025-ICV4)						Prepared: 13-Nov-2018 Analyzed: 30-Nov-2018						
4,4′-DDD	20.8				ng/mL	20.00		104	80-120			
4,4′-DDE	43.9				ng/mL	40.00		110	80-120			
4,4′-DDT	21.3				ng/mL	20.00		106	80-120			
Aldrin	22.7				ng/mL	20.00		113	80-120			
alpha-BHC	22.4				ng/mL	20.00		112	80-120			
alpha-Chlordane	41.3				ng/mL	40.00		103	80-120			
beta-BHC	19.7				ng/mL	20.00		98.3	80-120			
cis-Nonachlor	20.2				ng/mL	20.00		101	80-120			
delta-BHC	26.8				ng/mL	20.00		134	80-120			Q
Dieldrin	21.9				ng/mL	20.00		110	80-120			
Endosulfan I	43.8				ng/mL	40.00		110	80-120			
Endosulfan II	20.0				ng/mL	20.00		100	80-120			
Endosulfan sulfate	21.2				ng/mL	20.00		106	80-120			
Endrin	22.4				ng/mL	20.00		112	80-120			
Endrin aldehyde	19.5				ng/mL	20.00		97.4	80-120			
Endrin ketone	10.2				ng/mL	20.00		51.0	80-120			Q
gamma-BHC (Lindane)	21.4				ng/mL	20.00		107	80-120			
gamma-Chlordane	20.2				ng/mL	20.00		101	80-120			
Heptachlor	20.5				ng/mL	20.00		103	80-120			
Heptachlor epoxide	21.4				ng/mL	20.00		107	80-120			
Methoxychlor	17.5				ng/mL	20.00		87.4	80-120			
Oxychlordane	19.6				ng/mL	20.00		97.9	80-120			
trans-Nonachlor	41.3				ng/mL	40.00		103	80-120			
Initial Cal Check (18K0025-ICV5)						Prepared: 13-Nov-2018 Analyzed: 20-Nov-2018						
4,4′-DDD	18.0				ng/mL	20.00		89.8	80-120			
4,4′-DDE	37.0				ng/mL	40.00		92.6	80-120			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Initial Cal Check (18K0025-ICV5)						Prepared: 13-Nov-2018 Analyzed: 20-Nov-2018						
4,4´-DDT	17.1				ng/mL	20.00		85.3	80-120			
Aldrin	18.9				ng/mL	20.00		94.5	80-120			
alpha-BHC	19.0				ng/mL	20.00		94.9	80-120			
alpha-Chlordane	35.5				ng/mL	40.00		88.6	80-120			
beta-BHC	16.7				ng/mL	20.00		83.7	80-120			
delta-BHC	22.2				ng/mL	20.00		111	80-120			
Dieldrin	18.7				ng/mL	20.00		93.7	80-120			
Endosulfan I	37.1				ng/mL	40.00		92.8	80-120			
Endosulfan II	16.8				ng/mL	20.00		84.0	80-120			
Endosulfan sulfate	17.7				ng/mL	20.00		88.5	80-120			
Endrin	19.2				ng/mL	20.00		95.8	80-120			
Endrin aldehyde	17.0				ng/mL	20.00		85.0	80-120			
Endrin ketone	8.58				ng/mL	20.00		42.9	80-120			Q
gamma-BHC (Lindane)	18.8				ng/mL	20.00		94.1	80-120			
gamma-Chlordane	17.2				ng/mL	20.00		86.0	80-120			
Heptachlor	17.5				ng/mL	20.00		87.6	80-120			
Heptachlor epoxide	18.6				ng/mL	20.00		92.8	80-120			
Methoxychlor	18.1				ng/mL	20.00		90.3	80-120			
Batch B18J159 - EPA 3510C												
Blank (B18J159-BLK1)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	ND	0.0005	0.001	0.005	ug/L							U
Aldrin	ND	0.0005	0.001	0.005	ug/L							U
alpha-BHC	ND	0.0004	0.001	0.005	ug/L							U
alpha-Chlordane	ND	0.00080	0.001	0.005	ug/L							U
beta-BHC	ND	0.0007	0.001	0.005	ug/L							U
cis-Nonachlor	ND	0.0004	0.001	0.005	ug/L							U
delta-BHC	ND	0.0004	0.001	0.005	ug/L							U
Dieldrin	ND	0.0005	0.001	0.005	ug/L							U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
Blank (B18J159-BLK1)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
Endosulfan I	ND	0.001	0.001	0.005	ug/L							U
Endosulfan II	ND	0.0003	0.001	0.005	ug/L							U
Endosulfan sulfate	ND	0.0005	0.001	0.005	ug/L							U
Endrin	ND	0.0007	0.001	0.005	ug/L							U
Endrin aldehyde	ND	0.00040	0.001	0.005	ug/L							U
Endrin ketone	ND	0.0007	0.001	0.005	ug/L							U
gamma-BHC (Lindane)	ND	0.0005	0.001	0.005	ug/L							U
gamma-Chlordane	ND	0.0005	0.001	0.005	ug/L							U
Heptachlor	ND	0.0006	0.001	0.005	ug/L							U
Heptachlor epoxide	ND	0.0005	0.001	0.005	ug/L							U
Methoxychlor	ND	0.0008	0.001	0.005	ug/L							U
Oxychlordane	ND	0.0007	0.001	0.005	ug/L							U
Toxaphene	ND	0.049	0.066	0.200	ug/L							U
trans-Nonachlor	ND	0.0006	0.001	0.005	ug/L							U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0444*				*ug/L*	*0.1200*		*37.0*	*30-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-150*			*U*
Surrogate: PCB 198	*0.0952*				*ug/L*	*0.1200*		*79.3*	*30-125*			
LCS (B18J159-BS1)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Aldrin	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
alpha-BHC	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
alpha-Chlordane	ND	0.00080	0.001	0.005	ug/L				50-150		30	U
beta-BHC	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
cis-Nonachlor	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
delta-BHC	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
Dieldrin	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Endosulfan I	ND	0.001	0.001	0.005	ug/L				50-150		30	U
Endosulfan II	ND	0.0003	0.001	0.005	ug/L				50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
LCS (B18J159-BS1)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
Endosulfan sulfate	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Endrin	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
Endrin aldehyde	ND	0.00040	0.001	0.005	ug/L				50-150		30	U
Endrin ketone	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
gamma-BHC (Lindane)	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
gamma-Chlordane	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Heptachlor	ND	0.0006	0.001	0.005	ug/L				50-150		30	U
Heptachlor epoxide	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Methoxychlor	ND	0.0008	0.001	0.005	ug/L				50-150		30	U
Oxychlordane	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
Toxaphene	ND	0.049	0.066	0.200	ug/L				50-150		30	U
trans-Nonachlor	ND	0.0006	0.001	0.005	ug/L				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/L*	*0.1200*			*25-150*			*U*
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*ND*				*ug/L*	*0.1200*			*30-120*			*U*
LCS (B18J159-BS2)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	0.110	0.0005	0.001	0.005	ug/L	0.1200		91.7	50-150		30	
Aldrin	0.076	0.0005	0.001	0.005	ug/L	0.1200		63.3	50-150		30	
alpha-BHC	0.095	0.0004	0.001	0.005	ug/L	0.1200		79.3	50-150		30	
alpha-Chlordane	0.187	0.00080	0.001	0.005	ug/L	0.2400		77.8	50-150		30	
beta-BHC	0.090	0.0007	0.001	0.005	ug/L	0.1200		75.0	50-150		30	
cis-Nonachlor	0.106	0.0004	0.001	0.005	ug/L	0.1200		88.3	50-150		30	
delta-BHC	0.113	0.0004	0.001	0.005	ug/L	0.1200		94.0	50-150		30	
Dieldrin	0.104	0.0005	0.001	0.005	ug/L	0.1200		87.0	50-150		30	
Endosulfan I	0.188	0.001	0.001	0.005	ug/L	0.2400		78.3	50-150		30	
Endosulfan II	0.107	0.0003	0.001	0.005	ug/L	0.1200		89.3	50-150		30	
Endosulfan sulfate	0.103	0.0005	0.001	0.005	ug/L	0.1200		85.7	50-150		30	
Endrin	0.104	0.0007	0.001	0.005	ug/L	0.1200		86.7	50-150		30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
LCS (B18J159-BS2)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
Endrin aldehyde	0.103	0.00040	0.001	0.005	ug/L	0.1200		86.0	50-150		30	
Endrin ketone	0.060	0.0007	0.001	0.005	ug/L	0.1200		50.0	50-150		30	
gamma-BHC (Lindane)	0.091	0.0005	0.001	0.005	ug/L	0.1200		75.7	50-150		30	
gamma-Chlordane	0.098	0.0005	0.001	0.005	ug/L	0.1200		81.3	50-150		30	
Heptachlor	0.088	0.0006	0.001	0.005	ug/L	0.1200		73.0	50-150		30	
Heptachlor epoxide	0.096	0.0005	0.001	0.005	ug/L	0.1200		80.3	50-150		30	
Methoxychlor	0.103	0.0008	0.001	0.005	ug/L	0.1200		85.7	50-150		30	
Oxychlordane	0.090	0.0007	0.001	0.005	ug/L	0.1200		75.0	50-150		30	
Toxaphene	ND	0.049	0.066	0.200	ug/L				50-150		30	U
trans-Nonachlor	0.186	0.0006	0.001	0.005	ug/L	0.2400		77.7	50-150		30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0556*				*ug/L*	*0.1200*		*46.3*	*25-150*			
Surrogate: Decachlorobiphenyl	*0.0960*				*ug/L*				*30-120*			
Surrogate: PCB 198	*0.114*				*ug/L*	*0.1200*		*95.0*	*30-120*			
LCS (B18J159-BS3)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Aldrin	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
alpha-BHC	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
alpha-Chlordane	ND	0.00080	0.001	0.005	ug/L				50-150		30	U
beta-BHC	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
cis-Nonachlor	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
delta-BHC	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
Dieldrin	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Endosulfan I	ND	0.001	0.001	0.005	ug/L				50-150		30	U
Endosulfan II	ND	0.0003	0.001	0.005	ug/L				50-150		30	U
Endosulfan sulfate	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Endrin	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
Endrin aldehyde	ND	0.00040	0.001	0.005	ug/L				50-150		30	U
Endrin ketone	ND	0.0007	0.001	0.005	ug/L				50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
LCS (B18J159-BS3)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
gamma-BHC (Lindane)	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
gamma-Chlordane	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Heptachlor	ND	0.0006	0.001	0.005	ug/L				50-150		30	U
Heptachlor epoxide	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Methoxychlor	ND	0.0008	0.001	0.005	ug/L				50-150		30	U
Oxychlordane	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
Toxaphene	0.712	0.049	0.066	0.200	ug/L	1.200		59.3	50-150		30	
trans-Nonachlor	ND	0.0006	0.001	0.005	ug/L				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0640*				*ug/L*	*0.1200*		*53.3*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.0976*				*ug/L*	*0.1200*		*81.3*	*30-120*			
LCS Dup (B18J159-BSD1)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Aldrin	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
alpha-BHC	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
alpha-Chlordane	ND	0.00080	0.001	0.005	ug/L				50-150		30	U
beta-BHC	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
cis-Nonachlor	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
delta-BHC	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
Dieldrin	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Endosulfan I	ND	0.001	0.001	0.005	ug/L				50-150		30	U
Endosulfan II	ND	0.0003	0.001	0.005	ug/L				50-150		30	U
Endosulfan sulfate	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Endrin	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
Endrin aldehyde	ND	0.00040	0.001	0.005	ug/L				50-150		30	U
Endrin ketone	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
gamma-BHC (Lindane)	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
gamma-Chlordane	ND	0.0005	0.001	0.005	ug/L				50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
LCS Dup (B18J159-BSD1)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
Heptachlor	ND	0.0006	0.001	0.005	ug/L				50-150		30	U
Heptachlor epoxide	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Methoxychlor	ND	0.0008	0.001	0.005	ug/L				50-150		30	U
Oxychlordane	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
Toxaphene	ND	0.049	0.066	0.200	ug/L				50-150		30	U
trans-Nonachlor	ND	0.0006	0.001	0.005	ug/L				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/L*	*0.1200*			*25-150*			*U*
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*ND*				*ug/L*	*0.1200*			*30-120*			*U*
LCS Dup (B18J159-BSD2)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	0.120	0.0005	0.001	0.005	ug/L	0.1200		100	50-150	8.70	30	
Aldrin	0.087	0.0005	0.001	0.005	ug/L	0.1200		72.7	50-150	13.7	30	
alpha-BHC	0.101	0.0004	0.001	0.005	ug/L	0.1200		84.3	50-150	6.11	30	
alpha-Chlordane	0.201	0.00080	0.001	0.005	ug/L	0.2400		83.7	50-150	7.22	30	
beta-BHC	0.096	0.0007	0.001	0.005	ug/L	0.1200		80.3	50-150	6.87	30	
cis-Nonachlor	0.114	0.0004	0.001	0.005	ug/L	0.1200		94.7	50-150	6.92	30	
delta-BHC	0.106	0.0004	0.001	0.005	ug/L	0.1200		88.3	50-150	6.22	30	
Dieldrin	0.113	0.0005	0.001	0.005	ug/L	0.1200		94.0	50-150	7.73	30	
Endosulfan I	0.203	0.001	0.001	0.005	ug/L	0.2400		84.7	50-150	7.77	30	
Endosulfan II	0.114	0.0003	0.001	0.005	ug/L	0.1200		95.3	50-150	6.50	30	
Endosulfan sulfate	0.110	0.0005	0.001	0.005	ug/L	0.1200		91.7	50-150	6.77	30	
Endrin	0.114	0.0007	0.001	0.005	ug/L	0.1200		95.0	50-150	9.17	30	
Endrin aldehyde	0.111	0.00040	0.001	0.005	ug/L	0.1200		92.7	50-150	7.46	30	
Endrin ketone	0.063	0.0007	0.001	0.005	ug/L	0.1200		52.7	50-150	5.19	30	
gamma-BHC (Lindane)	0.098	0.0005	0.001	0.005	ug/L	0.1200		81.3	50-150	7.22	30	
gamma-Chlordane	0.106	0.0005	0.001	0.005	ug/L	0.1200		88.3	50-150	8.25	30	
Heptachlor	0.097	0.0006	0.001	0.005	ug/L	0.1200		81.0	50-150	10.4	30	
Heptachlor epoxide	0.102	0.0005	0.001	0.005	ug/L	0.1200		84.7	50-150	5.25	30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
LCS Dup (B18J159-BSD2)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
Methoxychlor	0.112	0.0008	0.001	0.005	ug/L	0.1200		93.3	50-150	8.57	30	
Oxychlordane	0.098	0.0007	0.001	0.005	ug/L	0.1200		82.0	50-150	8.92	30	
Toxaphene	ND	0.049	0.066	0.200	ug/L				50-150		30	U
trans-Nonachlor	0.201	0.0006	0.001	0.005	ug/L	0.2400		83.7	50-150	7.44	30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0632*				*ug/L*	*0.1200*		*52.7*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.124*				*ug/L*	*0.1200*		*104*	*30-120*			
LCS Dup (B18J159-BSD3)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Aldrin	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
alpha-BHC	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
alpha-Chlordane	ND	0.00080	0.001	0.005	ug/L				50-150		30	U
beta-BHC	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
cis-Nonachlor	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
delta-BHC	ND	0.0004	0.001	0.005	ug/L				50-150		30	U
Dieldrin	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Endosulfan I	ND	0.001	0.001	0.005	ug/L				50-150		30	U
Endosulfan II	ND	0.0003	0.001	0.005	ug/L				50-150		30	U
Endosulfan sulfate	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Endrin	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
Endrin aldehyde	ND	0.00040	0.001	0.005	ug/L				50-150		30	U
Endrin ketone	ND	0.0007	0.001	0.005	ug/L				50-150		30	U
gamma-BHC (Lindane)	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
gamma-Chlordane	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Heptachlor	ND	0.0006	0.001	0.005	ug/L				50-150		30	U
Heptachlor epoxide	ND	0.0005	0.001	0.005	ug/L				50-150		30	U
Methoxychlor	ND	0.0008	0.001	0.005	ug/L				50-150		30	U
Oxychlordane	ND	0.0007	0.001	0.005	ug/L				50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
LCS Dup (B18J159-BSD3)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
Toxaphene	0.844	0.049	0.066	0.200	ug/L	1.200		70.3	50-150	17.0	30	
trans-Nonachlor	ND	0.0006	0.001	0.005	ug/L				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0784*				*ug/L*	*0.1200*		*65.3*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.114*				*ug/L*	*0.1200*		*95.0*	*30-120*			
Duplicate (B18J159-DUP1)			**Source: 18I2007-08**			Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
4,4′-DDT	ND	0.001	0.002	0.010	ug/L		ND				30	U
Aldrin	ND	0.001	0.002	0.010	ug/L		ND				30	U
alpha-BHC	ND	0.0009	0.002	0.010	ug/L		ND				30	U
alpha-Chlordane	ND	0.002	0.002	0.010	ug/L		ND				30	U
beta-BHC	ND	0.001	0.002	0.010	ug/L		ND				30	U
cis-Nonachlor	ND	0.0009	0.002	0.010	ug/L		ND				30	U
delta-BHC	ND	0.0009	0.002	0.010	ug/L		ND				30	U
Dieldrin	ND	0.001	0.002	0.010	ug/L		ND				30	U
Endosulfan I	ND	0.002	0.002	0.010	ug/L		ND				30	U
Endosulfan II	ND	0.0006	0.002	0.010	ug/L		ND				30	U
Endosulfan sulfate	ND	0.001	0.002	0.010	ug/L		ND				30	U
Endrin	ND	0.001	0.002	0.010	ug/L		ND				30	U
Endrin aldehyde	ND	0.00080	0.002	0.010	ug/L		ND				30	U
Endrin ketone	ND	0.001	0.002	0.010	ug/L		ND				30	U
gamma-BHC (Lindane)	ND	0.001	0.002	0.010	ug/L		ND				30	U
gamma-Chlordane	ND	0.001	0.002	0.010	ug/L		ND				30	U
Heptachlor	ND	0.001	0.002	0.010	ug/L		ND				30	U
Heptachlor epoxide	ND	0.001	0.002	0.010	ug/L		ND				30	U
Methoxychlor	ND	0.002	0.002	0.010	ug/L		ND				30	U
Oxychlordane	ND	0.001	0.002	0.010	ug/L		ND				30	U
Toxaphene	ND	0.098	0.133	0.400	ug/L		ND				30	U
trans-Nonachlor	ND	0.001	0.002	0.010	ug/L		ND				30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
Duplicate (B18J159-DUP1)		**Source: 18I2007-08**			Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018							
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0632*				*ug/L*	*0.1200*		*52.7*	*30-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-150*			*U*
Surrogate: PCB 198	*0.108*				*ug/L*	*0.1200*		*90.0*	*30-125*			
Matrix Spike (B18J159-MS1)		**Source: 18I2007-08**			Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018							
4,4´-DDT	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
Aldrin	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
alpha-BHC	ND	0.0009	0.002	0.010	ug/L		ND		50-150	30		U
alpha-Chlordane	ND	0.002	0.002	0.010	ug/L		ND		50-150	30		U
beta-BHC	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
cis-Nonachlor	ND	0.0009	0.002	0.010	ug/L		ND		50-150	30		U
delta-BHC	ND	0.0009	0.002	0.010	ug/L		ND		50-150	30		U
Dieldrin	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
Endosulfan I	ND	0.002	0.002	0.010	ug/L		ND		50-150	30		U
Endosulfan II	ND	0.0006	0.002	0.010	ug/L		ND		50-150	30		U
Endosulfan sulfate	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
Endrin	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
Endrin aldehyde	ND	0.00080	0.002	0.010	ug/L		ND		50-150	30		U
Endrin ketone	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
gamma-BHC (Lindane)	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
gamma-Chlordane	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
Heptachlor	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
Heptachlor epoxide	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
Methoxychlor	ND	0.002	0.002	0.010	ug/L		ND		50-150	30		U
Oxychlordane	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
Toxaphene	ND	0.098	0.133	0.400	ug/L		ND		50-150	30		U
trans-Nonachlor	ND	0.001	0.002	0.010	ug/L		ND		50-150	30		U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/L*	*0.2400*			*25-150*			*U*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
Matrix Spike (B18J159-MS1)		**Source: 18I2007-08**				Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*ND*				*ug/L*	*0.2400*			*30-120*			*U*
Matrix Spike (B18J159-MS2)		**Source: 18I2007-08**				Prepared: 18-Oct-2018 Analyzed: 18-Nov-2018						
4,4´-DDT	0.197	0.002	0.005	0.020	ug/L	0.2400	ND	82.1	50-150		30	
Aldrin	0.148	0.002	0.005	0.020	ug/L	0.2400	ND	61.8	50-150		30	
alpha-BHC	0.183	0.002	0.005	0.020	ug/L	0.2400	ND	76.3	50-150		30	
alpha-Chlordane	0.338	0.003	0.005	0.020	ug/L	0.4800	ND	70.5	50-150		30	
beta-BHC	0.179	0.003	0.005	0.020	ug/L	0.2400	ND	74.5	50-150		30	
cis-Nonachlor	0.198	0.002	0.005	0.020	ug/L	0.2400	ND	82.4	50-150		30	
delta-BHC	0.172	0.002	0.005	0.020	ug/L	0.2400	ND	71.7	50-150		30	
Dieldrin	0.179	0.002	0.005	0.020	ug/L	0.2400	ND	74.7	50-150		30	
Endosulfan I	0.341	0.004	0.005	0.020	ug/L	0.4800	ND	71.0	50-150		30	
Endosulfan II	0.186	0.001	0.005	0.020	ug/L	0.2400	ND	77.7	50-150		30	
Endosulfan sulfate	0.190	0.002	0.005	0.020	ug/L	0.2400	ND	79.3	50-150		30	
Endrin	0.191	0.003	0.005	0.020	ug/L	0.2400	ND	79.7	50-150		30	
Endrin aldehyde	0.189	0.002	0.005	0.020	ug/L	0.2400	ND	78.8	50-150		30	
Endrin ketone	0.108	0.003	0.005	0.020	ug/L	0.2400	ND	44.9	50-150		30	QM-07
gamma-BHC (Lindane)	0.161	0.002	0.005	0.020	ug/L	0.2400	ND	67.0	50-150		30	
gamma-Chlordane	0.176	0.002	0.005	0.020	ug/L	0.2400	ND	73.2	50-150		30	
Heptachlor	0.168	0.002	0.005	0.020	ug/L	0.2400	ND	70.0	50-150		30	
Heptachlor epoxide	0.174	0.002	0.005	0.020	ug/L	0.2400	ND	72.6	50-150		30	
Methoxychlor	0.197	0.003	0.005	0.020	ug/L	0.2400	ND	82.2	50-150		30	
Oxychlordane	0.177	0.003	0.005	0.020	ug/L	0.2400	ND	73.7	50-150		30	
Toxaphene	ND	0.098	0.133	0.400	ug/L		ND		50-150		30	U
trans-Nonachlor	0.338	0.002	0.005	0.020	ug/L	0.4800	ND	70.4	50-150		30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.117*				*ug/L*	*0.2400*		*48.6*	*25-150*			
Surrogate: Decachlorobiphenyl	*3.34*				*ug/L*				*30-120*			
Surrogate: PCB 198	*0.215*				*ug/L*	*0.2400*		*89.7*	*30-120*			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
Matrix Spike (B18J159-MS3)		**Source: 18I2007-08**				Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Aldrin	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
alpha-BHC	ND	0.0009	0.002	0.010	ug/L		ND		50-150		30	U
alpha-Chlordane	ND	0.002	0.002	0.010	ug/L		ND		50-150		30	U
beta-BHC	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
cis-Nonachlor	ND	0.0009	0.002	0.010	ug/L		ND		50-150		30	U
delta-BHC	ND	0.0009	0.002	0.010	ug/L		ND		50-150		30	U
Dieldrin	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Endosulfan I	ND	0.002	0.002	0.010	ug/L		ND		50-150		30	U
Endosulfan II	ND	0.0006	0.002	0.010	ug/L		ND		50-150		30	U
Endosulfan sulfate	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Endrin	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Endrin aldehyde	ND	0.00080	0.002	0.010	ug/L		ND		50-150		30	U
Endrin ketone	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
gamma-Chlordane	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Heptachlor	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Heptachlor epoxide	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Methoxychlor	ND	0.002	0.002	0.010	ug/L		ND		50-150		30	U
Oxychlordane	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Toxaphene	1.33	0.195	0.266	0.800	ug/L	2.400	ND	55.3	50-150		30	
trans-Nonachlor	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0984*				*ug/L*	*0.2400*		*41.0*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.136*				*ug/L*	*0.2400*		*56.7*	*30-120*			
Matrix Spike Dup (B18J159-MSD1)		**Source: 18I2007-08**				Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Aldrin	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
Matrix Spike Dup (B18J159-MSD1)		**Source: 18I2007-08**				Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
alpha-BHC	ND	0.0009	0.002	0.010	ug/L		ND		50-150		30	U
alpha-Chlordane	ND	0.002	0.002	0.010	ug/L		ND		50-150		30	U
beta-BHC	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
cis-Nonachlor	ND	0.0009	0.002	0.010	ug/L		ND		50-150		30	U
delta-BHC	ND	0.0009	0.002	0.010	ug/L		ND		50-150		30	U
Dieldrin	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Endosulfan I	ND	0.002	0.002	0.010	ug/L		ND		50-150		30	U
Endosulfan II	ND	0.0006	0.002	0.010	ug/L		ND		50-150		30	U
Endosulfan sulfate	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Endrin	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Endrin aldehyde	ND	0.00080	0.002	0.010	ug/L		ND		50-150		30	U
Endrin ketone	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
gamma-Chlordane	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Heptachlor	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Heptachlor epoxide	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Methoxychlor	ND	0.002	0.002	0.010	ug/L		ND		50-150		30	U
Oxychlordane	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Toxaphene	ND	0.098	0.133	0.400	ug/L		ND		50-150		30	U
trans-Nonachlor	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/L*	*0.2400*			*25-150*			*U*
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*ND*				*ug/L*	*0.2400*			*30-120*			*U*
Matrix Spike Dup (B18J159-MSD2)		**Source: 18I2007-08**				Prepared: 18-Oct-2018 Analyzed: 18-Nov-2018						
4,4´-DDT	0.202	0.002	0.005	0.020	ug/L	0.2400	ND	84.4	50-150	2.76	30	
Aldrin	0.151	0.002	0.005	0.020	ug/L	0.2400	ND	62.9	50-150	1.87	30	
alpha-BHC	0.187	0.002	0.005	0.020	ug/L	0.2400	ND	77.8	50-150	1.96	30	
alpha-Chlordane	0.343	0.003	0.005	0.020	ug/L	0.4800	ND	71.5	50-150	1.40	30	

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
Matrix Spike Dup (B18J159-MSD2)		**Source: 18I2007-08**				Prepared: 18-Oct-2018 Analyzed: 18-Nov-2018						
beta-BHC	0.169	0.003	0.005	0.020	ug/L	0.2400	ND	70.3	50-150	5.82	30	
cis-Nonachlor	0.204	0.002	0.005	0.020	ug/L	0.2400	ND	85.0	50-150	3.02	30	
delta-BHC	0.175	0.002	0.005	0.020	ug/L	0.2400	ND	73.0	50-150	1.84	30	
Dieldrin	0.187	0.002	0.005	0.020	ug/L	0.2400	ND	77.9	50-150	4.22	30	
Endosulfan I	0.346	0.004	0.005	0.020	ug/L	0.4800	ND	72.0	50-150	1.40	30	
Endosulfan II	0.189	0.001	0.005	0.020	ug/L	0.2400	ND	78.7	50-150	1.28	30	
Endosulfan sulfate	0.194	0.002	0.005	0.020	ug/L	0.2400	ND	81.0	50-150	2.08	30	
Endrin	0.195	0.003	0.005	0.020	ug/L	0.2400	ND	81.2	50-150	1.82	30	
Endrin aldehyde	0.193	0.002	0.005	0.020	ug/L	0.2400	ND	80.2	50-150	1.83	30	
Endrin ketone	0.113	0.003	0.005	0.020	ug/L	0.2400	ND	47.0	50-150	4.50	30	QM-07
gamma-BHC (Lindane)	0.164	0.002	0.005	0.020	ug/L	0.2400	ND	68.1	50-150	1.67	30	
gamma-Chlordane	0.178	0.002	0.005	0.020	ug/L	0.2400	ND	74.4	50-150	1.54	30	
Heptachlor	0.172	0.002	0.005	0.020	ug/L	0.2400	ND	71.8	50-150	2.52	30	
Heptachlor epoxide	0.178	0.002	0.005	0.020	ug/L	0.2400	ND	74.1	50-150	2.12	30	
Methoxychlor	0.220	0.003	0.005	0.020	ug/L	0.2400	ND	91.6	50-150	10.9	30	
Oxychlordane	0.179	0.003	0.005	0.020	ug/L	0.2400	ND	74.5	50-150	1.04	30	
Toxaphene	ND	0.098	0.133	0.400	ug/L		ND		50-150		30	U
trans-Nonachlor	0.343	0.002	0.005	0.020	ug/L	0.4800	ND	71.4	50-150	1.40	30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.119*				*ug/L*	*0.2400*		*49.4*	*25-150*			
Surrogate: Decachlorobiphenyl	*2.79*				*ug/L*				*30-120*			
Surrogate: PCB 198	*0.218*				*ug/L*	*0.2400*		*90.9*	*30-120*			
Matrix Spike Dup (B18J159-MSD3)		**Source: 18I2007-08**				Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Aldrin	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
alpha-BHC	ND	0.0009	0.002	0.010	ug/L		ND		50-150		30	U
alpha-Chlordane	ND	0.002	0.002	0.010	ug/L		ND		50-150		30	U
beta-BHC	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
cis-Nonachlor	ND	0.0009	0.002	0.010	ug/L		ND		50-150		30	U

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)
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Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J159 - EPA 3510C												
Matrix Spike Dup (B18J159-MSD3)		**Source: 18I2007-08**				Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
delta-BHC	ND	0.0009	0.002	0.010	ug/L		ND		50-150		30	U
Dieldrin	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Endosulfan I	ND	0.002	0.002	0.010	ug/L		ND		50-150		30	U
Endosulfan II	ND	0.0006	0.002	0.010	ug/L		ND		50-150		30	U
Endosulfan sulfate	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Endrin	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Endrin aldehyde	ND	0.00080	0.002	0.010	ug/L		ND		50-150		30	U
Endrin ketone	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
gamma-Chlordane	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Heptachlor	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Heptachlor epoxide	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Methoxychlor	ND	0.002	0.002	0.010	ug/L		ND		50-150		30	U
Oxychlordane	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Toxaphene	1.26	0.195	0.266	0.800	ug/L	2.400	ND	52.7	50-150	4.94	30	
trans-Nonachlor	ND	0.001	0.002	0.010	ug/L		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.106*				*ug/L*	*0.2400*		*44.3*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.140*				*ug/L*	*0.2400*		*58.3*	*30-120*			
Reference (B18J159-SRM1)						Prepared: 18-Oct-2018 Analyzed: 21-Nov-2018						
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/L*	*0.1200*			*30-150*			*U*
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-150*			*U*
Surrogate: PCB 198	*ND*				*ug/L*	*0.1200*			*30-125*			*U*
Batch B18J226 - EPA 3510C												
Blank (B18J226-BLK1)						Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018						
4,4´-DDT	ND	0.0008	0.002	0.007	ug/L							U
Aldrin	ND	0.0007	0.002	0.007	ug/L							U

USACE ERDC-EP-C
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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Blank (B18J226-BLK1)						Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018						
alpha-BHC	ND	0.0007	0.002	0.007	ug/L							U
alpha-Chlordane	ND	0.001	0.002	0.007	ug/L							U
beta-BHC	ND	0.001	0.002	0.007	ug/L							U
cis-Nonachlor	ND	0.0007	0.002	0.007	ug/L							U
delta-BHC	ND	0.0007	0.002	0.007	ug/L							U
Dieldrin	ND	0.0007	0.002	0.007	ug/L							U
Endosulfan I	ND	0.001	0.002	0.007	ug/L							U
Endosulfan II	ND	0.0005	0.002	0.007	ug/L							U
Endosulfan sulfate	ND	0.0007	0.002	0.007	ug/L							U
Endrin	ND	0.001	0.002	0.007	ug/L							U
Endrin aldehyde	ND	0.00060	0.002	0.007	ug/L							U
Endrin ketone	ND	0.001	0.002	0.007	ug/L							U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.007	ug/L							U
gamma-Chlordane	ND	0.0007	0.002	0.007	ug/L							U
Heptachlor	ND	0.0008	0.002	0.007	ug/L							U
Heptachlor epoxide	ND	0.0007	0.002	0.007	ug/L							U
Methoxychlor	ND	0.001	0.002	0.007	ug/L							U
Oxychlordane	ND	0.001	0.002	0.007	ug/L							U
Toxaphene	ND	0.073	0.100	0.300	ug/L							U
trans-Nonachlor	ND	0.0008	0.002	0.007	ug/L							U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0735*				*ug/L*	*0.1000*		*73.5*	*30-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-150*			*U*
Surrogate: PCB 198	*0.102*				*ug/L*	*0.1200*		*85.0*	*30-125*			
LCS (B18J226-BS1)						Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018						
4,4′-DDT	0.098	0.0008	0.002	0.007	ug/L	0.1200		81.8	50-150		30	
Aldrin	0.077	0.0007	0.002	0.007	ug/L	0.1200		63.9	50-150		30	
alpha-BHC	0.088	0.0007	0.002	0.007	ug/L	0.1200		73.4	50-150		30	
alpha-Chlordane	0.166	0.001	0.002	0.007	ug/L	0.2400		69.3	50-150		30	

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)
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Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
LCS (B18J226-BS1)						Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018						
beta-BHC	0.078	0.001	0.002	0.007	ug/L	0.1200		65.2	50-150		30	
cis-Nonachlor	0.097	0.0007	0.002	0.007	ug/L	0.1200		80.8	50-150		30	
delta-BHC	0.087	0.0007	0.002	0.007	ug/L	0.1200		72.8	50-150		30	
Dieldrin	0.092	0.0007	0.002	0.007	ug/L	0.1200		77.0	50-150		30	
Endosulfan I	0.167	0.001	0.002	0.007	ug/L	0.2400		69.5	50-150		30	
Endosulfan II	0.098	0.0005	0.002	0.007	ug/L	0.1200		81.5	50-150		30	
Endosulfan sulfate	0.100	0.0007	0.002	0.007	ug/L	0.1200		83.0	50-150		30	
Endrin	0.099	0.001	0.002	0.007	ug/L	0.1200		82.8	50-150		30	
Endrin aldehyde	0.093	0.00060	0.002	0.007	ug/L	0.1200		77.4	50-150		30	
Endrin ketone	0.083	0.001	0.002	0.007	ug/L	0.1200		69.0	50-150		30	
gamma-BHC (Lindane)	0.082	0.0008	0.002	0.007	ug/L	0.1200		68.0	50-150		30	
gamma-Chlordane	0.090	0.0007	0.002	0.007	ug/L	0.1200		74.8	50-150		30	
Heptachlor	0.083	0.0008	0.002	0.007	ug/L	0.1200		69.3	50-150		30	
Heptachlor epoxide	0.091	0.0007	0.002	0.007	ug/L	0.1200		75.4	50-150		30	
Methoxychlor	0.103	0.001	0.002	0.007	ug/L	0.1200		85.7	50-150		30	
Oxychlordane	0.082	0.001	0.002	0.007	ug/L	0.1200		68.6	50-150		30	
Toxaphene	ND	0.073	0.100	0.300	ug/L				50-150		30	U
trans-Nonachlor	0.166	0.0008	0.002	0.007	ug/L	0.2400		69.3	50-150		30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0673*				*ug/L*	*0.1000*		*67.3*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.108*				*ug/L*	*0.1200*		*89.7*	*30-120*			
LCS (B18J226-BS2)						Prepared: 26-Oct-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Aldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-Chlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U
beta-BHC	ND	0.001	0.002	0.007	ug/L				50-150		30	U
cis-Nonachlor	ND	0.0007	0.002	0.007	ug/L				50-150		30	U

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
LCS (B18J226-BS2)						Prepared: 26-Oct-2018 Analyzed: 17-Nov-2018						
delta-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Dieldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Endosulfan I	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Endosulfan II	ND	0.0005	0.002	0.007	ug/L				50-150		30	U
Endosulfan sulfate	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Endrin	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Endrin aldehyde	ND	0.00060	0.002	0.007	ug/L				50-150		30	U
Endrin ketone	ND	0.001	0.002	0.007	ug/L				50-150		30	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
gamma-Chlordane	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Heptachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Heptachlor epoxide	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Methoxychlor	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Oxychlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Toxaphene	0.960	0.073	0.100	0.300	ug/L	1.200		80.0	50-150		30	
trans-Nonachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0630*				*ug/L*	*0.1000*		*63.0*	*25-150*			
Surrogate: Decachlorobiphenyl	*0.0942*				*ug/L*				*30-120*			
Surrogate: PCB 198	*0.0942*				*ug/L*	*0.1200*		*78.5*	*30-120*			
LCS (B18J226-BS3)						Prepared: 26-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Aldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-Chlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U
beta-BHC	ND	0.001	0.002	0.007	ug/L				50-150		30	U
cis-Nonachlor	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
delta-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Dieldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U

USACE ERDC-EP-C
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
LCS (B18J226-BS3)						Prepared: 26-Oct-2018 Analyzed: 21-Nov-2018						
Endosulfan I	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Endosulfan II	ND	0.0005	0.002	0.007	ug/L				50-150		30	U
Endosulfan sulfate	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Endrin	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Endrin aldehyde	ND	0.00060	0.002	0.007	ug/L				50-150		30	U
Endrin ketone	ND	0.001	0.002	0.007	ug/L				50-150		30	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
gamma-Chlordane	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Heptachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Heptachlor epoxide	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Methoxychlor	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Oxychlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Toxaphene	ND	0.073	0.100	0.300	ug/L				50-150		30	U
trans-Nonachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/L*	*0.1000*			*25-150*			*U*
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*ND*				*ug/L*	*0.1200*			*30-120*			*U*
LCS Dup (B18J226-BSD1)						Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018						
4,4´-DDT	0.102	0.0008	0.002	0.007	ug/L	0.1200		85.0	50-150	3.82	30	
Aldrin	0.078	0.0007	0.002	0.007	ug/L	0.1200		65.3	50-150	2.14	30	
alpha-BHC	0.091	0.0007	0.002	0.007	ug/L	0.1200		75.7	50-150	3.05	30	
alpha-Chlordane	0.173	0.001	0.002	0.007	ug/L	0.2400		72.1	50-150	3.86	30	
beta-BHC	0.082	0.001	0.002	0.007	ug/L	0.1200		68.4	50-150	4.84	30	
cis-Nonachlor	0.102	0.0007	0.002	0.007	ug/L	0.1200		85.3	50-150	5.45	30	
delta-BHC	0.092	0.0007	0.002	0.007	ug/L	0.1200		76.7	50-150	5.23	30	
Dieldrin	0.096	0.0007	0.002	0.007	ug/L	0.1200		80.4	50-150	4.31	30	
Endosulfan I	0.174	0.001	0.002	0.007	ug/L	0.2400		72.5	50-150	4.23	30	
Endosulfan II	0.102	0.0005	0.002	0.007	ug/L	0.1200		85.0	50-150	4.20	30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
LCS Dup (B18J226-BSD1)						Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018						
Endosulfan sulfate	0.106	0.0007	0.002	0.007	ug/L	0.1200		88.0	50-150	5.85	30	
Endrin	0.100	0.001	0.002	0.007	ug/L	0.1200		83.6	50-150	0.859	30	
Endrin aldehyde	0.101	0.00060	0.002	0.007	ug/L	0.1200		84.3	50-150	8.50	30	
Endrin ketone	0.089	0.001	0.002	0.007	ug/L	0.1200		74.5	50-150	7.67	30	
gamma-BHC (Lindane)	0.086	0.0008	0.002	0.007	ug/L	0.1200		72.1	50-150	5.79	30	
gamma-Chlordane	0.091	0.0007	0.002	0.007	ug/L	0.1200		76.2	50-150	1.84	30	
Heptachlor	0.087	0.0008	0.002	0.007	ug/L	0.1200		72.4	50-150	4.31	30	
Heptachlor epoxide	0.094	0.0007	0.002	0.007	ug/L	0.1200		78.2	50-150	3.65	30	
Methoxychlor	0.109	0.001	0.002	0.007	ug/L	0.1200		90.9	50-150	5.94	30	
Oxychlordane	0.086	0.001	0.002	0.007	ug/L	0.1200		71.8	50-150	4.62	30	
Toxaphene	ND	0.073	0.100	0.300	ug/L				50-150		30	U
trans-Nonachlor	0.173	0.0008	0.002	0.007	ug/L	0.2400		72.1	50-150	3.86	30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0672*				*ug/L*	*0.1000*		*67.2*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.113*				*ug/L*	*0.1200*		*94.5*	*30-120*			
LCS Dup (B18J226-BSD2)						Prepared: 26-Oct-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Aldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-Chlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U
beta-BHC	ND	0.001	0.002	0.007	ug/L				50-150		30	U
cis-Nonachlor	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
delta-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Dieldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Endosulfan I	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Endosulfan II	ND	0.0005	0.002	0.007	ug/L				50-150		30	U
Endosulfan sulfate	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Endrin	ND	0.001	0.002	0.007	ug/L				50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
LCS Dup (B18J226-BSD2)						Prepared: 26-Oct-2018 Analyzed: 17-Nov-2018						
Endrin aldehyde	ND	0.00060	0.002	0.007	ug/L				50-150		30	U
Endrin ketone	ND	0.001	0.002	0.007	ug/L				50-150		30	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
gamma-Chlordane	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Heptachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Heptachlor epoxide	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Methoxychlor	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Oxychlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Toxaphene	1.06	0.073	0.100	0.300	ug/L	1.200		88.0	50-150	9.52	30	
trans-Nonachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0600*				*ug/L*	*0.1000*		*60.0*	*25-150*			
Surrogate: Decachlorobiphenyl	*0.0852*				*ug/L*				*30-120*			
Surrogate: PCB 198	*0.0852*				*ug/L*	*0.1200*		*71.0*	*30-120*			
LCS Dup (B18J226-BSD3)						Prepared: 26-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Aldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-Chlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U
beta-BHC	ND	0.001	0.002	0.007	ug/L				50-150		30	U
cis-Nonachlor	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
delta-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Dieldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Endosulfan I	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Endosulfan II	ND	0.0005	0.002	0.007	ug/L				50-150		30	U
Endosulfan sulfate	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Endrin	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Endrin aldehyde	ND	0.00060	0.002	0.007	ug/L				50-150		30	U
Endrin ketone	ND	0.001	0.002	0.007	ug/L				50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
LCS Dup (B18J226-BSD3)						Prepared: 26-Oct-2018 Analyzed: 21-Nov-2018						
gamma-BHC (Lindane)	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
gamma-Chlordane	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Heptachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Heptachlor epoxide	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Methoxychlor	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Oxychlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Toxaphene	ND	0.073	0.100	0.300	ug/L				50-150		30	U
trans-Nonachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/L*	*0.1000*			*25-150*			*U*
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*ND*				*ug/L*	*0.1200*			*30-120*			*U*
Duplicate (B18J226-DUP1)						**Source: 18J0401-13**	Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018					
4,4´-DDT	ND	0.0008	0.002	0.007	ug/L		ND				30	U
Aldrin	ND	0.0007	0.002	0.007	ug/L		ND				30	U
alpha-BHC	ND	0.0007	0.002	0.007	ug/L		ND				30	U
alpha-Chlordane	ND	0.001	0.002	0.007	ug/L		ND				30	U
beta-BHC	ND	0.001	0.002	0.007	ug/L		ND				30	U
cis-Nonachlor	ND	0.0007	0.002	0.007	ug/L		ND				30	U
delta-BHC	0.019	0.0007	0.002	0.007	ug/L		ND				30	
Dieldrin	ND	0.0007	0.002	0.007	ug/L		ND				30	U
Endosulfan I	ND	0.001	0.002	0.007	ug/L		ND				30	U
Endosulfan II	ND	0.0005	0.002	0.007	ug/L		ND				30	U
Endosulfan sulfate	ND	0.0007	0.002	0.007	ug/L		ND				30	U
Endrin	ND	0.001	0.002	0.007	ug/L		ND				30	U
Endrin aldehyde	ND	0.00060	0.002	0.007	ug/L		ND				30	U
Endrin ketone	ND	0.001	0.002	0.007	ug/L		ND				30	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.007	ug/L		ND				30	U
gamma-Chlordane	ND	0.0007	0.002	0.007	ug/L		ND				30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Duplicate (B18J226-DUP1)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018						
Heptachlor	ND	0.0008	0.002	0.007	ug/L		ND				30	U
Heptachlor epoxide	ND	0.0007	0.002	0.007	ug/L		ND				30	U
Methoxychlor	ND	0.001	0.002	0.007	ug/L		ND				30	U
Oxychlordane	0.043	0.001	0.002	0.007	ug/L		ND				30	
Toxaphene	ND	0.073	0.100	0.300	ug/L		ND				30	U
trans-Nonachlor	ND	0.0008	0.002	0.007	ug/L		ND				30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0625*				*ug/L*	*0.1000*		*62.5*	*30-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-150*			*U*
Surrogate: PCB 198	*0.0822*				*ug/L*	*0.1200*		*68.5*	*30-125*			
Matrix Spike (B18J226-MS1)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018						
4,4´-DDT	0.274	0.002	0.004	0.015	ug/L	0.2400	ND	114	50-150		30	
Aldrin	0.157	0.001	0.004	0.015	ug/L	0.2400	ND	65.4	50-150		30	
alpha-BHC	0.194	0.001	0.004	0.015	ug/L	0.2400	ND	80.7	50-150		30	
alpha-Chlordane	0.369	0.002	0.004	0.015	ug/L	0.4800	ND	76.9	50-150		30	
beta-BHC	0.179	0.002	0.004	0.015	ug/L	0.2400	ND	74.7	50-150		30	
cis-Nonachlor	0.206	0.001	0.004	0.015	ug/L	0.2400	ND	85.7	50-150		30	
delta-BHC	0.189	0.001	0.004	0.015	ug/L	0.2400	ND	78.7	50-150		30	
Dieldrin	0.191	0.001	0.004	0.015	ug/L	0.2400	ND	79.8	50-150		30	
Endosulfan I	0.349	0.003	0.004	0.015	ug/L	0.4800	ND	72.8	50-150		30	
Endosulfan II	0.205	0.001	0.004	0.015	ug/L	0.2400	ND	85.5	50-150		30	
Endosulfan sulfate	0.205	0.001	0.004	0.015	ug/L	0.2400	ND	85.5	50-150		30	
Endrin	0.199	0.002	0.004	0.015	ug/L	0.2400	ND	82.8	50-150		30	
Endrin aldehyde	0.204	0.001	0.004	0.015	ug/L	0.2400	ND	85.2	50-150		30	
Endrin ketone	0.185	0.002	0.004	0.015	ug/L	0.2400	ND	77.0	50-150		30	
gamma-BHC (Lindane)	0.181	0.002	0.004	0.015	ug/L	0.2400	ND	75.6	50-150		30	
gamma-Chlordane	0.191	0.001	0.004	0.015	ug/L	0.2400	ND	79.5	50-150		30	
Heptachlor	0.171	0.002	0.004	0.015	ug/L	0.2400	ND	71.2	50-150		30	
Heptachlor epoxide	0.194	0.001	0.004	0.015	ug/L	0.2400	ND	81.0	50-150		30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Matrix Spike (B18J226-MS1)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018						
Methoxychlor	0.221	0.003	0.004	0.015	ug/L	0.2400	ND	92.3	50-150		30	
Oxychlordane	0.209	0.002	0.004	0.015	ug/L	0.2400	ND	87.1	50-150		30	
Toxaphene	ND	0.146	0.199	0.600	ug/L		ND		50-150		30	U
trans-Nonachlor	0.369	0.002	0.004	0.015	ug/L	0.4800	ND	76.9	50-150		30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.142*				*ug/L*	*0.2000*		*70.8*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.220*				*ug/L*	*0.2400*		*91.9*	*30-120*			
Matrix Spike (B18J226-MS2)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Aldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-Chlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
beta-BHC	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
cis-Nonachlor	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
delta-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Dieldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan I	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan II	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan sulfate	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Endrin aldehyde	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin ketone	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
gamma-Chlordane	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor epoxide	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Methoxychlor	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Oxychlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Matrix Spike (B18J226-MS2)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 17-Nov-2018						
Toxaphene	2.46	0.146	0.199	0.600	ug/L	2.400	ND	102	50-150		30	
trans-Nonachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.139*				*ug/L*	*0.2000*		*69.6*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.192*				*ug/L*	*0.2400*		*80.0*	*30-120*			
Matrix Spike (B18J226-MS3)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 21-Nov-2018						
4,4′-DDT	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Aldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-Chlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
beta-BHC	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
cis-Nonachlor	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
delta-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Dieldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan I	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan II	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan sulfate	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Endrin aldehyde	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin ketone	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
gamma-Chlordane	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor epoxide	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Methoxychlor	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Oxychlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Toxaphene	ND	0.146	0.199	0.600	ug/L		ND		50-150		30	U
trans-Nonachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Matrix Spike (B18J226-MS3)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 21-Nov-2018						
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/L*	*0.2000*			*25-150*			*U*
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*ND*				*ug/L*	*0.2400*			*30-120*			*U*
Matrix Spike Dup (B18J226-MSD1)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018						
4,4′-DDT	0.290	0.002	0.004	0.015	ug/L	0.2400	ND	121	50-150	5.61	30	
Aldrin	0.150	0.001	0.004	0.015	ug/L	0.2400	ND	62.7	50-150	4.15	30	
alpha-BHC	0.183	0.001	0.004	0.015	ug/L	0.2400	ND	76.4	50-150	5.52	30	
alpha-Chlordane	0.356	0.002	0.004	0.015	ug/L	0.4800	ND	74.2	50-150	3.66	30	
beta-BHC	0.176	0.002	0.004	0.015	ug/L	0.2400	ND	73.5	50-150	1.69	30	
cis-Nonachlor	0.202	0.001	0.004	0.015	ug/L	0.2400	ND	84.1	50-150	1.85	30	
delta-BHC	0.169	0.001	0.004	0.015	ug/L	0.2400	ND	70.5	50-150	11.0	30	
Dieldrin	0.185	0.001	0.004	0.015	ug/L	0.2400	ND	77.1	50-150	3.42	30	
Endosulfan I	0.342	0.003	0.004	0.015	ug/L	0.4800	ND	71.2	50-150	2.08	30	
Endosulfan II	0.194	0.001	0.004	0.015	ug/L	0.2400	ND	81.0	50-150	5.41	30	
Endosulfan sulfate	0.200	0.001	0.004	0.015	ug/L	0.2400	ND	83.5	50-150	2.37	30	
Endrin	0.195	0.002	0.004	0.015	ug/L	0.2400	ND	81.1	50-150	2.09	30	
Endrin aldehyde	0.200	0.001	0.004	0.015	ug/L	0.2400	ND	83.2	50-150	2.41	30	
Endrin ketone	0.186	0.002	0.004	0.015	ug/L	0.2400	ND	77.5	50-150	0.647	30	
gamma-BHC (Lindane)	0.171	0.002	0.004	0.015	ug/L	0.2400	ND	71.4	50-150	5.71	30	
gamma-Chlordane	0.186	0.001	0.004	0.015	ug/L	0.2400	ND	77.3	50-150	2.81	30	
Heptachlor	0.180	0.002	0.004	0.015	ug/L	0.2400	ND	75.0	50-150	5.20	30	
Heptachlor epoxide	0.194	0.001	0.004	0.015	ug/L	0.2400	ND	80.8	50-150	0.210	30	
Methoxychlor	0.213	0.003	0.004	0.015	ug/L	0.2400	ND	89.0	50-150	3.67	30	
Oxychlordane	0.178	0.002	0.004	0.015	ug/L	0.2400	ND	74.2	50-150	16.1	30	
Toxaphene	ND	0.146	0.199	0.600	ug/L		ND		50-150		30	U
trans-Nonachlor	0.356	0.002	0.004	0.015	ug/L	0.4800	ND	74.2	50-150	3.66	30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.145*				*ug/L*	*0.2000*		*72.7*	*25-150*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Matrix Spike Dup (B18J226-MSD1)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 15-Nov-2018						
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.214*				*ug/L*	*0.2400*		*89.3*	*30-120*			
Matrix Spike Dup (B18J226-MSD2)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Aldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-Chlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
beta-BHC	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
cis-Nonachlor	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
delta-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Dieldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan I	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan II	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan sulfate	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Endrin aldehyde	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin ketone	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
gamma-Chlordane	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor epoxide	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Methoxychlor	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Oxychlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Toxaphene	2.39	0.146	0.199	0.600	ug/L	2.400	ND	99.5	50-150	2.97	30	
trans-Nonachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.137*				*ug/L*	*0.2000*		*68.4*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.198*				*ug/L*	*0.2400*		*82.5*	*30-120*			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Matrix Spike Dup (B18J226-MSD3)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 21-Nov-2018						
4,4´-DDT	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Aldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-Chlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
beta-BHC	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
cis-Nonachlor	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
delta-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Dieldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan I	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan II	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan sulfate	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Endrin aldehyde	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin ketone	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
gamma-Chlordane	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor epoxide	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Methoxychlor	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Oxychlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Toxaphene	ND	0.146	0.199	0.600	ug/L		ND		50-150		30	U
trans-Nonachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/L*	*0.2000*			*25-150*			*U*
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*ND*				*ug/L*	*0.2400*			*30-120*			*U*
Reference (B18J226-SRM1)						Prepared: 26-Oct-2018 Analyzed: 17-Nov-2018						
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/L*	*0.1000*			*30-150*			*U*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Reference (B18J226-SRM1)	Prepared: 26-Oct-2018 Analyzed: 17-Nov-2018											
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-150*			*U*
Surrogate: PCB 198	*ND*				*ug/L*	*0.1200*			*30-125*			*U*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Nutrients - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J111 - *												
Blank (B18J111-BLK1)						Prepared: 15-Oct-2018 Analyzed: 16-Oct-2018						
Ammonia as N	0.00570	0.00440	0.00500	0.0100	mg/L							J
LCS (B18J111-BS1)						Prepared: 15-Oct-2018 Analyzed: 16-Oct-2018						
Ammonia as N	0.0941	0.00440	0.00500	0.0100	mg/L	0.1000		94.1	80-120			
Calibration Check (B18J111-CCV1)						Prepared: 15-Oct-2018 Analyzed: 16-Oct-2018						
Ammonia as N	0.401	0.00440	0.00500	0.0100	mg/L	0.4000		100	90-110			
Calibration Check (B18J111-CCV2)						Prepared: 15-Oct-2018 Analyzed: 16-Oct-2018						
Ammonia as N	0.495	0.00440	0.00500	0.0100	mg/L	0.5000		99.0	90-110			
Calibration Check (B18J111-CCV3)						Prepared: 15-Oct-2018 Analyzed: 16-Oct-2018						
Ammonia as N	0.502	0.00440	0.00500	0.0100	mg/L	0.5000		100	90-110			
Duplicate (B18J111-DUP1)			**Source: 18J0401-14**			Prepared: 15-Oct-2018 Analyzed: 16-Oct-2018						
Ammonia as N	ND	0.00880	0.0100	0.0200	mg/L		ND				30	U
Matrix Spike (B18J111-MS1)			**Source: 18J0401-14**			Prepared: 15-Oct-2018 Analyzed: 16-Oct-2018						
Ammonia as N	0.182	0.00880	0.0100	0.0200	mg/L	0.2000	ND	91.0	80-120			
Matrix Spike Dup (B18J111-MSD1)			**Source: 18J0401-14**			Prepared: 15-Oct-2018 Analyzed: 16-Oct-2018						
Ammonia as N	0.182	0.00880	0.0100	0.0200	mg/L	0.2000	ND	91.0	80-120	0.00	30	
Reference (B18J111-SRM1)						Prepared: 15-Oct-2018 Analyzed: 13-Dec-2018						
Ammonia as N	1.01	0.00440	0.00500	0.0100	mg/L	1.000		101	80-120			
Batch B18J221 - *												
Blank (B18J221-BLK1)						Prepared & Analyzed: 25-Oct-2018						
Ammonia as N, filtered	ND	0.00440	0.00500	0.0100	mg/L							U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Nutrients - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J221 - *												
LCS (B18J221-BS1)						Prepared & Analyzed: 25-Oct-2018						
Ammonia as N, filtered	0.107	0.00440	0.00500	0.0100	mg/L	0.1000		107	80-120			
Calibration Check (B18J221-CCV1)						Prepared & Analyzed: 25-Oct-2018						
Ammonia as N, filtered	0.373	0.00440	0.00500	0.0100	mg/L	0.4000		93.2	90-110			
Calibration Check (B18J221-CCV2)						Prepared & Analyzed: 25-Oct-2018						
Ammonia as N, filtered	0.498	0.00440	0.00500	0.0100	mg/L	0.5000		99.6	90-110			
Calibration Check (B18J221-CCV3)						Prepared & Analyzed: 25-Oct-2018						
Ammonia as N, filtered	0.496	0.00440	0.00500	0.0100	mg/L	0.5000		99.2	90-110			
Calibration Check (B18J221-CCV4)						Prepared & Analyzed: 25-Oct-2018						
Ammonia as N, filtered	0.492	0.00440	0.00500	0.0100	mg/L	0.5000		98.4	90-110			
Duplicate (B18J221-DUP1)			**Source: 18J0401-02**			Prepared & Analyzed: 25-Oct-2018						
Ammonia as N, filtered	0.203	0.00440	0.00500	0.0100	mg/L		0.205			0.980	30	
Matrix Spike (B18J221-MS1)			**Source: 18J0401-02**			Prepared & Analyzed: 25-Oct-2018						
Ammonia as N, filtered	0.298	0.00440	0.00500	0.0100	mg/L	0.1000	0.205	93.0	80-120			
Matrix Spike Dup (B18J221-MSD1)			**Source: 18J0401-02**			Prepared & Analyzed: 25-Oct-2018						
Ammonia as N, filtered	0.299	0.00440	0.00500	0.0100	mg/L	0.1000	0.205	94.0	80-120	0.335	30	
Reference (B18J221-SRM1)						Prepared: 25-Oct-2018 Analyzed: 13-Dec-2018						
Ammonia as N, filtered	1.10	0.00440	0.00500	0.0100	mg/L	1.000		110	80-120			
Batch B18J223 - *												
Blank (B18J223-BLK1)						Prepared: 25-Oct-2018 Analyzed: 26-Oct-2018						
Ammonia as N	ND	0.00440	0.00500	0.0100	mg/L							U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Nutrients - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J223 - *												
LCS (B18J223-BS1)						Prepared: 25-Oct-2018 Analyzed: 26-Oct-2018						
Ammonia as N	0.107	0.00440	0.00500	0.0100	mg/L	0.1000		107	80-120			
Calibration Check (B18J223-CCV1)						Prepared: 25-Oct-2018 Analyzed: 26-Oct-2018						
Ammonia as N	0.372	0.00440	0.00500	0.0100	mg/L	0.4000		93.0	90-110			
Calibration Check (B18J223-CCV2)						Prepared: 25-Oct-2018 Analyzed: 26-Oct-2018						
Ammonia as N	0.501	0.00440	0.00500	0.0100	mg/L	0.5000		100	90-110			
Calibration Check (B18J223-CCV3)						Prepared: 25-Oct-2018 Analyzed: 26-Oct-2018						
Ammonia as N	0.491	0.00440	0.00500	0.0100	mg/L	0.5000		98.2	90-110			
Duplicate (B18J223-DUP1)			**Source: 18J0401-15**			Prepared: 25-Oct-2018 Analyzed: 26-Oct-2018						
Ammonia as N	0.0374	0.00440	0.00500	0.0100	mg/L		0.0355			5.21	30	
Matrix Spike (B18J223-MS1)			**Source: 18J0401-15**			Prepared: 25-Oct-2018 Analyzed: 26-Oct-2018						
Ammonia as N	0.134	0.00440	0.00500	0.0100	mg/L	0.1000	0.0355	98.5	80-120			
Matrix Spike Dup (B18J223-MSD1)			**Source: 18J0401-15**			Prepared: 25-Oct-2018 Analyzed: 26-Oct-2018						
Ammonia as N	0.138	0.00440	0.00500	0.0100	mg/L	0.1000	0.0355	102	80-120	2.94	30	
Reference (B18J223-SRM1)						Prepared: 25-Oct-2018 Analyzed: 13-Dec-2018						
Ammonia as N	1.10	0.00440	0.00500	0.0100	mg/L	1.000		110	80-120			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCV7)						Prepared & Analyzed: 13-Nov-2018						
PCB 101	120				ng/mL	120.0		102	85-115			
PCB 105	37				ng/mL	40.00		93.5	85-115			
PCB 118	38				ng/mL	40.00		95.0	85-115			
PCB 126	86				ng/mL	80.00		108	85-115			
PCB 128	39				ng/mL	40.00		97.1	85-115			
PCB 138	110				ng/mL	120.0		90.6	85-115			
PCB 153	73				ng/mL	80.00		91.6	85-115			
PCB 169	36				ng/mL	40.00		90.8	85-115			
PCB 170	72				ng/mL	80.00		90.6	85-115			
PCB 18	38				ng/mL	40.00		96.2	85-115			
PCB 180	36				ng/mL	40.00		91.1	85-115			
PCB 187	37				ng/mL	40.00		93.4	85-115			
PCB 28	72				ng/mL	80.00		89.7	85-115			
PCB 44	38				ng/mL	40.00		94.1	85-115			
PCB 52	78				ng/mL	80.00		97.6	85-115			
PCB 66	78				ng/mL	80.00		96.9	85-115			
PCB 77	42				ng/mL	40.00		105	85-115			
PCB 8	75				ng/mL	80.00		94.1	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*43*				*ng/mL*	*40.00*		*108*	*85-115*			
Surrogate: PCB 198	*36*				*ng/mL*	*40.00*		*90.9*	*85-115*			
Calibration Check (18K0025-CCV8)						Prepared: 13-Nov-2018 Analyzed: 14-Nov-2018						
PCB 101	100				ng/mL	120.0		86.9	85-115			
PCB 105	39				ng/mL	40.00		97.2	85-115			
PCB 118	38				ng/mL	40.00		93.9	85-115			
PCB 126	80				ng/mL	80.00		100	85-115			
PCB 128	39				ng/mL	40.00		97.5	85-115			
PCB 138	110				ng/mL	120.0		92.1	85-115			
PCB 153	73				ng/mL	80.00		91.0	85-115			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCV8)						Prepared: 13-Nov-2018 Analyzed: 14-Nov-2018						
PCB 169	40				ng/mL	40.00		99.6	85-115			
PCB 170	80				ng/mL	80.00		99.7	85-115			
PCB 18	38				ng/mL	40.00		96.2	85-115			
PCB 180	39				ng/mL	40.00		98.5	85-115			
PCB 187	38				ng/mL	40.00		95.0	85-115			
PCB 28	76				ng/mL	80.00		94.8	85-115			
PCB 44	37				ng/mL	40.00		92.6	85-115			
PCB 52	81				ng/mL	80.00		102	85-115			
PCB 66	77				ng/mL	80.00		96.0	85-115			
PCB 77	38				ng/mL	40.00		95.2	85-115			
PCB 8	79				ng/mL	80.00		99.2	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*49*				*ng/mL*	*40.00*		*122*	*85-115*			*Q*
Surrogate: PCB 198	*39*				*ng/mL*	*40.00*		*97.1*	*85-115*			
Calibration Check (18K0025-CCV9)						Prepared: 13-Nov-2018 Analyzed: 16-Nov-2018						
PCB 101	100				ng/mL	120.0		85.6	85-115			
PCB 105	36				ng/mL	40.00		91.2	85-115			
PCB 118	37				ng/mL	40.00		92.3	85-115			
PCB 126	83				ng/mL	80.00		104	85-115			
PCB 128	39				ng/mL	40.00		98.4	85-115			
PCB 138	110				ng/mL	120.0		92.5	85-115			
PCB 153	74				ng/mL	80.00		93.0	85-115			
PCB 169	37				ng/mL	40.00		93.5	85-115			
PCB 170	75				ng/mL	80.00		93.4	85-115			
PCB 18	39				ng/mL	40.00		98.0	85-115			
PCB 180	40				ng/mL	40.00		98.8	85-115			
PCB 187	37				ng/mL	40.00		92.7	85-115			
PCB 28	82				ng/mL	80.00		102	85-115			
PCB 44	38				ng/mL	40.00		95.1	85-115			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCV9)						Prepared: 13-Nov-2018 Analyzed: 16-Nov-2018						
PCB 52	78				ng/mL	80.00		98.0	85-115			
PCB 66	83				ng/mL	80.00		103	85-115			
PCB 77	42				ng/mL	40.00		104	85-115			
PCB 8	84				ng/mL	80.00		106	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*44*				*ng/mL*	*40.00*		*109*	*85-115*			
Surrogate: PCB 198	*37*				*ng/mL*	*40.00*		*92.6*	*85-115*			
Calibration Check (18K0025-CCVA)						Prepared: 13-Nov-2018 Analyzed: 16-Nov-2018						
PCB 101	110				ng/mL	120.0		90.1	85-115			
PCB 105	37				ng/mL	40.00		91.3	85-115			
PCB 118	37				ng/mL	40.00		92.7	85-115			
PCB 126	80				ng/mL	80.00		100	85-115			
PCB 128	39				ng/mL	40.00		96.5	85-115			
PCB 138	110				ng/mL	120.0		91.4	85-115			
PCB 153	74				ng/mL	80.00		92.5	85-115			
PCB 169	37				ng/mL	40.00		93.1	85-115			
PCB 170	73				ng/mL	80.00		91.7	85-115			
PCB 18	38				ng/mL	40.00		94.5	85-115			
PCB 180	38				ng/mL	40.00		95.0	85-115			
PCB 187	38				ng/mL	40.00		95.4	85-115			
PCB 28	79				ng/mL	80.00		98.3	85-115			
PCB 44	37				ng/mL	40.00		93.2	85-115			
PCB 52	73				ng/mL	80.00		90.7	85-115			
PCB 66	79				ng/mL	80.00		98.5	85-115			
PCB 77	45				ng/mL	40.00		112	85-115			
PCB 8	79				ng/mL	80.00		99.1	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*44*				*ng/mL*	*40.00*		*111*	*85-115*			
Surrogate: PCB 198	*36*				*ng/mL*	*40.00*		*90.6*	*85-115*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCVB)						Prepared: 13-Nov-2018 Analyzed: 19-Nov-2018						
PCB 101	110				ng/mL	120.0		89.3	85-115			
PCB 105	36				ng/mL	40.00		89.3	85-115			
PCB 118	37				ng/mL	40.00		92.8	85-115			
PCB 126	78				ng/mL	80.00		97.0	85-115			
PCB 128	37				ng/mL	40.00		91.8	85-115			
PCB 138	100				ng/mL	120.0		85.8	85-115			
PCB 153	80				ng/mL	80.00		100	85-115			
PCB 169	35				ng/mL	40.00		88.3	85-115			
PCB 170	70				ng/mL	80.00		87.9	85-115			
PCB 18	38				ng/mL	40.00		93.8	85-115			
PCB 180	35				ng/mL	40.00		87.7	85-115			
PCB 187	35				ng/mL	40.00		87.7	85-115			
PCB 28	74				ng/mL	80.00		92.9	85-115			
PCB 44	38				ng/mL	40.00		96.2	85-115			
PCB 52	75				ng/mL	80.00		94.2	85-115			
PCB 66	78				ng/mL	80.00		97.2	85-115			
PCB 77	44				ng/mL	40.00		109	85-115			
PCB 8	78				ng/mL	80.00		97.6	85-115			
Surrogate: PCB 198	*35*				*ng/mL*	*40.00*		*87.5*	*85-115*			
Calibration Check (18K0025-CCVI)						Prepared: 13-Nov-2018 Analyzed: 17-Dec-2018						
PCB 101	110				ng/mL	120.0		94.2	85-115			
PCB 105	36				ng/mL	40.00		91.0	85-115			
PCB 118	37				ng/mL	40.00		91.5	85-115			
PCB 126	76				ng/mL	80.00		95.1	85-115			
PCB 128	43				ng/mL	40.00		107	85-115			
PCB 138	120				ng/mL	120.0		98.3	85-115			
PCB 153	72				ng/mL	80.00		90.5	85-115			
PCB 169	40				ng/mL	40.00		99.0	85-115			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCVI)						Prepared: 13-Nov-2018 Analyzed: 17-Dec-2018						
PCB 170	82				ng/mL	80.00		103	85-115			
PCB 18	41				ng/mL	40.00		102	85-115			
PCB 180	42				ng/mL	40.00		106	85-115			
PCB 187	39				ng/mL	40.00		96.5	85-115			
PCB 28	82				ng/mL	80.00		103	85-115			
PCB 44	40				ng/mL	40.00		99.0	85-115			
PCB 52	82				ng/mL	80.00		102	85-115			
PCB 66	84				ng/mL	80.00		105	85-115			
PCB 77	45				ng/mL	40.00		113	85-115			
PCB 8	85				ng/mL	80.00		107	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*48*				*ng/mL*	*40.00*		*119*	*85-115*			*Q*
Surrogate: PCB 198	*40*				*ng/mL*	*40.00*		*99.5*	*85-115*			
Calibration Check (18K0025-CCVJ)						Prepared: 13-Nov-2018 Analyzed: 17-Dec-2018						
PCB 101	120				ng/mL	120.0		98.3	85-115			
PCB 105	39				ng/mL	40.00		98.0	85-115			
PCB 118	38				ng/mL	40.00		94.0	85-115			
PCB 126	80				ng/mL	80.00		100	85-115			
PCB 128	45				ng/mL	40.00		112	85-115			
PCB 138	120				ng/mL	120.0		99.2	85-115			
PCB 153	78				ng/mL	80.00		97.4	85-115			
PCB 169	38				ng/mL	40.00		94.0	85-115			
PCB 170	78				ng/mL	80.00		97.8	85-115			
PCB 18	45				ng/mL	40.00		113	85-115			
PCB 180	37				ng/mL	40.00		92.0	85-115			
PCB 187	38				ng/mL	40.00		95.2	85-115			
PCB 28	88				ng/mL	80.00		110	85-115			
PCB 44	38				ng/mL	40.00		93.8	85-115			
PCB 52	85				ng/mL	80.00		106	85-115			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCVJ)						Prepared: 13-Nov-2018 Analyzed: 17-Dec-2018						
PCB 66	76				ng/mL	80.00		95.4	85-115			
PCB 77	39				ng/mL	40.00		97.0	85-115			
PCB 8	94				ng/mL	80.00		118	85-115			Q
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*57*				*ng/mL*	*40.00*		*142*	*85-115*			*Q*
Surrogate: PCB 198	*38*				*ng/mL*	*40.00*		*93.8*	*85-115*			
Initial Cal Blank (18K0025-ICB1)						Prepared & Analyzed: 13-Nov-2018						
PCB 101	0.0				ng/mL							U
PCB 105	0.0				ng/mL							U
PCB 118	0.0				ng/mL							U
PCB 126	0.0				ng/mL							U
PCB 128	0.0				ng/mL							U
PCB 138	0.0				ng/mL							U
PCB 153	0.0				ng/mL							U
PCB 169	0.0				ng/mL							U
PCB 170	0.0				ng/mL							U
PCB 18	0.0				ng/mL							U
PCB 180	0.0				ng/mL							U
PCB 187	0.0				ng/mL							U
PCB 28	0.0				ng/mL							U
PCB 44	0.0				ng/mL							U
PCB 52	0.0				ng/mL							U
PCB 66	0.0				ng/mL							U
PCB 77	0.0				ng/mL							U
PCB 8	0.0				ng/mL							U
Initial Cal Check (18K0025-ICV3)						Prepared & Analyzed: 13-Nov-2018						
PCB 101	59				ng/mL	60.00		98.6	80-120			
PCB 105	21				ng/mL	20.00		103	80-120			
PCB 118	21				ng/mL	20.00		105	80-120			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Initial Cal Check (18K0025-ICV3)						Prepared & Analyzed: 13-Nov-2018						
PCB 126	41				ng/mL	40.00		103	80-120			
PCB 128	22				ng/mL	20.00		112	80-120			
PCB 138	59				ng/mL	60.00		98.1	80-120			
PCB 153	38				ng/mL	40.00		95.5	80-120			
PCB 169	19				ng/mL	20.00		96.9	80-120			
PCB 170	39				ng/mL	40.00		96.7	80-120			
PCB 18	22				ng/mL	20.00		109	80-120			
PCB 180	22				ng/mL	20.00		109	80-120			
PCB 187	22				ng/mL	20.00		111	80-120			
PCB 28	39				ng/mL	40.00		97.9	80-120			
PCB 44	21				ng/mL	20.00		106	80-120			
PCB 52	41				ng/mL	40.00		103	80-120			
PCB 66	33				ng/mL	40.00		82.6	80-120			
PCB 77	24				ng/mL	20.00		120	80-120			
PCB 8	42				ng/mL	40.00		106	80-120			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*19*				*ng/mL*	*20.00*		*95.8*	*80-120*			
Surrogate: PCB 198	*22*				*ng/mL*	*20.00*		*111*	*80-120*			
Batch B18J226 - EPA 3510C												
Blank (B18J226-BLK1)						Prepared: 26-Oct-2018 Analyzed: 13-Nov-2018						
PCB 101	ND	0.420	0.004	1.20	ug/L							U
PCB 105	ND	0.420	0.004	1.20	ug/L							U
PCB 118	ND	0.420	0.004	1.20	ug/L							U
PCB 126	ND	0.420	0.004	1.20	ug/L							U
PCB 128	ND	0.420	0.004	1.20	ug/L							U
PCB 138	ND	0.420	0.004	1.20	ug/L							U
PCB 153	ND	0.420	0.004	1.20	ug/L							U
PCB 169	ND	0.420	0.004	1.20	ug/L							U
PCB 170	ND	0.420	0.004	1.20	ug/L							U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Blank (B18J226-BLK1)						Prepared: 26-Oct-2018 Analyzed: 13-Nov-2018						
PCB 18	ND	0.420	0.004	1.20	ug/L							U
PCB 180	ND	0.420	0.004	1.20	ug/L							U
PCB 187	ND	0.420	0.004	1.20	ug/L							U
PCB 28	ND	0.420	0.004	1.20	ug/L							U
PCB 44	ND	0.420	0.004	1.20	ug/L							U
PCB 52	ND	0.420	0.004	1.20	ug/L							U
PCB 66	ND	0.420	0.004	1.20	ug/L							U
PCB 77	ND	0.420	0.004	1.20	ug/L							U
PCB 8	ND	0.006	1.50	3.00	ug/L							U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.077*				*ug/L*	*0.1000*		*76.7*	*30-150*			
Surrogate: PCB 198	*0.093*				*ug/L*	*0.1200*		*77.7*	*30-150*			
LCS (B18J226-BS3)						Prepared: 26-Oct-2018 Analyzed: 14-Nov-2018						
PCB 101	ND	0.420	0.004	1.20	ug/L	0.1600			50-150			U
PCB 105	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 118	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 126	ND	0.420	0.004	1.20	ug/L	0.1600			50-150			U
PCB 128	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 138	ND	0.420	0.004	1.20	ug/L	0.2400			50-150			U
PCB 153	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 169	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 170	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 18	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 180	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 187	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 28	ND	0.420	0.004	1.20	ug/L	0.1600			50-150			U
PCB 44	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 52	ND	0.420	0.004	1.20	ug/L	0.1600			50-150			U
PCB 66	ND	0.420	0.004	1.20	ug/L	0.1600			50-150			U

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
LCS (B18J226-BS3)						Prepared: 26-Oct-2018 Analyzed: 14-Nov-2018						
PCB 77	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 8	0.12	0.006	1.50	3.00	ug/L	0.1600		72.8	50-150			J
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.080*				*ug/L*	*0.1000*		*79.8*	*30-150*			
Surrogate: PCB 198	*0.065*				*ug/L*	*0.1200*		*54.2*	*30-150*			
LCS Dup (B18J226-BSD3)						Prepared: 26-Oct-2018 Analyzed: 14-Nov-2018						
PCB 101	ND	0.420	0.004	1.20	ug/L	0.1600			50-150		30	U
PCB 105	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 118	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 126	ND	0.420	0.004	1.20	ug/L	0.1600			50-150		30	U
PCB 128	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 138	ND	0.420	0.004	1.20	ug/L	0.2400			50-150		30	U
PCB 153	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 169	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 170	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 18	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 180	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 187	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 28	ND	0.420	0.004	1.20	ug/L	0.1600			50-150		30	U
PCB 44	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 52	ND	0.420	0.004	1.20	ug/L	0.1600			50-150		30	U
PCB 66	ND	0.420	0.004	1.20	ug/L	0.1600			50-150		30	U
PCB 77	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 8	0.13	0.006	1.50	3.00	ug/L	0.1600		81.8	50-150	11.7	30	J
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.088*				*ug/L*	*0.1000*		*87.5*	*30-150*			
Surrogate: PCB 198	*0.077*				*ug/L*	*0.1200*		*63.8*	*30-150*			
Duplicate (B18J226-DUP1)			**Source: 18J0401-13**			Prepared: 26-Oct-2018 Analyzed: 14-Nov-2018						
PCB 101	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 105	ND	0.420	0.004	1.20	ug/L		ND				30	U

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Duplicate (B18J226-DUP1)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 14-Nov-2018						
PCB 118	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 126	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 128	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 138	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 153	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 169	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 170	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 18	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 180	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 187	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 28	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 44	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 52	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 66	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 77	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 8	ND	0.006	1.50	3.00	ug/L		ND				30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.074*				*ug/L*	*0.1000*		*73.6*	*30-150*			
Surrogate: PCB 198	*0.077*				*ug/L*	*0.1200*		*64.1*	*30-150*			
Matrix Spike (B18J226-MS3)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 14-Nov-2018						
PCB 101	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150			U
PCB 105	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 118	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 126	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150			U
PCB 128	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 138	ND	0.840	0.008	2.40	ug/L	0.4800	ND		50-150			U
PCB 153	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 169	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 170	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Matrix Spike (B18J226-MS3)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 14-Nov-2018						
PCB 18	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 180	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 187	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 28	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150			U
PCB 44	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 52	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150			U
PCB 66	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150			U
PCB 77	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 8	0.25	0.012	3.00	6.00	ug/L	0.3200	ND	78.8	50-150			J
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.18*				*ug/L*	*0.2000*		*88.0*	*30-150*			
Surrogate: PCB 198	*0.15*				*ug/L*	*0.2400*		*61.2*	*30-150*			
Matrix Spike Dup (B18J226-MSD3)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 14-Nov-2018						
PCB 101	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150	30		U
PCB 105	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 118	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 126	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150	30		U
PCB 128	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 138	ND	0.840	0.008	2.40	ug/L	0.4800	ND		50-150	30		U
PCB 153	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 169	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 170	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 18	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 180	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 187	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 28	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150	30		U
PCB 44	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 52	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150	30		U
PCB 66	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150	30		U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J226 - EPA 3510C												
Matrix Spike Dup (B18J226-MSD3)		**Source: 18J0401-13**				Prepared: 26-Oct-2018 Analyzed: 14-Nov-2018						
PCB 77	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150		30	U
PCB 8	0.21	0.012	3.00	6.00	ug/L	0.3200	ND	64.9	50-150	19.3	30	J
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.16*				*ug/L*	*0.2000*		*78.9*	*30-150*			
Surrogate: PCB 198	*0.12*				*ug/L*	*0.2400*		*51.8*	*30-150*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Wet Chemistry - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J222 - none												
Blank (B18J222-BLK1)						Prepared & Analyzed: 24-Oct-2018						
Total Suspended Solids	ND	1.00	2.00	5.00	mg/L							U
Blank (B18J222-BLK2)						Prepared & Analyzed: 24-Oct-2018						
Total Suspended Solids	ND	1.00	2.00	5.00	mg/L							U
Duplicate (B18J222-DUP1)			**Source: 18J0401-06**			Prepared & Analyzed: 24-Oct-2018						
Total Suspended Solids	12.7	0.667	1.33	3.33	mg/L		12.7			0.00	20	
Duplicate (B18J222-DUP2)			**Source: 18J0401-10**			Prepared & Analyzed: 24-Oct-2018						
Total Suspended Solids	17.3	0.667	1.33	3.33	mg/L		17.3			0.00	20	

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167814 - EPA 3510C												
BLK (WG1167814-1)					Prepared: 13-Oct-2018 Analyzed: 02-Nov-2018							
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l				-			Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l				-			Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l				-			Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l				-			Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l				-			Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l				-			Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l				-			Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l				-			Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l				-			Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l				-			Ub
2-Chlorophenol	ND	0.091		0.5	ug/l				-			Ub
2-Nitrophenol	ND	0.115		0.5	ug/l				-			Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l				-			Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l				-			Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l				-			Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l				-			Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l				-			Ub
4-Nitrophenol	ND	0.59		2.5	ug/l				-			Ub
Azobenzene	ND	0.128		0.5	ug/l				-			Ub
Benzidine	ND	0.464		20	ug/l				-			Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l				-			Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l				-			Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l				-			Ub
bis(2-Ethylhexyl)phthalate	ND	0.081		0.5	ug/l				-			Ub
Butylbenzylphthalate	ND	0.085		0.5	ug/l				-			Ub
Diethylphthalate	ND	0.18		0.5	ug/l				-			Ub
Dimethylphthalate	ND	0.117		0.5	ug/l				-			Ub
Di-n-butylphthalate	ND	0.1		0.5	ug/l				-			Ub

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167814 - EPA 3510C												
BLK (WG1167814-1)						Prepared: 13-Oct-2018 Analyzed: 02-Nov-2018						
Di-n-octylphthalate	ND	0.079		1	ug/l				-			Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l				-			Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l				-			Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l				-			Ub
Hexachloroethane	ND	0.102		0.5	ug/l				-			Ub
Isophorone	ND	0.126		0.5	ug/l				-			Ub
Nitrobenzene	ND	0.102		0.5	ug/l				-			Ub
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l				-			Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l				-			Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l				-			Ub
Pentachlorophenol	ND	0.43		2	ug/l				-			Ub
Phenol	ND	0.051		0.5	ug/l				-			Ub
Surrogate: 2-Fluorobiphenyl	*13.6*				*ug/l*			*68*	*30-130*			
Surrogate: 2-Fluorophenol	*8.56*				*ug/l*			*43*	*15-115*			
Surrogate: Nitrobenzene-d5	*12.6*				*ug/l*			*63*	*30-130*			
Surrogate: Phenol-d5	*6.22*				*ug/l*			*31*	*15-115*			
Surrogate: Terphenyl-d14	*17.7*				*ug/l*			*89*	*30-130*			
LCS (WG1167814-2)						Prepared: 13-Oct-2018 Analyzed: 02-Nov-2018						
1,2,4-Trichlorobenzene	7.55	0.096		0.5	ug/l	10		75	40-140			
1,2-Dichlorobenzene	7.03	0.068		0.5	ug/l	10		70	40-140			
1,3-Dichlorobenzene	6.73	0.078		0.5	ug/l	10		67	40-140			
1,4-Dichlorobenzene	6.8	0.083		0.5	ug/l	10		68	40-140			
2,4-Dichlorophenol	8.38	0.1		0.5	ug/l	10		84	40-140			
2,4-Dimethylphenol	9.78	0.241		2	ug/l	10		98	40-140			
2,4-Dinitrophenol	8.9	0.728		5	ug/l	10		89	40-140			
2,4-Dinitrotoluene	9.57	0.163		0.5	ug/l	10		96	40-140			
2,6-Dinitrotoluene	9.38	0.168		0.5	ug/l	10		94	40-140			
2-Chloronaphthalene	8.32	0.09		0.5	ug/l	10		83	40-140			
2-Chlorophenol	7.32	0.091		0.5	ug/l	10		73	40-140			

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167814 - EPA 3510C												
LCS (WG1167814-2)						Prepared: 13-Oct-2018 Analyzed: 02-Nov-2018						
2-Nitrophenol	8.38	0.115		0.5	ug/l	10		84	40-140			
3,3'-Dichlorobenzidine	8.97	0.193		0.5	ug/l	10		90	40-140			
4,6-Dinitro-2-methylphenol	9.07	0.51		2	ug/l	10		91	40-140			
4-Bromophenyl-phenylether	8.89	0.1		0.5	ug/l	10		89	40-140			
4-Chloro-3-methylphenol	8.5	0.103		0.5	ug/l	10		85	40-140			
4-Chlorophenyl-phenylether	8.92	0.079		0.5	ug/l	10		89	40-140			
4-Nitrophenol	3.97	0.59		2.5	ug/l	10		40	17-65			
Azobenzene	8.96	0.128		0.5	ug/l	10		90	40-140			
Benzidine	3.56	0.464		20	ug/l	10		14	10-82			
bis(2-Chloroethoxy)methane	8.39	0.085		0.5	ug/l	10		84	40-140			
bis(2-Chloroethyl)ether	7.72	0.093		0.5	ug/l	10		77	40-140			
bis(2-chloroisopropyl)ether	7.74	0.108		0.5	ug/l	10		77	40-140			
bis(2-Ethylhexyl)phthalate	9.63	0.081		0.5	ug/l	10		96	40-140			
Butylbenzylphthalate	9.16	0.085		0.5	ug/l	10		92	40-140			
Diethylphthalate	9.18	0.18		0.5	ug/l	10		92	40-140			
Dimethylphthalate	8.88	0.117		0.5	ug/l	10		89	40-140			
Di-n-butylphthalate	9.46	0.1		0.5	ug/l	10		95	40-140			
Di-n-octylphthalate	9.87	0.079		1	ug/l	10		99	40-140			
Hexachlorobenzene	8.77	0.122		0.5	ug/l	10		88	40-140			
Hexachlorobutadiene	7.32	0.086		0.5	ug/l	10		73	40-140			
Hexachlorocyclopentadiene	7.81	0.153		0.5	ug/l	10		78	10-109			
Hexachloroethane	6.35	0.102		0.5	ug/l	10		64	10-97			
Isophorone	8.46	0.126		0.5	ug/l	10		84	40-140			
Nitrobenzene	7.95	0.102		0.5	ug/l	10		80	40-140			
N-Nitrosodimethylamine	5.71	0.072		0.5	ug/l	10		57	27-70			
N-Nitroso-di-n-propylamine	8.64	0.123		0.5	ug/l	10		86	40-140			
n-Nitrosodiphenylamine	8.96	0.072		0.5	ug/l	10		90	40-140			
Pentachlorophenol	7.88	0.43		2	ug/l	10		79	40-140			

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167814 - EPA 3510C												
LCS (WG1167814-2)						Prepared: 13-Oct-2018 Analyzed: 02-Nov-2018						
Phenol	4.03	0.051		0.5	ug/l	10		40	18-54			
Surrogate: 2-Fluorobiphenyl	*14.9*				*ug/l*			*75*	*30-130*			
Surrogate: 2-Fluorophenol	*9.28*				*ug/l*			*46*	*15-115*			
Surrogate: Nitrobenzene-d5	*14.5*				*ug/l*			*73*	*30-130*			
Surrogate: Phenol-d5	*7.19*				*ug/l*			*36*	*15-115*			
Surrogate: Terphenyl-d14	*16.3*				*ug/l*			*81*	*30-130*			
LCD (WG1167814-3)						Prepared: 13-Oct-2018 Analyzed: 02-Nov-2018						
1,2,4-Trichlorobenzene	5.91	0.096		0.5	ug/l	10		59	40-140	24	30	*
1,2-Dichlorobenzene	5.35	0.068		0.5	ug/l	10		53	40-140	28	30	*
1,3-Dichlorobenzene	5.06	0.078		0.5	ug/l	10		50	40-140	29	30	*
1,4-Dichlorobenzene	5.21	0.083		0.5	ug/l	10		52	40-140	27	30	*
2,4-Dichlorophenol	6.31	0.1		0.5	ug/l	10		63	40-140	29	30	*
2,4-Dimethylphenol	7.1	0.241		2	ug/l	10		71	40-140	32	30	*
2,4-Dinitrophenol	8.1	0.728		5	ug/l	10		81	40-140	9	30	
2,4-Dinitrotoluene	8.76	0.163		0.5	ug/l	10		88	40-140	9	30	
2,6-Dinitrotoluene	7.86	0.168		0.5	ug/l	10		78	40-140	19	30	
2-Chloronaphthalene	6.51	0.09		0.5	ug/l	10		65	40-140	24	30	*
2-Chlorophenol	5.46	0.091		0.5	ug/l	10		55	40-140	28	30	*
2-Nitrophenol	6.37	0.115		0.5	ug/l	10		64	40-140	27	30	*
3,3'-Dichlorobenzidine	8.19	0.193		0.5	ug/l	10		82	40-140	9	30	
4,6-Dinitro-2-methylphenol	8.33	0.51		2	ug/l	10		83	40-140	9	30	
4-Bromophenyl-phenylether	7.63	0.1		0.5	ug/l	10		76	40-140	16	30	
4-Chloro-3-methylphenol	6.55	0.103		0.5	ug/l	10		66	40-140	25	30	*
4-Chlorophenyl-phenylether	7.32	0.079		0.5	ug/l	10		73	40-140	20	30	
4-Nitrophenol	3.59	0.59		2.5	ug/l	10		36	17-65	11	30	
Azobenzene	7.5	0.128		0.5	ug/l	10		75	40-140	18	30	
Benzidine	2.13	0.464		20	ug/l	10		8.5	10-82	49	30	*
bis(2-Chloroethoxy)methane	6.47	0.085		0.5	ug/l	10		65	40-140	26	30	*
bis(2-Chloroethyl)ether	6.06	0.093		0.5	ug/l	10		60	40-140	25	30	*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167814 - EPA 3510C												
LCD (WG1167814-3)						Prepared: 13-Oct-2018 Analyzed: 02-Nov-2018						
bis(2-chloroisopropyl)ether	6	0.108		0.5	ug/l	10		60	40-140	25	30	*
bis(2-Ethylhexyl)phthalate	9.26	0.081		0.5	ug/l	10		93	40-140	3	30	
Butylbenzylphthalate	8.84	0.085		0.5	ug/l	10		88	40-140	4	30	
Diethylphthalate	8.16	0.18		0.5	ug/l	10		82	40-140	11	30	
Dimethylphthalate	7.67	0.117		0.5	ug/l	10		77	40-140	14	30	
Di-n-butylphthalate	9.11	0.1		0.5	ug/l	10		91	40-140	4	30	
Di-n-octylphthalate	9.65	0.079		1	ug/l	10		96	40-140	3	30	
Hexachlorobenzene	7.8	0.122		0.5	ug/l	10		78	40-140	12	30	
Hexachlorobutadiene	5.81	0.086		0.5	ug/l	10		58	40-140	23	30	*
Hexachlorocyclopentadiene	5.81	0.153		0.5	ug/l	10		58	10-109	29	30	*
Hexachloroethane	4.88	0.102		0.5	ug/l	10		49	10-97	27	30	*
Isophorone	6.67	0.126		0.5	ug/l	10		67	40-140	23	30	*
Nitrobenzene	6.25	0.102		0.5	ug/l	10		62	40-140	25	30	*
N-Nitrosodimethylamine	4.59	0.072		0.5	ug/l	10		46	27-70	21	30	*
N-Nitroso-di-n-propylamine	6.51	0.123		0.5	ug/l	10		65	40-140	28	30	*
n-Nitrosodiphenylamine	7.97	0.072		0.5	ug/l	10		80	40-140	12	30	
Pentachlorophenol	7.25	0.43		2	ug/l	10		72	40-140	9	30	
Phenol	3.14	0.051		0.5	ug/l	10		31	18-54	25	30	*
Surrogate: 2-Fluorobiphenyl	*11.6*				*ug/l*			*58*	*30-130*			
Surrogate: 2-Fluorophenol	*7.06*				*ug/l*			*35*	*15-115*			
Surrogate: Nitrobenzene-d5	*11.5*				*ug/l*			*57*	*30-130*			
Surrogate: Phenol-d5	*5.59*				*ug/l*			*28*	*15-115*			
Surrogate: Terphenyl-d14	*15.7*				*ug/l*			*78*	*30-130*			
Batch WG1173490 - EPA 3510C												
BLK (WG1173490-1)						Prepared: 29-Oct-2018 Analyzed: 07-Nov-2018						
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l				-			Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l				-			Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l				-			Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l				-			Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1173490 - EPA 3510C												
BLK (WG1173490-1)						Prepared: 29-Oct-2018 Analyzed: 07-Nov-2018						
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l				-			Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l				-			Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l				-			Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l				-			Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l				-			Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l				-			Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l				-			Ub
2-Chlorophenol	ND	0.091		0.5	ug/l				-			Ub
2-Nitrophenol	ND	0.115		0.5	ug/l				-			Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l				-			Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l				-			Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l				-			Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l				-			Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l				-			Ub
4-Nitrophenol	ND	0.59		2.5	ug/l				-			Ub
Azobenzene	ND	0.128		0.5	ug/l				-			Ub
Benzidine	ND	0.464		20	ug/l				-			Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l				-			Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l				-			Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l				-			Ub
bis(2-Ethylhexyl)phthalate	ND	0.081		0.5	ug/l				-			Ub
Butylbenzylphthalate	ND	0.085		0.5	ug/l				-			Ub
Diethylphthalate	ND	0.18		0.5	ug/l				-			Ub
Dimethylphthalate	ND	0.117		0.5	ug/l				-			Ub
Di-n-butylphthalate	ND	0.1		0.5	ug/l				-			Ub
Di-n-octylphthalate	ND	0.079		1	ug/l				-			Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l				-			Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l				-			Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1173490 - EPA 3510C												
BLK (WG1173490-1)						Prepared: 29-Oct-2018 Analyzed: 07-Nov-2018						
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l				-			Ub
Hexachloroethane	ND	0.102		0.5	ug/l				-			Ub
Isophorone	ND	0.126		0.5	ug/l				-			Ub
Nitrobenzene	ND	0.102		0.5	ug/l				-			Ub
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l				-			Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l				-			Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l				-			Ub
Pentachlorophenol	ND	0.43		2	ug/l				-			Ub
Phenol	ND	0.051		0.5	ug/l				-			Ub
Surrogate: 2,4,6-Tribromophenol	*11.1*				*ug/l*			*56*	*15-115*			
Surrogate: 2-Fluorobiphenyl	*10.4*				*ug/l*			*52*	*30-130*			
Surrogate: 2-Fluorophenol	*6.56*				*ug/l*			*33*	*15-115*			
Surrogate: Nitrobenzene-d5	*11.1*				*ug/l*			*56*	*30-130*			
Surrogate: Phenol-d5	*4.61*				*ug/l*			*23*	*15-115*			
Surrogate: Terphenyl-d14	*12.8*				*ug/l*			*64*	*30-130*			
LCS (WG1173490-2)						Prepared: 29-Oct-2018 Analyzed: 07-Nov-2018						
1,2,4-Trichlorobenzene	3.96	0.096		0.5	ug/l	10		40	40-140			
1,2-Dichlorobenzene	3.84	0.068		0.5	ug/l	10		38	40-140			N
1,3-Dichlorobenzene	3.54	0.078		0.5	ug/l	10		35	40-140			N
1,4-Dichlorobenzene	3.65	0.083		0.5	ug/l	10		36	40-140			N
2,4,6-Trichlorophenol	6.01	0.152		0.5	ug/l	10		60	40-140			
2,4-Dichlorophenol	5.6	0.1		0.5	ug/l	10		56	40-140			
2,4-Dimethylphenol	4.04	0.241		2	ug/l	10		40	40-140			
2,4-Dinitrophenol	5.6	0.728		5	ug/l	10		56	40-140			
2,4-Dinitrotoluene	6.46	0.163		0.5	ug/l	10		64	40-140			
2,6-Dinitrotoluene	6.15	0.168		0.5	ug/l	10		62	40-140			
2-Chloronaphthalene	4.97	0.09		0.5	ug/l	10		50	40-140			
2-Chlorophenol	4.81	0.091		0.5	ug/l	10		48	40-140			
2-Nitrophenol	5.5	0.115		0.5	ug/l	10		55	17-65			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1173490 - EPA 3510C												
LCS (WG1173490-2)						Prepared: 29-Oct-2018 Analyzed: 07-Nov-2018						
3,3'-Dichlorobenzidine	5.96	0.193		0.5	ug/l	10		60	40-140			
4,6-Dinitro-2-methylphenol	6.05	0.51		2	ug/l	10		60	40-140			
4-Bromophenyl-phenylether	5.81	0.1		0.5	ug/l	10		58	40-140			
4-Chloro-3-methylphenol	5.92	0.103		0.5	ug/l	10		59	40-140			
4-Chlorophenyl-phenylether	5.71	0.079		0.5	ug/l	10		57	40-140			
4-Nitrophenol	2.65	0.59		2.5	ug/l	10		26	40-140			
Azobenzene	5.83	0.128		0.5	ug/l	10		58	40-140			
Benzidine	4.51	0.464		20	ug/l	10		18	10-82			
bis(2-Chloroethoxy)methane	5.79	0.085		0.5	ug/l	10		58	40-140			
bis(2-Chloroethyl)ether	5.39	0.093		0.5	ug/l	10		54	40-140			
bis(2-chloroisopropyl)ether	5.39	0.108		0.5	ug/l	10		54	40-140			
bis(2-Ethylhexyl)phthalate	6.08	0.081		0.5	ug/l	10		61	40-140			
Butylbenzylphthalate	6.01	0.085		0.5	ug/l	10		60	40-140			
Diethylphthalate	6.37	0.18		0.5	ug/l	10		64	40-140			
Dimethylphthalate	6.16	0.117		0.5	ug/l	10		62	40-140			
Di-n-butylphthalate	6.13	0.1		0.5	ug/l	10		61	40-140			
Di-n-octylphthalate	6.08	0.079		1	ug/l	10		61	40-140			
Hexachlorobenzene	5.69	0.122		0.5	ug/l	10		57	40-140			
Hexachlorobutadiene	3.24	0.086		0.5	ug/l	10		32	40-140			N
Hexachlorocyclopentadiene	2.83	0.153		0.5	ug/l	10		28	10-109			
Hexachloroethane	3.21	0.102		0.5	ug/l	10		32	10-97			
Isophorone	5.98	0.126		0.5	ug/l	10		60	40-140			
Nitrobenzene	5.34	0.102		0.5	ug/l	10		53	40-140			
N-Nitrosodimethylamine	3.38	0.072		0.5	ug/l	10		34	27-70			
N-Nitroso-di-n-propylamine	5.85	0.123		0.5	ug/l	10		58	40-140			
n-Nitrosodiphenylamine	6.1	0.072		0.5	ug/l	10		61	40-140			
Pentachlorophenol	5.54	0.43		2	ug/l	10		55	40-140			
Phenol	2.42	0.051		0.5	ug/l	10		24	18-54			

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Semivolatile Organics by GC-MS - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1173490 - EPA 3510C												
LCS (WG1173490-2)						Prepared: 29-Oct-2018 Analyzed: 07-Nov-2018						
Surrogate: 2,4,6-Tribromophenol	*13.1*				*ug/l*			*66*	*15-115*			
Surrogate: 2-Fluorobiphenyl	*11*				*ug/l*			*55*	*30-130*			
Surrogate: 2-Fluorophenol	*6.41*				*ug/l*			*32*	*15-150*			
Surrogate: Nitrobenzene-d5	*11.4*				*ug/l*			*57*	*30-130*			
Surrogate: Phenol-d5	*4.73*				*ug/l*			*24*	*15-115*			
Surrogate: Terphenyl-d14	*12.4*				*ug/l*			*62*	*30-130*			
LCD (WG1173490-3)						Prepared: 29-Oct-2018 Analyzed: 07-Nov-2018						
1,2,4-Trichlorobenzene	4.31	0.096		0.5	ug/l	10		43	40-140	7	30	
1,2-Dichlorobenzene	4.15	0.068		0.5	ug/l	10		42	40-140	10	30	
1,3-Dichlorobenzene	3.88	0.078		0.5	ug/l	10		39	40-140	11	30	N
1,4-Dichlorobenzene	3.99	0.083		0.5	ug/l	10		40	40-140	11	30	
2,4,6-Trichlorophenol	5.92	0.152		0.5	ug/l	10		59	40-140	2	30	
2,4-Dichlorophenol	5.71	0.1		0.5	ug/l	10		57	40-140	2	30	
2,4-Dimethylphenol	3.95	0.241		2	ug/l	10		40	40-140	0	30	
2,4-Dinitrophenol	5.98	0.728		5	ug/l	10		60	40-140	7	30	
2,4-Dinitrotoluene	6.6	0.163		0.5	ug/l	10		66	40-140	3	30	
2,6-Dinitrotoluene	6.32	0.168		0.5	ug/l	10		63	40-140	2	30	
2-Chloronaphthalene	5.13	0.09		0.5	ug/l	10		51	40-140	2	30	
2-Chlorophenol	5.03	0.091		0.5	ug/l	10		50	40-140	4	30	
2-Nitrophenol	5.73	0.115		0.5	ug/l	10		57	17-65	4	30	
3,3'-Dichlorobenzidine	6.3	0.193		0.5	ug/l	10		63	40-140	5	30	
4,6-Dinitro-2-methylphenol	6.24	0.51		2	ug/l	10		62	40-140	3	30	
4-Bromophenyl-phenylether	5.88	0.1		0.5	ug/l	10		59	40-140	2	30	
4-Chloro-3-methylphenol	6.16	0.103		0.5	ug/l	10		62	40-140	5	30	
4-Chlorophenyl-phenylether	5.82	0.079		0.5	ug/l	10		58	40-140	2	30	
4-Nitrophenol	2.65	0.59		2.5	ug/l	10		26	40-140	0	30	
Azobenzene	5.85	0.128		0.5	ug/l	10		58	40-140	0	30	
Benzidine	4.04	0.464		20	ug/l	10		16	10-82	12	30	
bis(2-Chloroethoxy)methane	5.9	0.085		0.5	ug/l	10		59	40-140	2	30	

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1173490 - EPA 3510C												
LCD (WG1173490-3)						Prepared: 29-Oct-2018 Analyzed: 07-Nov-2018						
bis(2-Chloroethyl)ether	5.54	0.093		0.5	ug/l	10		55	40-140	2	30	
bis(2-chloroisopropyl)ether	5.51	0.108		0.5	ug/l	10		55	40-140	2	30	
bis(2-Ethylhexyl)phthalate	6.29	0.081		0.5	ug/l	10		63	40-140	3	30	
Butylbenzylphthalate	6.12	0.085		0.5	ug/l	10		61	40-140	2	30	
Diethylphthalate	6.43	0.18		0.5	ug/l	10		64	40-140	0	30	
Dimethylphthalate	6.26	0.117		0.5	ug/l	10		62	40-140	0	30	
Di-n-butylphthalate	6.24	0.1		0.5	ug/l	10		62	40-140	2	30	
Di-n-octylphthalate	6.22	0.079		1	ug/l	10		62	40-140	2	30	
Hexachlorobenzene	5.71	0.122		0.5	ug/l	10		57	40-140	0	30	
Hexachlorobutadiene	3.62	0.086		0.5	ug/l	10		36	40-140	12	30	N
Hexachlorocyclopentadiene	3.1	0.153		0.5	ug/l	10		31	10-109	10	30	
Hexachloroethane	3.56	0.102		0.5	ug/l	10		36	10-97	12	30	
Isophorone	6.23	0.126		0.5	ug/l	10		62	40-140	3	30	
Nitrobenzene	5.5	0.102		0.5	ug/l	10		55	40-140	4	30	
N-Nitrosodimethylamine	3.53	0.072		0.5	ug/l	10		35	27-70	3	30	
N-Nitroso-di-n-propylamine	5.92	0.123		0.5	ug/l	10		59	40-140	2	30	
n-Nitrosodiphenylamine	6.22	0.072		0.5	ug/l	10		62	40-140	2	30	
Pentachlorophenol	5.69	0.43		2	ug/l	10		57	40-140	4	30	
Phenol	2.47	0.051		0.5	ug/l	10		25	18-54	4	30	
Surrogate: 2,4,6-Tribromophenol	*12.7*				*ug/l*			*64*	*15-115*			
Surrogate: 2-Fluorobiphenyl	*10.5*				*ug/l*			*53*	*30-130*			
Surrogate: 2-Fluorophenol	*6.42*				*ug/l*			*32*	*15-150*			
Surrogate: Nitrobenzene-d5	*11.1*				*ug/l*			*56*	*30-130*			
Surrogate: Phenol-d5	*4.58*				*ug/l*			*23*	*15-115*			
Surrogate: Terphenyl-d14	*12.3*				*ug/l*			*61*	*30-130*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

PAHs by GC/MS SIM - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167722 - EPA 3510C												
BLK (WG1167722-1)						Prepared: 13-Oct-2018 Analyzed: 26-Oct-2018						
Acenaphthene	ND	0.00161		0.01	ug/l				-			Ub
Acenaphthylene	ND	0.00177		0.01	ug/l				-			Ub
Anthracene	0.00276	0.00194		0.01	ug/l				-			Jb
Benz(a)anthracene	0.02	0.00173		0.01	ug/l				-			B
Benzo(a)pyrene	0.0259	0.00084		0.01	ug/l				-			B
Benzo(b)fluoranthene	0.0254	0.00148		0.01	ug/l				-			B
Benzo(e)pyrene	0.0195	0.00127		0.01	ug/l				-			B
Benzo(g,h,i)perylene	0.0201	0.00131		0.01	ug/l				-			B
Benzo(k)fluoranthene	0.0214	0.00117		0.01	ug/l				-			B
Chrysene	0.0206	0.000936		0.01	ug/l				-			B
Dibenz(a,h)anthracene	0.00457	0.000685		0.01	ug/l				-			Jb
Fluoranthene	0.0277	0.00149		0.01	ug/l				-			B
Fluorene	ND	0.00173		0.01	ug/l				-			Ub
Indeno(1,2,3-cd)pyrene	0.021	0.000533		0.01	ug/l				-			B
Naphthalene	0.00359	0.00177		0.01	ug/l				-			Jb
Phenanthrene	0.0107	0.00189		0.01	ug/l				-			B
Pyrene	0.0245	0.00152		0.01	ug/l				-			B
Surrogate: 2-Methylnaphthalene-d10	*0.362*				*ug/l*			*72*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*0.488*				*ug/l*			*98*	*30-130*			
Surrogate: Pyrene-d10	*0.49*				*ug/l*			*98*	*30-130*			
LCS (WG1167722-2)						Prepared: 13-Oct-2018 Analyzed: 26-Oct-2018						
Acenaphthene	0.368	0.00161		0.01	ug/l	0.5		74	40-140		30	
Acenaphthylene	0.373	0.00177		0.01	ug/l	0.5		75	40-140		30	
Anthracene	0.427	0.00194		0.01	ug/l	0.5		85	40-140		30	
Benz(a)anthracene	0.537	0.00173		0.01	ug/l	0.5		107	40-140		30	
Benzo(a)pyrene	0.552	0.00084		0.01	ug/l	0.5		110	40-140		30	
Benzo(b)fluoranthene	0.56	0.00148		0.01	ug/l	0.5		112	40-140		30	
Benzo(e)pyrene	0.56	0.00127		0.01	ug/l	0.5		112	40-140		30	

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

PAHs by GC/MS SIM - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167722 - EPA 3510C												
LCS (WG1167722-2)						Prepared: 13-Oct-2018 Analyzed: 26-Oct-2018						
Benzo(g,h,i)perylene	0.548	0.00131		0.01	ug/l	0.5		110	40-140		30	
Benzo(k)fluoranthene	0.51	0.00117		0.01	ug/l	0.5		102	40-140		30	
Chrysene	0.498	0.000936		0.01	ug/l	0.5		100	40-140		30	
Dibenz(a,h)anthracene	0.53	0.000685		0.01	ug/l	0.5		106	40-140		30	
Fluoranthene	0.506	0.00149		0.01	ug/l	0.5		101	40-140		30	
Fluorene	0.388	0.00173		0.01	ug/l	0.5		78	40-140		30	
Indeno(1,2,3-cd)pyrene	0.584	0.000533		0.01	ug/l	0.5		117	40-140		30	
Naphthalene	0.385	0.00177		0.01	ug/l	0.5		77	40-140		30	
Phenanthrene	0.421	0.00189		0.01	ug/l	0.5		84	40-140		30	
Pyrene	0.468	0.00152		0.01	ug/l	0.5		94	40-140		30	
Surrogate: 2-Methylnaphthalene-d10	*0.386*				*ug/l*			*77*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*0.514*				*ug/l*			*103*	*30-130*			
Surrogate: Pyrene-d10	*0.517*				*ug/l*			*103*	*30-130*			
LCD (WG1167722-3)						Prepared: 13-Oct-2018 Analyzed: 26-Oct-2018						
Acenaphthene	0.378	0.00161		0.01	ug/l	0.5		76	40-140	3	30	
Acenaphthylene	0.383	0.00177		0.01	ug/l	0.5		77	40-140	3	30	
Anthracene	0.457	0.00194		0.01	ug/l	0.5		91	40-140	7	30	
Benz(a)anthracene	0.566	0.00173		0.01	ug/l	0.5		113	40-140	5	30	
Benzo(a)pyrene	0.594	0.00084		0.01	ug/l	0.5		119	40-140	8	30	
Benzo(b)fluoranthene	0.589	0.00148		0.01	ug/l	0.5		118	40-140	5	30	
Benzo(e)pyrene	0.592	0.00127		0.01	ug/l	0.5		118	40-140	5	30	
Benzo(g,h,i)perylene	0.582	0.00131		0.01	ug/l	0.5		116	40-140	5	30	
Benzo(k)fluoranthene	0.548	0.00117		0.01	ug/l	0.5		110	40-140	8	30	
Chrysene	0.528	0.000936		0.01	ug/l	0.5		106	40-140	6	30	
Dibenz(a,h)anthracene	0.556	0.000685		0.01	ug/l	0.5		111	40-140	5	30	
Fluoranthene	0.541	0.00149		0.01	ug/l	0.5		108	40-140	7	30	
Fluorene	0.414	0.00173		0.01	ug/l	0.5		83	40-140	6	30	
Indeno(1,2,3-cd)pyrene	0.615	0.000533		0.01	ug/l	0.5		123	40-140	5	30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

PAHs by GC/MS SIM - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167722 - EPA 3510C												
LCD (WG1167722-3)	Prepared: 13-Oct-2018 Analyzed: 26-Oct-2018											
Naphthalene	0.369	0.00177		0.01	ug/l	0.5		74	40-140	4	30	
Phenanthrene	0.449	0.00189		0.01	ug/l	0.5		90	40-140	7	30	
Pyrene	0.472	0.00152		0.01	ug/l	0.5		94	40-140	0	30	
Surrogate: 2-Methylnaphthalene-d10	*0.41*				*ug/l*			*82*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*0.513*				*ug/l*			*103*	*30-130*			
Surrogate: Pyrene-d10	*0.485*				*ug/l*			*97*	*30-130*			
Batch WG1173002 - EPA 3510C												
BLK (WG1173002-1)	Prepared: 27-Oct-2018 Analyzed: 09-Nov-2018											
Acenaphthene	ND	0.00161		0.01	ug/l				-			Ub
Acenaphthylene	ND	0.00177		0.01	ug/l				-			Ub
Anthracene	ND	0.00194		0.01	ug/l				-			Ub
Benz(a)anthracene	ND	0.00173		0.01	ug/l				-			Ub
Benzo(a)pyrene	ND	0.00084		0.01	ug/l				-			Ub
Benzo(b)fluoranthene	ND	0.00148		0.01	ug/l				-			Ub
Benzo(e)pyrene	ND	0.00127		0.01	ug/l				-			Ub
Benzo(g,h,i)perylene	ND	0.00131		0.01	ug/l				-			Ub
Benzo(k)fluoranthene	ND	0.00117		0.01	ug/l				-			Ub
Chrysene	ND	0.000936		0.01	ug/l				-			Ub
Dibenz(a,h)anthracene	ND	0.000685		0.01	ug/l				-			Ub
Fluoranthene	ND	0.00149		0.01	ug/l				-			Ub
Fluorene	ND	0.00173		0.01	ug/l				-			Ub
Indeno(1,2,3-cd)pyrene	ND	0.000533		0.01	ug/l				-			Ub
Naphthalene	ND	0.00177		0.01	ug/l				-			Ub
Phenanthrene	ND	0.00189		0.01	ug/l				-			Ub
Pyrene	ND	0.00152		0.01	ug/l				-			Ub
Surrogate: 2-Methylnaphthalene-d10	*0.345*				*ug/l*			*69*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*0.466*				*ug/l*			*93*	*30-130*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

PAHs by GC/MS SIM - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1173002 - EPA 3510C												
BLK (WG1173002-1)						Prepared: 27-Oct-2018 Analyzed: 09-Nov-2018						
Surrogate: Pyrene-d10	*0.422*				*ug/l*			*84*	*30-130*			
LCS (WG1173002-2)						Prepared: 27-Oct-2018 Analyzed: 09-Nov-2018						
Acenaphthene	0.383	0.00161		0.01	ug/l	0.5		76	40-140		30	
Acenaphthylene	0.358	0.00177		0.01	ug/l	0.5		72	40-140		30	
Anthracene	0.416	0.00194		0.01	ug/l	0.5		83	40-140		30	
Benz(a)anthracene	0.418	0.00173		0.01	ug/l	0.5		84	40-140		30	
Benzo(a)pyrene	0.453	0.00084		0.01	ug/l	0.5		90	40-140		30	
Benzo(b)fluoranthene	0.443	0.00148		0.01	ug/l	0.5		88	40-140		30	
Benzo(e)pyrene	0.475	0.00127		0.01	ug/l	0.5		95	40-140		30	
Benzo(g,h,i)perylene	0.48	0.00131		0.01	ug/l	0.5		96	40-140		30	
Benzo(k)fluoranthene	0.467	0.00117		0.01	ug/l	0.5		93	40-140		30	
Chrysene	0.451	0.000936		0.01	ug/l	0.5		90	40-140		30	
Dibenz(a,h)anthracene	0.496	0.000685		0.01	ug/l	0.5		99	40-140		30	
Fluoranthene	0.445	0.00149		0.01	ug/l	0.5		89	40-140		30	
Fluorene	0.393	0.00173		0.01	ug/l	0.5		79	40-140		30	
Indeno(1,2,3-cd)pyrene	0.421	0.000533		0.01	ug/l	0.5		84	40-140		30	
Naphthalene	0.362	0.00177		0.01	ug/l	0.5		72	40-140		30	
Phenanthrene	0.402	0.00189		0.01	ug/l	0.5		80	40-140		30	
Pyrene	0.378	0.00152		0.01	ug/l	0.5		76	40-140		30	
Surrogate: 2-Methylnaphthalene-d10	*0.346*				*ug/l*			*69*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*0.419*				*ug/l*			*84*	*30-130*			
Surrogate: Pyrene-d10	*0.393*				*ug/l*			*79*	*30-130*			
LCD (WG1173002-3)						Prepared: 27-Oct-2018 Analyzed: 09-Nov-2018						
Acenaphthene	0.429	0.00161		0.01	ug/l	0.5		86	40-140	12	30	
Acenaphthylene	0.404	0.00177		0.01	ug/l	0.5		81	40-140	12	30	
Anthracene	0.474	0.00194		0.01	ug/l	0.5		95	40-140	13	30	
Benz(a)anthracene	0.46	0.00173		0.01	ug/l	0.5		92	40-140	9	30	
Benzo(a)pyrene	0.462	0.00084		0.01	ug/l	0.5		92	40-140	2	30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

PAHs by GC/MS SIM - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1173002 - EPA 3510C												
LCD (WG1173002-3)	Prepared: 27-Oct-2018 Analyzed: 09-Nov-2018											
Benzo(b)fluoranthene	0.458	0.00148		0.01	ug/l	0.5		92	40-140	4	30	
Benzo(e)pyrene	0.503	0.00127		0.01	ug/l	0.5		101	40-140	6	30	
Benzo(g,h,i)perylene	0.5	0.00131		0.01	ug/l	0.5		100	40-140	4	30	
Benzo(k)fluoranthene	0.508	0.00117		0.01	ug/l	0.5		102	40-140	9	30	
Chrysene	0.492	0.000936		0.01	ug/l	0.5		98	40-140	9	30	
Dibenz(a,h)anthracene	0.518	0.000685		0.01	ug/l	0.5		104	40-140	5	30	
Fluoranthene	0.499	0.00149		0.01	ug/l	0.5		100	40-140	12	30	
Fluorene	0.442	0.00173		0.01	ug/l	0.5		88	40-140	11	30	
Indeno(1,2,3-cd)pyrene	0.437	0.000533		0.01	ug/l	0.5		87	40-140	4	30	
Naphthalene	0.406	0.00177		0.01	ug/l	0.5		81	40-140	12	30	
Phenanthrene	0.454	0.00189		0.01	ug/l	0.5		91	40-140	13	30	
Pyrene	0.418	0.00152		0.01	ug/l			84	30-130	10	30	
Surrogate: 2-Methylnaphthalene-d10	*0.383*				*ug/l*			*77*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*0.443*				*ug/l*			*89*	*30-130*			
Surrogate: Pyrene-d10	*0.439*				*ug/l*			*88*	*40-140*			

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Wet Chemistry Analysis - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0650 - No Prep Wet Chem												
Blank (BBJ0650-BLK1)						Prepared & Analyzed: 19-Oct-2018						
Cyanide	ND	10		10	ug/l				-			Ua
LCS (BBJ0650-BS1)						Prepared & Analyzed: 19-Oct-2018						
Cyanide	270				ug/l	250		108	80-120			
LCS Dup (BBJ0650-BSD1)						Prepared & Analyzed: 19-Oct-2018						
Cyanide	260				ug/l	250		103	80-120	4.54	20	
Matrix Spike (BBJ0650-MS1)		**Source: 18J0711-01**				Prepared & Analyzed: 19-Oct-2018						
Cyanide	230	10		10	ug/l	250	ND	92.1	80-120			
Matrix Spike (BBJ0650-MS2)		**Source: 18J0507-05**				Prepared & Analyzed: 19-Oct-2018						
Cyanide	230	10		10	ug/l	250	ND	92.4	80-120			
Matrix Spike Dup (BBJ0650-MSD1)		**Source: 18J0711-01**				Prepared & Analyzed: 19-Oct-2018						
Cyanide	250	10		10	ug/l	250	ND	101	80-120	9.16	20	
Matrix Spike Dup (BBJ0650-MSD2)		**Source: 18J0507-05**				Prepared & Analyzed: 19-Oct-2018						
Cyanide	250	10		10	ug/l	250	ND	101	80-120	9.25	20	
Batch BBK0038 - No Prep Wet Chem												
Blank (BBK0038-BLK1)						Prepared & Analyzed: 01-Nov-2018						
Cyanide	ND	10		10	ug/L				-			Ua
LCS (BBK0038-BS1)						Prepared & Analyzed: 01-Nov-2018						
Cyanide	270				ug/L	250		107	80-120			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Wet Chemistry Analysis - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0038 - No Prep Wet Chem												
LCS Dup (BBK0038-BSD1)						Prepared & Analyzed: 01-Nov-2018						
Cyanide	270				ug/L	250		108	80-120	0.890	20	
MRL Check (BBK0038-MRL1)						Prepared & Analyzed: 01-Nov-2018						
Cyanide	20				ug/L	20		112	0-200			
Matrix Spike (BBK0038-MS1)		**Source: 18J0401-02**				Prepared & Analyzed: 01-Nov-2018						
Cyanide	240	10		10	ug/L	250	ND	94.5	80-120			
Matrix Spike (BBK0038-MS2)		**Source: 18J0401-13**				Prepared & Analyzed: 01-Nov-2018						
Cyanide	240	10		10	ug/L	250	ND	94.0	80-120			
Matrix Spike Dup (BBK0038-MSD1)		**Source: 18J0401-02**				Prepared & Analyzed: 01-Nov-2018						
Cyanide	240	10		10	ug/L	250	ND	97.6	80-120	3.21	20	
Matrix Spike Dup (BBK0038-MSD2)		**Source: 18J0401-13**				Prepared & Analyzed: 01-Nov-2018						
Cyanide	250	10		10	ug/L	250	ND	99.6	80-120	5.74	20	
Batch BBK0039 - No Prep Wet Chem												
Blank (BBK0039-BLK1)						Prepared & Analyzed: 01-Nov-2018						
Cyanide	ND	10		10	ug/L				-			Ua
LCS (BBK0039-BS1)						Prepared & Analyzed: 01-Nov-2018						
Cyanide	280				ug/L	250		112	80-120			
LCS Dup (BBK0039-BSD1)						Prepared & Analyzed: 01-Nov-2018						
Cyanide	270				ug/L	250		109	80-120	2.39	20	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Wet Chemistry Analysis - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0039 - No Prep Wet Chem												
Matrix Spike (BBK0039-MS1)		**Source: 18J0917-01**				Prepared & Analyzed: 01-Nov-2018						
Cyanide	230	10		10	ug/L	250	ND	91.0	80-120			
Matrix Spike Dup (BBK0039-MSD1)		**Source: 18J0917-01**				Prepared & Analyzed: 01-Nov-2018						
Cyanide	240	10		10	ug/L	250	ND	96.7	80-120	6.09	20	

USACE ERDC-EP-C
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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL) ERDC, 3909 Halls Ferry Road Vicksburg MS, 39180	Project: Houston Ship Channel-North of Morgan's Point Project Manager: Cheryl Montgomery	**Reported:** 22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5807224 - NA												
Blank (5807224-BLK)					Prepared: 24-Oct-2018 Analyzed: 29-Oct-2018							
1,2,3,4,6,7,8-Hepta CDD	ND	1.2		50	pg/L				-			Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.44		50	pg/L				-			Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.43		50	pg/L				-			Ud
1,2,3,4,7,8-Hexa CDD	ND	1.43		50	pg/L				-			Ud
1,2,3,4,7,8-Hexa CDF	1.49	1.21		50	pg/L				-			Ja
1,2,3,6,7,8-Hexa CDD	ND	1.45		50	pg/L				-			Ud
1,2,3,6,7,8-Hexa CDF	ND	1.3		50	pg/L				-			Ud
1,2,3,7,8,9-Hexa CDD	ND	1.46		50	pg/L				-			Ud
1,2,3,7,8,9-Hexa CDF	1.9	1.26		50	pg/L				-			Ja
1,2,3,7,8-Penta CDD	ND	1.25		50	pg/L				-			Ud
1,2,3,7,8-Penta CDF	ND	1.23		50	pg/L				-			Ud
2,3,4,6,7,8-Hexa CDF	1.74	1.17		50	pg/L				-			Ja
2,3,4,7,8-Penta CDF	ND	1.12		50	pg/L				-			Ud
2,3,7,8-Tetra CDD	ND	1.2		10	pg/L				-			Ud
2,3,7,8-Tetra CDF	ND	1.4		10	pg/L				-			Ud
Octa CDD	ND	2.2		100	pg/L				-			Ud
Octa CDF	ND	2.27		100	pg/L				-			Ud
Total Hepta CDD	ND	1.2		50	pg/L				-			Ud
Total Hepta CDF	ND	1.44		50	pg/L				-			Ud
Total Hexa CDD	ND	1.46		50	pg/L				-			Ud
Total Hexa CDF	5.12	1.23		50	pg/L				-			Ja
Total Penta CDD	ND	1.25		50	pg/L				-			Ud
Total Penta CDF	ND	1.18		50	pg/L				-			Ud
Total Tetra CDD	ND	1.2		10	pg/L				-			Ud
Total Tetra CDF	ND	1.4		10	pg/L				-			Ud
Surrogate: 37CL4 2378 Tetra CDD	*1400*				*pg/L*	*2000*		*70*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1260*				*pg/L*	*2000*		*63*	*23-140*			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5807224 - NA												
Blank (5807224-BLK)						Prepared: 24-Oct-2018 Analyzed: 29-Oct-2018						
Surrogate: C13-1234678 HeptaCDF	*1500*				*pg/L*	*2000*		*75*	*28-143*			
Surrogate: C13-123478 HexaCDD	*1360*				*pg/L*	*2000*		*68*	*32-141*			
Surrogate: C13-123478 HexaCDF	*1680*				*pg/L*	*2000*		*84*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1260*				*pg/L*	*2000*		*63*	*28-143*			
Surrogate: C13-123678 HexaCDD	*1740*				*pg/L*	*2000*		*87*	*28-130*			
Surrogate: C13-123678 HexaCDF	*1740*				*pg/L*	*2000*		*87*	*26-123*			
Surrogate: C13-12378 PentaCDD	*1820*				*pg/L*	*2000*		*91*	*25-181*			
Surrogate: C13-12378 PentaCDF	*1820*				*pg/L*	*2000*		*91*	*24-185*			
Surrogate: C13-123789 HexaCDF	*1660*				*pg/L*	*2000*		*83*	*28-136*			
Surrogate: C13-234678 HexaCDF	*1520*				*pg/L*	*2000*		*76*	*29-147*			
Surrogate: C13-23478 PentaCDF	*2020*				*pg/L*	*2000*		*101*	*21-178*			
Surrogate: C13-2378 TetraCDD	*1680*				*pg/L*	*2000*		*84*	*24-164*			
Surrogate: C13-2378 TetraCDF	*1520*				*pg/L*	*2000*		*76*	*24-169*			
Surrogate: C13-OCDD	*2080*				*pg/L*	*4000*		*52*	*17-157*			
LCS (5807224-LCS)						Prepared: 24-Oct-2018 Analyzed: 29-Oct-2018						
1,2,3,4,6,7,8-Hepta CDD	91	1.12		50	pg/L	100		91	70-140			
1,2,3,4,6,7,8-Hepta CDF	92	1.47		50	pg/L	100		92	82-122			
1,2,3,4,7,8,9-Hepta CDF	97	1.46		50	pg/L	100		97	78-138			
1,2,3,4,7,8-Hexa CDD	97	1.43		50	pg/L	100		97	70-164			
1,2,3,4,7,8-Hexa CDF	93	1.43		50	pg/L	100		93	72-134			
1,2,3,6,7,8-Hexa CDD	90	1.45		50	pg/L	100		90	76-134			
1,2,3,6,7,8-Hexa CDF	94	1.53		50	pg/L	100		94	84-130			
1,2,3,7,8,9-Hexa CDD	110	1.46		50	pg/L	100		110	64-162			
1,2,3,7,8,9-Hexa CDF	95	1.48		50	pg/L	100		95	78-130			
1,2,3,7,8-Penta CDD	92	1.36		50	pg/L	100		92	25-181			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5807224 - NA												
LCS (5807224-LCS)						Prepared: 24-Oct-2018 Analyzed: 29-Oct-2018						
1,2,3,7,8-Penta CDF	90	1.31		50	pg/L	100		90	80-134			
2,3,4,6,7,8-Hexa CDF	98	1.38		50	pg/L	100		98	70-156			
2,3,4,7,8-Penta CDF	95	1.19		50	pg/L	100		95	68-160			
2,3,7,8-Tetra CDD	89	1.4		10	pg/L	100		89	67-158			
2,3,7,8-Tetra CDF	91	1.23		10	pg/L	100		91	75-158			
Octa CDD	89	2.73		100	pg/L	100		89	78-144			
Octa CDF	87	1.43		100	pg/L	100		87	63-170			
Surrogate: 37CL4 2378 Tetra CDD	*1640*				*pg/L*	*2000*		*82*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1420*				*pg/L*	*2000*		*71*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*1600*				*pg/L*	*2000*		*80*	*28-143*			
Surrogate: C13-123478 HexaCDD	*1480*				*pg/L*	*2000*		*74*	*32-141*			
Surrogate: C13-123478 HexaCDF	*1800*				*pg/L*	*2000*		*90*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1360*				*pg/L*	*2000*		*68*	*28-143*			
Surrogate: C13-123678 HexaCDD	*1960*				*pg/L*	*2000*		*98*	*28-130*			
Surrogate: C13-123678 HexaCDF	*1860*				*pg/L*	*2000*		*93*	*26-123*			
Surrogate: C13-12378 PentaCDD	*2020*				*pg/L*	*2000*		*101*	*25-181*			
Surrogate: C13-12378 PentaCDF	*2020*				*pg/L*	*2000*		*101*	*24-185*			
Surrogate: C13-123789 HexaCDF	*1780*				*pg/L*	*2000*		*89*	*28-136*			
Surrogate: C13-234678 HexaCDF	*1660*				*pg/L*	*2000*		*83*	*29-147*			
Surrogate: C13-23478 PentaCDF	*2100*				*pg/L*	*2000*		*105*	*21-178*			
Surrogate: C13-2378 TetraCDD	*1700*				*pg/L*	*2000*		*85*	*24-164*			
Surrogate: C13-2378 TetraCDF	*1580*				*pg/L*	*2000*		*79*	*24-169*			
Surrogate: C13-OCDD	*2320*				*pg/L*	*4000*		*58*	*17-157*			
LCS Dup (5807224-LCS Dup)						Prepared: 24-Oct-2018 Analyzed: 29-Oct-2018						
1,2,3,4,6,7,8-Hepta CDD	98	1.36		50	pg/L	100		98	70-140	7.4	25	

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5807224 - NA												
LCS Dup (5807224-LCS Dup)						Prepared: 24-Oct-2018 Analyzed: 29-Oct-2018						
1,2,3,4,6,7,8-Hepta CDF	94	1.06		50	pg/L	100		94	82-122	2.2	25	
1,2,3,4,7,8,9-Hepta CDF	99	1.05		50	pg/L	100		99	78-138	2.0	25	
1,2,3,4,7,8-Hexa CDD	90	1.39		50	pg/L	100		90	70-164	7.5	25	
1,2,3,4,7,8-Hexa CDF	95	1.44		50	pg/L	100		95	72-134	2.1	25	
1,2,3,6,7,8-Hexa CDD	95	1.42		50	pg/L	100		95	76-134	5.4	25	
1,2,3,6,7,8-Hexa CDF	100	1.55		50	pg/L	100		100	84-130	6.2	25	
1,2,3,7,8,9-Hexa CDD	92	1.43		50	pg/L	100		92	64-162	18	25	
1,2,3,7,8,9-Hexa CDF	100	1.5		50	pg/L	100		100	78-130	5.1	25	
1,2,3,7,8-Penta CDD	95	1.3		50	pg/L	100		95	25-181	3.2	25	
1,2,3,7,8-Penta CDF	93	1.28		50	pg/L	100		93	80-134	3.3	25	
2,3,4,6,7,8-Hexa CDF	103	1.39		50	pg/L	100		103	70-156	5.0	25	
2,3,4,7,8-Penta CDF	98	1.17		50	pg/L	100		98	68-160	3.1	25	
2,3,7,8-Tetra CDD	89	1.33		10	pg/L	100		89	67-158	0	25	
2,3,7,8-Tetra CDF	90	1.12		10	pg/L	100		90	75-158	1.1	25	
Octa CDD	91	1.02		100	pg/L	100		91	78-144	0	25	
Octa CDF	88	1.52		100	pg/L	100		88	63-170	0	25	
Surrogate: 37CL4 2378 Tetra CDD	*1780*				*pg/L*	*2000*		*89*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1580*				*pg/L*	*2000*		*79*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*1840*				*pg/L*	*2000*		*92*	*28-143*			
Surrogate: C13-123478 HexaCDD	*1740*				*pg/L*	*2000*		*87*	*32-141*			
Surrogate: C13-123478 HexaCDF	*2220*				*pg/L*	*2000*		*111*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1540*				*pg/L*	*2000*		*77*	*28-143*			
Surrogate: C13-123678 HexaCDD	*2280*				*pg/L*	*2000*		*114*	*28-130*			
Surrogate: C13-123678 HexaCDF	*2240*				*pg/L*	*2000*		*112*	*26-123*			
Surrogate: C13-12378 PentaCDD	*1960*				*pg/L*	*2000*		*98*	*25-181*			
Surrogate: C13-12378 PentaCDF	*1940*				*pg/L*	*2000*		*97*	*24-185*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL) ERDC, 3909 Halls Ferry Road Vicksburg MS, 39180	Project: Houston Ship Channel-North of Morgan's Point Project Manager: Cheryl Montgomery	**Reported:** 22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5807224 - NA												
LCS Dup (5807224-LCS Dup)						Prepared: 24-Oct-2018 Analyzed: 29-Oct-2018						
Surrogate: C13-123789 HexaCDF	*1860*				*pg/L*	*2000*		*93*	*28-136*			
Surrogate: C13-234678 HexaCDF	*1980*				*pg/L*	*2000*		*99*	*29-147*			
Surrogate: C13-23478 PentaCDF	*2000*				*pg/L*	*2000*		*100*	*21-178*			
Surrogate: C13-2378 TetraCDD	*1860*				*pg/L*	*2000*		*93*	*24-164*			
Surrogate: C13-2378 TetraCDF	*1800*				*pg/L*	*2000*		*90*	*24-169*			
Surrogate: C13-OCDD	*2640*				*pg/L*	*4000*		*66*	*17-157*			
Batch 5818560 - NA												
Blank (5818560-BLK)						Prepared: 24-Oct-2018 Analyzed: 05-Nov-2018						
1,2,3,4,6,7,8-Hepta CDD	ND	2.59		50	pg/L				-			Ud
1,2,3,4,6,7,8-Hepta CDF	ND	2.3		50	pg/L				-			A9439, U
1,2,3,4,7,8,9-Hepta CDF	3.54	1.6		50	pg/L				-			Ja
1,2,3,4,7,8-Hexa CDD	ND	1.27		50	pg/L				-			Ud
1,2,3,4,7,8-Hexa CDF	ND	2.02		50	pg/L				-			A9441, U
1,2,3,6,7,8-Hexa CDD	ND	1.3		50	pg/L				-			Ud
1,2,3,6,7,8-Hexa CDF	2.09	1.24		50	pg/L				-			Ja
1,2,3,7,8,9-Hexa CDD	ND	1.31		50	pg/L				-			Ud
1,2,3,7,8,9-Hexa CDF	ND	1.2		50	pg/L				-			Ud
1,2,3,7,8-Penta CDD	ND	2.03		50	pg/L				-			Ud
1,2,3,7,8-Penta CDF	1.99	1.42		50	pg/L				-			Ja
2,3,4,6,7,8-Hexa CDF	2.74	1.12		50	pg/L				-			Ja
2,3,4,7,8-Penta CDF	2.45	1.29		50	pg/L				-			Ja
2,3,7,8-Tetra CDD	ND	1.15		10	pg/L				-			Ud
2,3,7,8-Tetra CDF	ND	1.29		10	pg/L				-			Ud
Octa CDD	7.66	2.5		100	pg/L				-			Ja
Octa CDF	ND	6.77		100	pg/L				-			A9428, U
Total Hepta CDD	ND	2.59		50	pg/L				-			Ud
Total Hepta CDF	3.54	1.61		50	pg/L				-			Ja

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5818560 - NA												
Blank (5818560-BLK)						Prepared: 24-Oct-2018 Analyzed: 05-Nov-2018						
Total Hexa CDD	ND	1.31		50	pg/L				-			Ud
Total Hexa CDF	4.83	1.18		50	pg/L				-			Ja
Total Penta CDD	ND	2.03		50	pg/L				-			Ud
Total Penta CDF	4.44	1.35		50	pg/L				-			Ja
Total Tetra CDD	ND	1.15		10	pg/L				-			Ud
Total Tetra CDF	ND	1.29		10	pg/L				-			Ud
Surrogate: 37CL4 2378 Tetra CDD	*1380*				*pg/L*	*2000*		*69*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1460*				*pg/L*	*2000*		*73*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*1460*				*pg/L*	*2000*		*73*	*28-143*			
Surrogate: C13-123478 HexaCDD	*1440*				*pg/L*	*2000*		*72*	*32-141*			
Surrogate: C13-123478 HexaCDF	*1400*				*pg/L*	*2000*		*70*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1360*				*pg/L*	*2000*		*68*	*28-143*			
Surrogate: C13-123678 HexaCDD	*1640*				*pg/L*	*2000*		*82*	*28-130*			
Surrogate: C13-123678 HexaCDF	*1440*				*pg/L*	*2000*		*72*	*26-123*			
Surrogate: C13-12378 PentaCDD	*1880*				*pg/L*	*2000*		*94*	*25-181*			
Surrogate: C13-12378 PentaCDF	*1580*				*pg/L*	*2000*		*79*	*24-185*			
Surrogate: C13-123789 HexaCDF	*1540*				*pg/L*	*2000*		*77*	*28-136*			
Surrogate: C13-234678 HexaCDF	*1380*				*pg/L*	*2000*		*69*	*29-147*			
Surrogate: C13-23478 PentaCDF	*1880*				*pg/L*	*2000*		*94*	*21-178*			
Surrogate: C13-2378 TetraCDD	*1500*				*pg/L*	*2000*		*75*	*24-164*			
Surrogate: C13-2378 TetraCDF	*1380*				*pg/L*	*2000*		*69*	*24-169*			
Surrogate: C13-OCDD	*3080*				*pg/L*	*4000*		*77*	*17-157*			
LCS (5818560-LCS)						Prepared: 24-Oct-2018 Analyzed: 06-Nov-2018						
1,2,3,4,6,7,8-Hepta CDD	101	1.11		50	pg/L	100		101	70-140			
1,2,3,4,6,7,8-Hepta CDF	92	1.02		50	pg/L	100		92	82-122			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5818560 - NA												
LCS (5818560-LCS)						Prepared: 24-Oct-2018 Analyzed: 06-Nov-2018						
1,2,3,4,7,8,9-Hepta CDF	94	1.01		50	pg/L	100		94	78-138			
1,2,3,4,7,8-Hexa CDD	94	1.01		50	pg/L	100		94	70-164			
1,2,3,4,7,8-Hexa CDF	91	1.17		50	pg/L	100		91	72-134			
1,2,3,6,7,8-Hexa CDD	91	1.03		50	pg/L	100		91	76-134			
1,2,3,6,7,8-Hexa CDF	97	1.25		50	pg/L	100		97	84-130			
1,2,3,7,8,9-Hexa CDD	95	1.04		50	pg/L	100		95	64-162			
1,2,3,7,8,9-Hexa CDF	94	1.21		50	pg/L	100		94	78-130			
1,2,3,7,8-Penta CDD	97	1.12		50	pg/L	100		97	25-181			
1,2,3,7,8-Penta CDF	95	1.15		50	pg/L	100		95	80-134			
2,3,4,6,7,8-Hexa CDF	93	1.13		50	pg/L	100		93	70-156			
2,3,4,7,8-Penta CDF	97	1.05		50	pg/L	100		97	68-160			
2,3,7,8-Tetra CDD	88	1.02		10	pg/L	100		88	67-158			
2,3,7,8-Tetra CDF	92	1.15		10	pg/L	100		92	75-158			
Octa CDD	92	2.08		100	pg/L	100		92	78-144			
Octa CDF	90	1.69		100	pg/L	100		90	63-170			
Surrogate: 37CL4 2378 Tetra CDD	*1400*				*pg/L*	*2000*		*70*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1580*				*pg/L*	*2000*		*79*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*1660*				*pg/L*	*2000*		*83*	*28-143*			
Surrogate: C13-123478 HexaCDD	*1720*				*pg/L*	*2000*		*86*	*32-141*			
Surrogate: C13-123478 HexaCDF	*1620*				*pg/L*	*2000*		*81*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1600*				*pg/L*	*2000*		*80*	*28-143*			
Surrogate: C13-123678 HexaCDD	*1880*				*pg/L*	*2000*		*94*	*28-130*			
Surrogate: C13-123678 HexaCDF	*1600*				*pg/L*	*2000*		*80*	*26-123*			
Surrogate: C13-12378 PentaCDD	*1840*				*pg/L*	*2000*		*92*	*25-181*			
Surrogate: C13-12378 PentaCDF	*1520*				*pg/L*	*2000*		*76*	*24-185*			
Surrogate: C13-123789 HexaCDF	*1640*				*pg/L*	*2000*		*82*	*28-136*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5818560 - NA												
LCS (5818560-LCS)						Prepared: 24-Oct-2018 Analyzed: 06-Nov-2018						
Surrogate: C13-234678 HexaCDF	*1620*				*pg/L*	*2000*		*81*	*29-147*			
Surrogate: C13-23478 PentaCDF	*1900*				*pg/L*	*2000*		*95*	*21-178*			
Surrogate: C13-2378 TetraCDD	*1600*				*pg/L*	*2000*		*80*	*24-164*			
Surrogate: C13-2378 TetraCDF	*1440*				*pg/L*	*2000*		*72*	*24-169*			
Surrogate: C13-OCDD	*3520*				*pg/L*	*4000*		*88*	*17-157*			
LCS Dup (5818560-LCS Dup)						Prepared: 24-Oct-2018 Analyzed: 06-Nov-2018						
1,2,3,4,6,7,8-Hepta CDD	94	1.13		50	pg/L	100		94	70-140	7.2	25	
1,2,3,4,6,7,8-Hepta CDF	96	1.17		50	pg/L	100		96	82-122	4.3	25	
1,2,3,4,7,8,9-Hepta CDF	95	1.16		50	pg/L	100		95	78-138	1.1	25	
1,2,3,4,7,8-Hexa CDD	96	1.09		50	pg/L	100		96	70-164	2.1	25	
1,2,3,4,7,8-Hexa CDF	91	1.13		50	pg/L	100		91	72-134	0	25	
1,2,3,6,7,8-Hexa CDD	92	1.11		50	pg/L	100		92	76-134	1.1	25	
1,2,3,6,7,8-Hexa CDF	93	1.22		50	pg/L	100		93	84-130	4.2	25	
1,2,3,7,8,9-Hexa CDD	110	1.12		50	pg/L	100		110	64-162	15	25	
1,2,3,7,8,9-Hexa CDF	99	1.18		50	pg/L	100		99	78-130	5.2	25	
1,2,3,7,8-Penta CDD	96	1.14		50	pg/L	100		96	25-181	1.0	25	
1,2,3,7,8-Penta CDF	96	1.16		50	pg/L	100		96	80-134	1.0	25	
2,3,4,6,7,8-Hexa CDF	94	1.1		50	pg/L	100		94	70-156	1.1	25	
2,3,4,7,8-Penta CDF	94	1.06		50	pg/L	100		94	68-160	3.1	25	
2,3,7,8-Tetra CDD	91	1.02		10	pg/L	100		91	67-158	3.4	25	
2,3,7,8-Tetra CDF	89	1.04		10	pg/L	100		89	75-158	3.3	25	
Octa CDD	95	2.48		100	pg/L	100		95	78-144	0	25	
Octa CDF	93	1.67		100	pg/L	100		93	63-170	0	25	
Surrogate: 37CL4 2378 Tetra CDD	*1820*				*pg/L*	*2000*		*91*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1800*				*pg/L*	*2000*		*90*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*1820*				*pg/L*	*2000*		*91*	*28-143*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5818560 - NA												
LCS Dup (5818560-LCS Dup)						Prepared: 24-Oct-2018 Analyzed: 06-Nov-2018						
Surrogate: C13-123478 HexaCDD	*1920*				*pg/L*	*2000*		*96*	*32-141*			
Surrogate: C13-123478 HexaCDF	*1860*				*pg/L*	*2000*		*93*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1760*				*pg/L*	*2000*		*88*	*28-143*			
Surrogate: C13-123678 HexaCDD	*2080*				*pg/L*	*2000*		*104*	*28-130*			
Surrogate: C13-123678 HexaCDF	*1820*				*pg/L*	*2000*		*91*	*26-123*			
Surrogate: C13-12378 PentaCDD	*2260*				*pg/L*	*2000*		*113*	*25-181*			
Surrogate: C13-12378 PentaCDF	*1880*				*pg/L*	*2000*		*94*	*24-185*			
Surrogate: C13-123789 HexaCDF	*1860*				*pg/L*	*2000*		*93*	*28-136*			
Surrogate: C13-234678 HexaCDF	*1780*				*pg/L*	*2000*		*89*	*29-147*			
Surrogate: C13-23478 PentaCDF	*2240*				*pg/L*	*2000*		*112*	*21-178*			
Surrogate: C13-2378 TetraCDD	*2060*				*pg/L*	*2000*		*103*	*24-164*			
Surrogate: C13-2378 TetraCDF	*1860*				*pg/L*	*2000*		*93*	*24-169*			
Surrogate: C13-OCDD	*3840*				*pg/L*	*4000*		*96*	*17-157*			
Batch 5861463 - NA												
Blank (5861463-BLK)						Prepared: 28-Nov-2018 Analyzed: 02-Dec-2018						
1,2,3,4,6,7,8-Hepta CDD	ND	1.25		50	pg/L				-			Ud
1,2,3,4,6,7,8-Hepta CDF	ND	0.705		50	pg/L				-			Ud
1,2,3,4,7,8,9-Hepta CDF	ND	0.701		50	pg/L				-			Ud
1,2,3,4,7,8-Hexa CDD	ND	1.19		50	pg/L				-			Ud
1,2,3,4,7,8-Hexa CDF	ND	1.08		50	pg/L				-			Ud
1,2,3,6,7,8-Hexa CDD	ND	1.21		50	pg/L				-			Ud
1,2,3,6,7,8-Hexa CDF	ND	1.16		50	pg/L				-			Ud
1,2,3,7,8,9-Hexa CDD	ND	1.22		50	pg/L				-			Ud
1,2,3,7,8,9-Hexa CDF	ND	1.12		50	pg/L				-			Ud
1,2,3,7,8-Penta CDD	ND	1.35		50	pg/L				-			Ud

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5861463 - NA												
Blank (5861463-BLK)					Prepared: 28-Nov-2018 Analyzed: 02-Dec-2018							
1,2,3,7,8-Penta CDF	ND	1.59		50	pg/L				-			Ud
2,3,4,6,7,8-Hexa CDF	ND	1.05		50	pg/L				-			Ud
2,3,4,7,8-Penta CDF	ND	1.45		50	pg/L				-			Ud
2,3,7,8-Tetra CDD	ND	1.15		10	pg/L				-			Ud
2,3,7,8-Tetra CDF	ND	0.775		10	pg/L				-			Ud
Octa CDD	ND	2.12		100	pg/L				-			Ud
Octa CDF	ND	2.17		100	pg/L				-			Ud
Total Hepta CDD	ND	1.25		50	pg/L				-			Ud
Total Hepta CDF	ND	0.703		50	pg/L				-			Ud
Total Hexa CDD	ND	1.22		50	pg/L				-			Ud
Total Hexa CDF	ND	1.1		50	pg/L				-			Ud
Total Penta CDD	ND	1.35		50	pg/L				-			Ud
Total Penta CDF	ND	1.51		50	pg/L				-			Ud
Total Tetra CDD	ND	1.15		10	pg/L				-			Ud
Total Tetra CDF	ND	0.775		10	pg/L				-			Ud
Surrogate: 37CL4 2378 Tetra CDD	*1880*				*pg/L*	*2000*		*94*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1980*				*pg/L*	*2000*		*99*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*2020*				*pg/L*	*2000*		*101*	*28-143*			
Surrogate: C13-123478 HexaCDD	*2140*				*pg/L*	*2000*		*107*	*32-141*			
Surrogate: C13-123478 HexaCDF	*1900*				*pg/L*	*2000*		*95*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1940*				*pg/L*	*2000*		*97*	*28-143*			
Surrogate: C13-123678 HexaCDD	*2300*				*pg/L*	*2000*		*115*	*28-130*			
Surrogate: C13-123678 HexaCDF	*2140*				*pg/L*	*2000*		*107*	*26-123*			
Surrogate: C13-12378 PentaCDD	*2200*				*pg/L*	*2000*		*110*	*25-181*			
Surrogate: C13-12378 PentaCDF	*1800*				*pg/L*	*2000*		*90*	*24-185*			
Surrogate: C13-123789 HexaCDF	*2000*				*pg/L*	*2000*		*100*	*28-136*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5861463 - NA												
Blank (5861463-BLK)						Prepared: 28-Nov-2018 Analyzed: 02-Dec-2018						
Surrogate: C13-234678 HexaCDF	*1980*				*pg/L*	*2000*		*99*	*29-147*			
Surrogate: C13-23478 PentaCDF	*2080*				*pg/L*	*2000*		*104*	*21-178*			
Surrogate: C13-2378 TetraCDD	*1940*				*pg/L*	*2000*		*97*	*24-164*			
Surrogate: C13-2378 TetraCDF	*1980*				*pg/L*	*2000*		*99*	*24-169*			
Surrogate: C13-OCDD	*4080*				*pg/L*	*4000*		*102*	*17-157*			
LCS (5861463-LCS)						Prepared: 28-Nov-2018 Analyzed: 01-Dec-2018						
1,2,3,4,6,7,8-Hepta CDD	93	1.47		50	pg/L	100		93	70-140			
1,2,3,4,6,7,8-Hepta CDF	91	1.54		50	pg/L	100		91	82-122			
1,2,3,4,7,8,9-Hepta CDF	96	1.53		50	pg/L	100		96	78-138			
1,2,3,4,7,8-Hexa CDD	81	1.07		50	pg/L	100		81	70-164			
1,2,3,4,7,8-Hexa CDF	97	1.35		50	pg/L	100		97	72-134			
1,2,3,6,7,8-Hexa CDD	98	1.09		50	pg/L	100		98	76-134			
1,2,3,6,7,8-Hexa CDF	99	1.45		50	pg/L	100		99	84-130			
1,2,3,7,8,9-Hexa CDD	92	1.1		50	pg/L	100		92	64-162			
1,2,3,7,8,9-Hexa CDF	94	1.4		50	pg/L	100		94	78-130			
1,2,3,7,8-Penta CDD	98	2.72		50	pg/L	100		98	25-181			
1,2,3,7,8-Penta CDF	94	1.84		50	pg/L	100		94	80-134			
2,3,4,6,7,8-Hexa CDF	98	1.3		50	pg/L	100		98	70-156			
2,3,4,7,8-Penta CDF	93	1.68		50	pg/L	100		93	68-160			
2,3,7,8-Tetra CDD	85	1.9		10	pg/L	100		85	67-158			
2,3,7,8-Tetra CDF	88	2.03		10	pg/L	100		88	75-158			
Octa CDD	95	3.21		100	pg/L	100		95	78-144			
Octa CDF	89	2.1		100	pg/L	100		89	63-170			
Surrogate: 37CL4 2378 Tetra CDD	*1960*				*pg/L*	*2000*		*98*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1960*				*pg/L*	*2000*		*98*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*1800*				*pg/L*	*2000*		*90*	*28-143*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5861463 - NA												
LCS (5861463-LCS)						Prepared: 28-Nov-2018 Analyzed: 01-Dec-2018						
Surrogate: C13-123478 HexaCDD	*2240*				*pg/L*	*2000*		*112*	*32-141*			
Surrogate: C13-123478 HexaCDF	*1900*				*pg/L*	*2000*		*95*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1840*				*pg/L*	*2000*		*92*	*28-143*			
Surrogate: C13-123678 HexaCDD	*2340*				*pg/L*	*2000*		*117*	*28-130*			
Surrogate: C13-123678 HexaCDF	*2000*				*pg/L*	*2000*		*100*	*26-123*			
Surrogate: C13-12378 PentaCDD	*2500*				*pg/L*	*2000*		*125*	*25-181*			
Surrogate: C13-12378 PentaCDF	*2020*				*pg/L*	*2000*		*101*	*24-185*			
Surrogate: C13-123789 HexaCDF	*1960*				*pg/L*	*2000*		*98*	*28-136*			
Surrogate: C13-234678 HexaCDF	*1920*				*pg/L*	*2000*		*96*	*29-147*			
Surrogate: C13-23478 PentaCDF	*2360*				*pg/L*	*2000*		*118*	*21-178*			
Surrogate: C13-2378 TetraCDD	*2260*				*pg/L*	*2000*		*113*	*24-164*			
Surrogate: C13-2378 TetraCDF	*2080*				*pg/L*	*2000*		*104*	*24-169*			
Surrogate: C13-OCDD	*4120*				*pg/L*	*4000*		*103*	*17-157*			
LCS Dup (5861463-LCS Dup)						Prepared: 28-Nov-2018 Analyzed: 01-Dec-2018						
1,2,3,4,6,7,8-Hepta CDD	94	1.05		50	pg/L	100		94	70-140	1.1	25	
1,2,3,4,6,7,8-Hepta CDF	90	1.03		50	pg/L	100		90	82-122	1.1	25	
1,2,3,4,7,8,9-Hepta CDF	96	1.03		50	pg/L	100		96	78-138	0	25	
1,2,3,4,7,8-Hexa CDD	80	0.953		50	pg/L	100		80	70-164	1.2	25	
1,2,3,4,7,8-Hexa CDF	94	0.944		50	pg/L	100		94	72-134	3.1	25	
1,2,3,6,7,8-Hexa CDD	94	0.971		50	pg/L	100		94	76-134	4.2	25	
1,2,3,6,7,8-Hexa CDF	94	1.01		50	pg/L	100		94	84-130	5.2	25	
1,2,3,7,8,9-Hexa CDD	88	0.978		50	pg/L	100		88	64-162	4.4	25	
1,2,3,7,8,9-Hexa CDF	97	0.98		50	pg/L	100		97	78-130	3.1	25	
1,2,3,7,8-Penta CDD	97	1.48		50	pg/L	100		97	25-181	1.0	25	
1,2,3,7,8-Penta CDF	94	1.73		50	pg/L	100		94	80-134	0	25	
2,3,4,6,7,8-Hexa CDF	96	0.912		50	pg/L	100		96	70-156	2.1	25	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5861463 - NA												
LCS Dup (5861463-LCS Dup)						Prepared: 28-Nov-2018 Analyzed: 01-Dec-2018						
2,3,4,7,8-Penta CDF	89	1.57		50	pg/L	100		89	68-160	4.4	25	
2,3,7,8-Tetra CDD	84	1.26		10	pg/L	100		84	67-158	1.2	25	
2,3,7,8-Tetra CDF	89	1.16		10	pg/L	100		89	75-158	1.1	25	
Octa CDD	92	4.07		100	pg/L	100		92	78-144	0	25	
Octa CDF	90	2.36		100	pg/L	100		90	63-170	0	25	
Surrogate: 37CL4 2378 Tetra CDD	*2080*				*pg/L*	*2000*		*104*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*2160*				*pg/L*	*2000*		*108*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*2200*				*pg/L*	*2000*		*110*	*28-143*			
Surrogate: C13-123478 HexaCDD	*2580*				*pg/L*	*2000*		*129*	*32-141*			
Surrogate: C13-123478 HexaCDF	*2240*				*pg/L*	*2000*		*112*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*2160*				*pg/L*	*2000*		*108*	*28-143*			
Surrogate: C13-123678 HexaCDD	*2500*				*pg/L*	*2000*		*125*	*28-130*			
Surrogate: C13-123678 HexaCDF	*2340*				*pg/L*	*2000*		*117*	*26-123*			
Surrogate: C13-12378 PentaCDD	*2660*				*pg/L*	*2000*		*133*	*25-181*			
Surrogate: C13-12378 PentaCDF	*2180*				*pg/L*	*2000*		*109*	*24-185*			
Surrogate: C13-123789 HexaCDF	*2160*				*pg/L*	*2000*		*108*	*28-136*			
Surrogate: C13-234678 HexaCDF	*2140*				*pg/L*	*2000*		*107*	*29-147*			
Surrogate: C13-23478 PentaCDF	*2540*				*pg/L*	*2000*		*127*	*21-178*			
Surrogate: C13-2378 TetraCDD	*2320*				*pg/L*	*2000*		*116*	*24-164*			
Surrogate: C13-2378 TetraCDF	*2180*				*pg/L*	*2000*		*109*	*24-169*			
Surrogate: C13-OCDD	*4560*				*pg/L*	*4000*		*114*	*17-157*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

TNRCC 1005 - Quality Control

Katahdin

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG239722 - TPH TCEQ 1005												
BLK (WG239722-1)						Prepared & Analyzed: 31-Oct-2018						
>C12-C28	ND	3900		5000	ug/L				-			Uc
>C28-C35	ND	3900		5000	ug/L				-			Uc
C6-C12	ND	2000		5000	ug/L				-			Uc
C6-C35	ND	6900		10000	ug/L				-			Uc
Surrogate: 1-Chlorooctane	*88.0*				*%*			*88.0*	*70-130*			
Surrogate: O-TERPHENYL	*97.5*				*%*			*97.5*	*70-130*			
BS (WG239722-2)						Prepared & Analyzed: 31-Oct-2018						
>C12-C28	35700	3900		5000	ug/L	33300		107	70-125			
C6-C12	33500	2000		5000	ug/L	33300		101	75-125			
C6-C35	68800	6900		10000	ug/L	66700		103	70-125			
Surrogate: 1-Chlorooctane	*104*				*%*			*104*	*70-130*			
Surrogate: O-TERPHENYL	*99.5*				*%*			*99.5*	*70-130*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0914 - SW5030B												
Blank (BBJ0914-BLK1)					Prepared & Analyzed: 29-Oct-2018							
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L				-			Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L				-			Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L				-			Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L				-			Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L				-			Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L				-			Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L				-			Ua
1,2,4-Trichlorobenzene	ND	0.50		1.00	ug/L				-			Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		4.00	ug/L				-			Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L				-			Ua
1,2-Dichlorobenzene	ND	0.40		1.00	ug/L				-			Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L				-			Ua
1,2-Dichloropropane	ND	0.40		1.00	ug/L				-			Ua
1,3-Dichlorobenzene	ND	0.30		1.00	ug/L				-			Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L				-			Ua
1,4-Dioxane	ND	40.0		100	ug/L				-			Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L				-			Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L				-			Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L				-			Ua
Acetone	ND	7.00		10.0	ug/L				-			Ua
Benzene	ND	0.40		1.00	ug/L				-			Ua
Bromodichloromethane	ND	0.40		0.50	ug/L				-			Ua
Bromoform	ND	0.40		1.00	ug/L				-			Ua
Bromomethane	ND	0.80		1.00	ug/L				-			Ua
Carbon disulfide	ND	1.00		10.0	ug/L				-			Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L				-			Ua
Chlorobenzene	ND	0.40		1.00	ug/L				-			Ua
Chloroethane	ND	0.70		1.00	ug/L				-			Ua

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0914 - SW5030B												
Blank (BBJ0914-BLK1)					Prepared & Analyzed: 29-Oct-2018							
Chloroform	ND	0.50		0.50	ug/L				-			Ua
Chloromethane	ND	0.95		1.00	ug/L				-			Ua
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L				-			Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L				-			Ua
Cyclohexane	ND	0.50		1.00	ug/L				-			Ua
Dibromochloromethane	ND	0.35		1.00	ug/L				-			Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L				-			Ua
Ethylbenzene	ND	0.40		1.00	ug/L				-			Ua
Isopropylbenzene	ND	0.50		1.00	ug/L				-			Ua
m+p-Xylenes	ND	0.60		2.00	ug/L				-			Ua
Methyl acetate	ND	1.00		4.00	ug/L				-			Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L				-			Ua
Methylene chloride	ND	1.00		4.00	ug/L				-			Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L				-			Ua
o-Xylene	ND	0.40		1.00	ug/L				-			Ua
Styrene	ND	0.40		1.00	ug/L				-			Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L				-			Ua
Toluene	ND	0.50		1.00	ug/L				-			Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L				-			Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L				-			Ua
Trichloroethylene	ND	0.40		1.00	ug/L				-			Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L				-			Ua
Vinyl chloride	ND	0.50		0.50	ug/L				-			Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*51.9*				*ug/L*	*50.0*		*104*	*70-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*45.9*				*ug/L*	*50.0*		*91.8*	*75-120*			
Surrogate: Dibromofluoromethane (Surr)	*52.1*				*ug/L*	*50.0*		*104*	*70-130*			
Surrogate: Toluene-d8 (Surr)	*51.0*				*ug/L*	*50.0*		*102*	*70-130*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL) ERDC, 3909 Halls Ferry Road Vicksburg MS, 39180	Project: Houston Ship Channel-North of Morgan's Point Project Manager: Cheryl Montgomery	**Reported:** 22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0914 - SW5030B												
LCS (BBJ0914-BS1)						Prepared & Analyzed: 29-Oct-2018						
1,1,1-Trichloroethane	53.5				ug/L	50.0		107	65-130			
1,1,2,2-Tetrachloroethane	51.1				ug/L	50.0		102	65-130			
1,1,2-Trichloroethane	55.4				ug/L	50.0		111	75-125			
1,1-Dichloroethane	54.5				ug/L	50.0		109	70-135			
1,1-Dichloroethylene	52.7				ug/L	50.0		105	70-130			
1,2,3-Trichlorobenzene	54.0				ug/L	50.0		108	55-140			
1,2,4-Trichlorobenzene	53.7				ug/L	50.0		107	65-135			
1,2-Dibromo-3-chloropropane (DBCP)	48.4				ug/L	50.0		96.7	50-130			
1,2-Dibromoethane (EDB)	52.4				ug/L	50.0		105	80-120			
1,2-Dichlorobenzene	52.6				ug/L	50.0		105	70-120			
1,2-Dichloroethane	47.5				ug/L	50.0		94.9	70-130			
1,2-Dichloropropane	49.7				ug/L	50.0		99.3	75-125			
1,3-Dichlorobenzene	55.6				ug/L	50.0		111	75-125			
1,4-Dichlorobenzene	53.1				ug/L	50.0		106	75-125			
2-Butanone (MEK)	49.2				ug/L	50.0		98.4	30-150			
2-Hexanone (MBK)	44.6				ug/L	50.0		89.2	55-130			
4-Methyl-2-pentanone (MIBK)	47.4				ug/L	50.0		94.9	60-135			
Acetone	48.4				ug/L	50.0		96.8	40-140			
Benzene	54.3				ug/L	50.0		109	80-120			
Bromodichloromethane	52.7				ug/L	50.0		105	75-120			
Bromoform	55.4				ug/L	50.0		111	70-130			
Bromomethane	46.5				ug/L	50.0		93.0	30-145			
Carbon disulfide	48.0				ug/L	50.0		96.0	35-160			
Carbon tetrachloride	53.3				ug/L	50.0		107	65-140			
Chlorobenzene	50.9				ug/L	50.0		102	80-120			
Chloroethane	52.0				ug/L	50.0		104	60-135			
Chloroform	53.1				ug/L	50.0		106	65-135			
Chloromethane	50.4				ug/L	50.0		101	40-125			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0914 - SW5030B												
LCS (BBJ0914-BS1)						Prepared & Analyzed: 29-Oct-2018						
cis-1,2-Dichloroethylene	54.3				ug/L	50.0		109	70-125			
cis-1,3-Dichloropropene	52.6				ug/L	50.0		105	70-130			
Dibromochloromethane	52.4				ug/L	50.0		105	60-135			
Dichlorodifluoromethane	44.5				ug/L	50.0		88.9	30-155			
Ethylbenzene	55.5				ug/L	50.0		111	75-125			
Isopropylbenzene	59.0				ug/L	50.0		118	75-125			
m+p-Xylenes	113				ug/L	100		113	75-130			
Methylene chloride	51.6				ug/L	50.0		103	55-140			
Methyl-t-butyl ether (MTBE)	52.5				ug/L	50.0		105	65-125			
o-Xylene	56.1				ug/L	50.0		112	80-120			
Styrene	53.7				ug/L	50.0		107	65-135			
Tetrachloroethylene (PCE)	78.4				ug/L	50.0		157	45-150			L
Toluene	52.1				ug/L	50.0		104	75-120			
trans-1,2-Dichloroethylene	52.1				ug/L	50.0		104	60-140			
trans-1,3-Dichloropropene	52.2				ug/L	50.0		104	55-140			
Trichloroethylene	53.5				ug/L	50.0		107	70-125			
Trichlorofluoromethane	45.1				ug/L	50.0		90.2	60-145			
Vinyl chloride	45.8				ug/L	50.0		91.6	50-145			
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*51.5*				*ug/L*	*50.0*		*103*	*70-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*53.1*				*ug/L*	*50.0*		*106*	*75-120*			
Surrogate: Dibromofluoromethane (Surr)	*48.8*				*ug/L*	*50.0*		*97.6*	*70-130*			
Surrogate: Toluene-d8 (Surr)	*50.1*				*ug/L*	*50.0*		*100*	*70-130*			
Matrix Spike (BBJ0914-MS1)		**Source: 18J0401-13**				Prepared & Analyzed: 29-Oct-2018						
1,1,1-Trichloroethane	53.0				ug/L	50.0	0.00	106	65-130			
1,1,2,2-Tetrachloroethane	49.7				ug/L	50.0	0.00	99.3	65-130			
1,1,2-Trichloroethane	55.2				ug/L	50.0	0.00	110	75-125			
1,1-Dichloroethane	53.3				ug/L	50.0	0.00	107	70-135			
1,1-Dichloroethylene	46.4				ug/L	50.0	0.00	92.8	70-130			

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0914 - SW5030B												
Matrix Spike (BBJ0914-MS1)		**Source: 18J0401-13**				Prepared & Analyzed: 29-Oct-2018						
1,2,3-Trichlorobenzene	46.9				ug/L	50.0	0.00	93.9	55-140			
1,2,4-Trichlorobenzene	45.8				ug/L	50.0	0.00	91.6	65-135			
1,2-Dibromo-3-chloropropane (DBCP)	45.5				ug/L	50.0	0.00	90.9	50-130			
1,2-Dibromoethane (EDB)	51.6				ug/L	50.0	0.00	103	80-120			
1,2-Dichlorobenzene	47.8				ug/L	50.0	0.00	95.5	70-120			
1,2-Dichloroethane	49.6				ug/L	50.0	0.00	99.3	70-130			
1,2-Dichloropropane	46.7				ug/L	50.0	0.00	93.4	75-125			
1,3-Dichlorobenzene	50.1				ug/L	50.0	0.00	100	75-125			
1,4-Dichlorobenzene	49.2				ug/L	50.0	0.00	98.4	75-125			
2-Butanone (MEK)	46.6				ug/L	50.0	0.00	93.3	30-150			
2-Hexanone (MBK)	46.5				ug/L	50.0	0.00	92.9	55-130			
4-Methyl-2-pentanone (MIBK)	48.7				ug/L	50.0	0.00	97.4	60-135			
Acetone	55.2				ug/L	50.0	0.00	110	40-140			
Benzene	51.4				ug/L	50.0	0.00	103	80-120			
Bromodichloromethane	53.6				ug/L	50.0	0.00	107	75-120			
Bromoform	55.3				ug/L	50.0	0.00	111	70-130			
Bromomethane	40.8				ug/L	50.0	0.00	81.7	30-145			
Carbon disulfide	45.8				ug/L	50.0	0.00	91.7	35-160			
Carbon tetrachloride	53.2				ug/L	50.0	0.00	106	65-140			
Chlorobenzene	49.3				ug/L	50.0	0.00	98.6	80-120			
Chloroethane	48.2				ug/L	50.0	0.00	96.5	60-135			
Chloroform	53.5				ug/L	50.0	1.53	104	65-135			
Chloromethane	46.6				ug/L	50.0	1.50	90.1	40-125			
cis-1,2-Dichloroethylene	51.8				ug/L	50.0	0.00	104	70-125			
cis-1,3-Dichloropropene	49.3				ug/L	50.0	0.00	98.7	70-130			
Dibromochloromethane	52.0				ug/L	50.0	0.00	104	60-135			
Dichlorodifluoromethane	43.0				ug/L	50.0	0.00	86.0	30-155			
Ethylbenzene	52.2				ug/L	50.0	0.00	104	75-125			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0914 - SW5030B												
Matrix Spike (BBJ0914-MS1)		**Source: 18J0401-13**				Prepared & Analyzed: 29-Oct-2018						
Isopropylbenzene	55.5				ug/L	50.0	0.00	111	75-125			
m+p-Xylenes	108				ug/L	100	0.00	108	75-130			
Methylene chloride	49.0				ug/L	50.0	0.00	98.0	55-140			
Methyl-t-butyl ether (MTBE)	50.9				ug/L	50.0	0.00	102	65-125			
o-Xylene	54.2				ug/L	50.0	0.00	108	80-120			
Styrene	51.6				ug/L	50.0	0.00	103	65-135			
Tetrachloroethylene (PCE)	74.7				ug/L	50.0	0.00	149	45-150			
Toluene	50.0				ug/L	50.0	0.00	100	75-120			
trans-1,2-Dichloroethylene	46.3				ug/L	50.0	0.00	92.7	60-140			
trans-1,3-Dichloropropene	48.9				ug/L	50.0	0.00	97.8	55-140			
Trichloroethylene	49.8				ug/L	50.0	0.00	99.7	70-125			
Trichlorofluoromethane	43.9				ug/L	50.0	0.00	87.8	60-145			
Vinyl chloride	43.4				ug/L	50.0	0.00	86.8	50-145			
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*50.6*				*ug/L*	*50.0*		*101*	*70-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*52.0*				*ug/L*	*50.0*		*104*	*75-120*			
Surrogate: Dibromofluoromethane (Surr)	*49.7*				*ug/L*	*50.0*		*99.3*	*70-130*			
Surrogate: Toluene-d8 (Surr)	*49.9*				*ug/L*	*50.0*		*99.7*	*70-130*			
Matrix Spike Dup (BBJ0914-MSD1)		**Source: 18J0401-13**				Prepared & Analyzed: 29-Oct-2018						
1,1,1-Trichloroethane	51.5				ug/L	50.0	0.00	103	65-130	3.00	30	
1,1,2,2-Tetrachloroethane	49.4				ug/L	50.0	0.00	98.9	65-130	0.444	30	
1,1,2-Trichloroethane	55.0				ug/L	50.0	0.00	110	75-125	0.327	30	
1,1-Dichloroethane	50.2				ug/L	50.0	0.00	100	70-135	5.91	30	
1,1-Dichloroethylene	47.0				ug/L	50.0	0.00	94.0	70-130	1.26	30	
1,2,3-Trichlorobenzene	50.7				ug/L	50.0	0.00	101	55-140	7.68	30	
1,2,4-Trichlorobenzene	46.5				ug/L	50.0	0.00	93.0	65-135	1.47	30	
1,2-Dibromo-3-chloropropane (DBCP)	51.5				ug/L	50.0	0.00	103	50-130	12.5	30	
1,2-Dibromoethane (EDB)	50.7				ug/L	50.0	0.00	101	80-120	1.70	30	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0914 - SW5030B												
Matrix Spike Dup (BBJ0914-MSD1)		**Source: 18J0401-13**				Prepared & Analyzed: 29-Oct-2018						
1,2-Dichlorobenzene	47.8				ug/L	50.0	0.00	95.6	70-120	0.126	30	
1,2-Dichloroethane	48.6				ug/L	50.0	0.00	97.2	70-130	2.12	30	
1,2-Dichloropropane	47.6				ug/L	50.0	0.00	95.2	75-125	1.99	30	
1,3-Dichlorobenzene	51.3				ug/L	50.0	0.00	103	75-125	2.43	30	
1,4-Dichlorobenzene	48.9				ug/L	50.0	0.00	97.8	75-125	0.530	30	
2-Butanone (MEK)	53.2				ug/L	50.0	0.00	106	30-150	13.1	30	
2-Hexanone (MBK)	50.2				ug/L	50.0	0.00	100	55-130	7.84	30	
4-Methyl-2-pentanone (MIBK)	48.8				ug/L	50.0	0.00	97.6	60-135	0.185	30	
Acetone	55.9				ug/L	50.0	0.00	112	40-140	1.40	30	
Benzene	51.6				ug/L	50.0	0.00	103	80-120	0.349	30	
Bromodichloromethane	53.4				ug/L	50.0	0.00	107	75-120	0.243	30	
Bromoform	54.3				ug/L	50.0	0.00	109	70-130	1.82	30	
Bromomethane	44.4				ug/L	50.0	0.00	88.7	30-145	8.24	30	
Carbon disulfide	47.0				ug/L	50.0	0.00	94.0	35-160	2.50	30	
Carbon tetrachloride	53.8				ug/L	50.0	0.00	108	65-140	1.07	30	
Chlorobenzene	49.2				ug/L	50.0	0.00	98.5	80-120	0.122	30	
Chloroethane	48.2				ug/L	50.0	0.00	96.3	60-135	0.166	30	
Chloroform	52.6				ug/L	50.0	1.53	102	65-135	1.75	30	
Chloromethane	47.9				ug/L	50.0	1.50	92.8	40-125	2.82	30	
cis-1,2-Dichloroethylene	50.2				ug/L	50.0	0.00	100	70-125	3.08	30	
cis-1,3-Dichloropropene	50.5				ug/L	50.0	0.00	101	70-130	2.28	30	
Dibromochloromethane	52.5				ug/L	50.0	0.00	105	60-135	1.07	30	
Dichlorodifluoromethane	43.3				ug/L	50.0	0.00	86.6	30-155	0.672	30	
Ethylbenzene	51.2				ug/L	50.0	0.00	102	75-125	1.97	30	
Isopropylbenzene	54.4				ug/L	50.0	0.00	109	75-125	1.96	30	
m+p-Xylenes	109				ug/L	100	0.00	109	75-130	0.894	30	
Methylene chloride	52.0				ug/L	50.0	0.00	104	55-140	5.86	30	
Methyl-t-butyl ether (MTBE)	50.0				ug/L	50.0	0.00	100	65-125	1.84	30	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0914 - SW5030B												
Matrix Spike Dup (BBJ0914-MSD1)		**Source: 18J0401-13**				Prepared & Analyzed: 29-Oct-2018						
o-Xylene	53.7				ug/L	50.0	0.00	107	80-120	0.834	30	
Styrene	49.8				ug/L	50.0	0.00	99.6	65-135	3.63	30	
Tetrachloroethylene (PCE)	72.3				ug/L	50.0	0.00	145	45-150	3.22	30	
Toluene	50.6				ug/L	50.0	0.00	101	75-120	1.17	30	
trans-1,2-Dichloroethylene	46.4				ug/L	50.0	0.00	92.8	60-140	0.0863	30	
trans-1,3-Dichloropropene	50.0				ug/L	50.0	0.00	100	55-140	2.28	30	
Trichloroethylene	51.8				ug/L	50.0	0.00	104	70-125	3.84	30	
Trichlorofluoromethane	43.8				ug/L	50.0	0.00	87.6	60-145	0.228	30	
Vinyl chloride	44.6				ug/L	50.0	0.00	89.2	50-145	2.75	30	
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*49.8*				*ug/L*	*50.0*		*99.6*	*70-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*51.6*				*ug/L*	*50.0*		*103*	*75-120*			
Surrogate: Dibromofluoromethane (Surr)	*50.0*				*ug/L*	*50.0*		*100*	*70-130*			
Surrogate: Toluene-d8 (Surr)	*50.2*				*ug/L*	*50.0*		*100*	*70-130*			

18J0401

CHAIN OF CUSTODY RECORD
USACE ERDC Laboratories, 3909 Halls Ferry Road, Vicksburg, MS 39180

Page 2 of 2

Houston Ship Channel North of Morgan's Point	Sampling Company:	ERDC:	EL, CEERD-EP-R	EL, CEERD-EP-R
	POC: Neil Henthorne	Project Manager:	Cheryl Montgomery	Dan Farrar
	Address:	Address:	696 Virginia Road Concord, MA 01742	3909 Halls Ferry Road Bldg 6009 Vicksburg, MS 39180
	Email:	Email:	cheryl.montgomery@usace.army.mil	daniel.farrar@erdc.dren.mil
	Phone:	Phone:	W: 978-318-8644 C: 781-530-8317	W: 601-634-2118 M: 601-529-8042

Additional Notes:

Equip blank kit: 25 VOA vials, 8 hdpe jars, ~~3~~ 4 1 3/4 10L cubitainers.

	Sample Name	Date	Time	Depth	Media	# of containers	Station	DOC	Dissolved Ammonia	Dissolved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/ Furans, OC Pests, PAH/PCP, PCBs, SVOC	TPH high-level	TOC	Total Hg and Se	TSS	VOC	Cr III and VI	VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ MeOH)	TPH
								1 10L HDPE Cubitainer, Pre-filtered time: 48 hours Hold						2 40 ml Clear VOA w/ HCl non-filtered Hold Time: 7 days	2 1L HDPE Cubitainer, non-filtered Hold Time: 48 hours			3 40 ml Clear VOA w/ HCl non-filtered Hold time: 7 days	125 ml HDPE pre-filtered Hold Time: 24 HOURS	Terra Core Kit Hold Time: 14 days	1 4 oz clear glass jar. Hold Time: 14 days		
																				Sediment		
1	HSCNew-NMP-02-SW	10/22/18	1002	3.5ft	W	14	02	X	X	X	X	X	X	X	X	X	X	X	X			
2	HSCNew-NMP-04-SW		1030	12.5ft	W	14	04	X	X	X	X	X	X	X	X	X	X	X	X			
3	HSCNew-NMP-06-SW		1125	5.1	W	14	06	X	X	X	X	X	X	X	X	X	X	X	X			
4	HSCNew-NMP-08-SW		1200	20.1	W	14	08	X	X	X	X	X	X	X	X	X	X	X	X			
5	HSCNew-NMP-10-SW		1230	16.0	W	14	10	X	X	X	X	X	X	X	X	X	X	X	X			
6	HSCNew-NMP-EQB		0900	—	W	33	—															
7																						
8																						
9																						
10																						
11																						
12																						
13																						
14																						
15																						
Total																						

includes 5 5gal cubits
"
"
"

1. I hereby transfer the sample containers to ERDC. Samples have been properly labeled and kept on ice or refrigerated.

Signature — Date: 10-22-18

2. I accept these samples for transfer to ERDC.

Signature of ERDC Representative: Kayley Watson — Date: 10-23-18 — Tempurature of Cooler: 4 9

CHAIN OF CUSTODY RECORD

USACE ERDC Laboratories, 3909 Halls Ferry Road, Vicksburg, MS 39180

Houston Ship Channel North of Morgan's Point	Sampling Company:	ERDC:	EL, CEERD-EP-R	EL, CEERD-EP-R
	POC: Neil Hawthorne	Project Manager:	Cheryl Montgomery	Dan Farrar
	Address:	Address:	696 Virginia Road Concord, MA 01742	3909 Halls Ferry Road Bldg 6009 Vicksburg, MS 39180
	Email:	Email:	cheryl.montgomery@usace.army.mil	daniel.farrar@erdc.dren.mil
	Phone:	Phone:	W: 978-318-8644 C: 781-530-8317	W: 601-634-2118 M: 601-529-8042

Additional Notes:

	Sample Name	Date	Time	Depth	Media	# of containers	Station	DOC	Dissolved Ammonia	Dissolved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/ Furans, OC Pests, PAH/PCP, PCBs, SVOC	TPH high-level	TOC	Total Hg and Se	TSS	VOC	Cr III and VI	VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ MeOH)	TPH	5 gallon containers
								1 10L HDPE Cubitainer, Pre-filtered time: 48 hours					Hold	2 40 ml Clear VOA w/ HCL non-filtered Hold Time: 7 days	2 1L HDPE Cubitainer, non-filtered Hold Time: 48 hours			3 40 ml Clear VOA w/ HCL non-filtered Hold time: 7 days	125 ml HDPE unfiltered Hold Time: 24 HOURS	Terra Core Kit Hold Time: 14 days		1 4 oz clear glass jar, Hold Time: 14 days	
																				Sediment			
1	HSCNew-NMP-01-SW	10-22-18	10:00	N/A	H_2O	14	1	X	X	X	X	X	X	X	X	X	X	X	X				X
2	HSCNew-NMP-03-SW	10-22-18	10:53			14	3																
3	HSCNew-NMP-03-SW-DUP	10-22-18	11:30			9	DUP																
4	HSCNew-NMP-05-SW	10-22-18	12:00			14	5																
5	HSCNew-NMP-07-SW	10-22-18	12:40			14	7																
6	HSCNew-NMP-09-SW	10-22-18	1310			14	9																
7	HSCNew-NMP-11-SW	10-22-18	1340			14	11																
8																							
9																							
10																							
11																							
12																							
13																							
14																							
15																							
Total																							

1. I have transferred the sample containers to ERDC. Samples have been properly labeled and kept on ice or refrigerated.

Signature — Date: 10-22-18

2. I accept these samples for transfer to ERDC.

Signature of ERDC Representative — Date: 10-23-18 — Tempurature of Cooler: 4.9

CHAIN OF CUSTODY RECORD
USACE ERDC Laboratories, 3909 Halls Ferry Road, Vicksburg, MS 39180

Page _____

Houston Ship Channel North of Morgan's Point	Sampling Company:	ERDC:	EL, CEERD-EP-R	EL, CEERD-EP-R
	POC:	Project Manager:	Cheryl Montgomery	Dan Farrar
	Address:	Address:	696 Virginia Road Concord, MA 01742	3909 Halls Ferry Road Bldg 6009 Vicksburg, MS 39180
	Email:	Email:	cheryl.montgomery@usace.army.mil	daniel.farrar@erdc.dren.mil
	Phone:	Phone:	W: 978-318-8644 C: 781-530-8317	W: 601-634-2118 M: 601-529-8042

Additional Notes:

									1 10L HDPE Cubitainer, Pre-filtered time: 48 hours					Hold	2 40 ml Clear VOA w/ HCl, non-filtered Hold Time: 7 days	2 1L HDPE Cubitainer, non-filtered Hold Time: 48 hours				3 40 ml Clear VOA w/ HCl, non-filtered Hold time: 7 days	125 ml HDPE pre-filtered Hold Time: 24 HOURS	Terra Core Kit Hold Time: 14 days	1 4 oz clear glass jar, Hold Time: 14 days	
																						Sediment		
	Sample Name	Date	Time	Depth	Media	# of containers	Station	DOC	Dissolved Ammonia	Dissolved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/ Furans, OC Pests, PAH/PCP, PCBs, SVOC	TPH high-level	TOC	Total Hg and Se	TSS	Bulk Sediment*	VOC	Cr III and VI	VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ MeOH)	TPH
1	HSCNew-NMP-06	10-4-18	0750	NA	Sed	8												X			X	X	X
2	NSCNew-NMP-05	10-4-18	1215	|	|	8												X			X	X	X
3	HSCNew-NMP-04	10-5-18	0940	|	|	8												X			X	X	X
4	HSCNew-NMP-03	10-5-18	1430	|	|	8												X			X	X	X
5	HSCNew-NMP-02	10-6-18	0920	|	|	8												X			X	X	X
6	HSCNew-NMP-01	10-6-18	1220	|	|	8												X			X	X	X
7 (field duplicate)	HSCNew-NMP-03-DUP	10-5-18	1710	|	|	8												X			X	X	X
8	HSCNew-NMP-EQPB	10-6-18	1414	|	H_2O	9 11		X	X	X	X	X	X		X	X	X				X	X	
9	HSCNew-NMP-02-Sed-DUP	10-6-18	0920	|	Sed	5															X	X	X
10																							
11																							
12																							
13																							
14																							
15																							
Total																							

* Bulk sediment includes (3) 1-gallon buckets

1. I hereby transfer the samples containers to ERDC. Samples have been properly labeled and kept on ice or refrigerated.

Signature — Date: 10-9-18

2. I accept these samples for transfer to ERDC:

Signature of ERDC Representative — Date: 10/9/18 — Tempurature of Cooler

ERDC SAMPLE RECEIPT CHECKLIST

Client: ERDC-Vicksburg (EL)				Work Order: 18J0401
Project: Houston Ship Channel North of Morgan's Point				Date/Time Received 10/9/18 10/23/18
Shipping Company: N/A				
Suspected Hazard Information	**Yes**	**No**	**NA**	**Comments:**
Shipped as DOT Hazardous?		X		
Samples identified as Foreign Material?		X		
Sample Receipt Criteria	**Yes**	**No**	**NA**	**Comments:**
1. Shipping containers received intact and sealed?	X			
2. Chain of Custody documents included with shipment?	X			
3. COC form is properly signed in relinquished/received sections?	X			
4. Samples requiring chemical preservation at proper pH?	X			
5. Samples requiring cold preservation within 0-5°C?	X			4.9°C
6. Samples IDs on COC match IDs on containers?	X			
7. Date and time of COC match date and time on containers?	X			
8. Number of containers received match number indicated on COC?	X			
9. Samples received within holding time?	X			
10. Aqueous samples found to have visible solids?		X		
Additional Comments: received 18J0401-14 on 10/9/18 received remaining samples on 10/23/18				
Checklist preformed by: Kelli Hartman				
Time/Date Completed: 10/23/18				

Items for Project Manager Review

LabNumber	Analysis	Analyte	Exception
			Data included from: W:\TransferIn\18J0401 TRANSFER 14 Dec 2018 1022.mdb
			Data included from: W:\TransferIn\18J0401 TRANSFER 16 Dec 2018 1651.mdb
			Data included from: W:\TransferIn\18J0401 TRANSFER 16 Dec 2018 1652.mdb
			Data included from: W:\TransferIn\18J0401 TRANSFER 16 Dec 2018 1719.mdb
			Data included from: W:\TransferIn\18J0401 TRANSFER 16 Dec 2018 1720.mdb
			Data included from: W:\TransferIn\18J0401 TRANSFER 16 Dec 2018 1724.mdb
			Data included from: W:\TransferIn\18J0401 TRANSFER 16 Dec 2018 1826.mdb
			Data included from: W:\TransferIn\18J0401 TRANSFER 16 Dec 2018 1827.mdb
			Data included from: W:\TransferIn\18J0401 TRANSFER 16 Dec 2018 1912.mdb
			Data included from: W:\TransferIn\18J0401 TRANSFER 16 Dec 2018 2037.mdb

Analytical Reports: Sediment

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

22 May 2019

Cheryl Montgomery
ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg, MS 39180

RE: Houston Ship Channel-North of Morgan's Point

Enclosed are the results of analyses for samples received by the laboratory on 09-Oct-2018. The samples associated with this report will be held for 90 days from the date of this report. The raw data associated with this report will be held for 5 years from the date of this report. If you need us to hold onto the samples or the data longer then these specified times, you will need to notify us in writing at least 30 days before the expiration dates. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jenifer Milam
Database Manager

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL) ERDC, 3909 Halls Ferry Road Vicksburg MS, 39180	Project: Houston Ship Channel-North of Morgan's Point Project Manager: Cheryl Montgomery	**Reported:** 22-May-2019

WORK ORDER SUMMARY

Sample ID	Laboratory ID	Matrix	Date Sampled	Date of Work Order
HSCNew-NMP-01-SD	18J0402-01	Soil/Sediment	06-Oct-2018	09-Oct-2018
HSCNew-NMP-02-SD	18J0402-02	Soil/Sediment	06-Oct-2018	09-Oct-2018
HSCNew-NMP-03-SD	18J0402-03	Soil/Sediment	05-Oct-2018	09-Oct-2018
HSCNew-NMP-04-SD	18J0402-04	Soil/Sediment	05-Oct-2018	09-Oct-2018
HSCNew-NMP-05-SD	18J0402-05	Soil/Sediment	04-Oct-2018	09-Oct-2018
HSCNew-NMP-06-SD	18J0402-06	Soil/Sediment	04-Oct-2018	09-Oct-2018
HSCNew-NMP-07-SD	18J0402-07	Soil/Sediment	03-Oct-2018	09-Oct-2018
HSCNew-NMP-08-SD	18J0402-08	Soil/Sediment	03-Oct-2018	09-Oct-2018
HSCNew-NMP-09-SD	18J0402-09	Soil/Sediment	02-Oct-2018	09-Oct-2018
HSCNew-NMP-10-SD	18J0402-10	Soil/Sediment	02-Oct-2018	09-Oct-2018
HSCNew-NMP-11-SD	18J0402-11	Soil/Sediment	02-Oct-2018	09-Oct-2018
HSCNew-NMP-03-DUP	18J0402-12	Soil/Sediment	05-Oct-2018	09-Oct-2018

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Case Narrative

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

No issues were experienced during the analysis of Work Order 18J0402 unless specified below.

SVOC/PAH/PCP- The RLs ranging from 933-2180 ug/kg exceeded the TDL of 5 ug/kg for benzidine for all samples. Benzidine was not detected in any of the samples. The RL ranging from 200-468 ug/kg exceeded the TDL of 100ug/kg for pentachlorophenol. However, the MDLs ranging from 59.9-98.7 ug/ kg were below the TDL except for HSCNew-NMP-01-SD, which had a MDL of 140 ug/kg. PCP was not detected in any of the sample. Azobenzene was reported instead of 1,2-phenylhydrazine due to the degradation of 1,2-phenylhydrazine in the injection port of the GC/MS. The WG1167103-2/-3 LCS/LCSD recoveries/RPD, associated with all sediment samples, were outside of the acceptance criteria for benzoic acid (2%/6% and 95% RPD); however, it has been identified as a "difficult" analyte. The results of the associated samples are reported. The MS/MSD for aniline had low recoveries of 3 and 1% (Projects Limits=50-150%), respectively, as well as an elevated RPD of 60% (Project Limits=30%). The LCS/LCD for aniline had acceptable recoveries of 71 and 70%, respectively, as well as an acceptable RPD of 1%. Some of the SVOC analytes had slightly elevated RPDs in the MS/MSD ranging from 31-41% (Project Limits=30%). Some of the SVOC analytes had low recoveries in the MS/MSD ranging from 0-32% (Project Limits=30%). All of the SVOC analytes have acceptable recoveries and RPDs in the LCS/LCD. Some bias was suspected for the benzoic acid and aniline based on the quality control samples.
Pests- There were some elevated recoveries in the CCVs ranging from 116-126% (Project Limits=85-115%), however, several analytes were within DOD QSM 5.1 limits of 80-120%. The results of toxaphene for the ICV was not reportable. The ICV is a second source standard that did not match the pattern of the standard used for the calibration. SW846 states that some toxaphene components, particularly the more heavily chlorinated components, are subject to dechlorination reactions. As a result, standards from different vendors may exhibit differences, which could lead to possible false negative results or large differences in quantitative results. The LCS had low recoveries of 25.4 and 42.3% (Project Limits =50-150%) and an RPD of 50% (Project Limits 30%) for endrin aldehyde but that analyte had acceptable MS recoveries. The recovery of beta-BHC could not be determined in the matrix spikes due to an interfering peak but that analyte had acceptable recoveries in the LCSs (Project Limits=50-150%). The MSs had low recoveries of 22.6 and 22.7% (Project Limits=50-150%) for endosulfan I but that analyte had acceptable recoveries in the LCSs (Project Limit=50-150%). The SRM recoveries were within manufacturer's acceptance limits. No bias was observed for the pesticide results based on the quality control samples.
PCBs- The surrogate, 2,4,5,6 tetrachloro-m-xylene (TMX), had elevated recoveries of 119, 122, and 142% in the CCVs and PCB 8 had an elevated recovery of 118% in one of the CCVs. The recoveries of TMX were low in both the LCS and LSD at 14 and 10% (Project Limits=30-150%), respectively. The recoveries of PCBs 18, 44, and 52 could not be determined in the matrix spikes since the inherent analyte concentration in the samples were greater than the spiked concentrations; however, the LCSs for these analytes were within acceptable ranges (Project Limits=50-150%). PCB 28 had a low recovery of 47.7% in one of the matrix spikes but had acceptable recoveries in the other MS/MSD. The SRM recoveries were within manufacturer's acceptance limits. No bias was observed for the PCB congener results based on the quality control samples.
TPH- The RL of 50-100 mg/kg exceeded the TDL of 5 mg/kg for TPH by TCEQ (TNRRC) 1005. Due to a laboratory error, another aliquot of the extraction surrogate, 1-chlorooctane, was added to the LCS QG238699-2, instead of the spike mix. Consequently, the LCS had an elevated surrogate recoveries of 4.84-3730% (Laboratory Limits=70-130%) and very low recoveries of the hydrocarbons ranges. All of the associated samples were re-extracted within holding time, except for samples: HSCNew-NMP-10-SD, HSCNew-NMP-11-SD, and HSCNew-NMP-12-SD, which were extracted 1 day outside of holding time. The surrogate, 1-chlorooctane, had low recoveries ranging from 46.8-67.8% (Laboratory Limits=70-130%) in samples: HSCNew-NMP-01-SD, HSCNew-NMP-02-SD, HSCNew-NMP-03-SD, HSCNew-NMP-05-SD, HSCNew-NMP-07-SD, and HSCNew-NMP-08-SD. However, the second surrogate, o-terphenyl, had acceptable recoveries of 91.7-128% (Laboratory Limits=70-130%). No significant bias was observed for the TPH results.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

VOC- The laboratory control sample had an elevated recovery of 166% (Laboratory Limits=65-140%) for tetrachloroethylene (TCE). The matrix spike/matrix spike duplicate elevated recoveries of 156 and 146%, respectively (Laboratory Limits = 45-150%). TCE was not detected in any of the sediments; therefore, a positive bias was not suspected. The laboratory control sample had a slightly elevated recovery of 129% (Laboratory Limits=75-125%) for 1,1-dichlorethane. The analyte,1,1-dichlorethane, was not detected in any of the sediments; therefore, a positive bias was not suspected.
TOC- The method blank had TOC concentrations of 0.00559 and 0.00725 mg/kg, which was slightly above the RL of 0.005%. The MS/MSD had recoveries ranging from 125-168% (Project Limits=75-125%). The MSD had elevated RPDs ranging from 21.5-26.5% (Project Limits=20%). These results suggest a positive bias.
Dioxins/Furans- The peak detected does not meet ratio criteria and has resulted in an elevated detection limit of 0.640 pg/g for 1,2,3,7,8,9-hexa CDF for sample HSCNew-NMP-04-SD. The retention time for the detected peak was > 3 seconds when compared to the expected retention time from the internal standard for the analysis of 1,2,3,7,8-penta CDF in HSCNew-NMP-04-SD. The peak detected does not meet ratio criteria and has resulted in an elevated detection limit of 1.96 pg/g for 1,2,3,6,7,8- hexa CDF in HSCNew-NMP-10-SD.
Metals- The MS/MSD had low recoveries for antimony of 55.3 and 54.4% (Project Limits=70-130%), respectively. Some negative bias was possibly observed for the results of antimony due to matrix interferences. The method blank had a concentration of 2.4 mg/kg for barium that was above the RL of 0.1 mg/kg; however, the concentration was <10% of the sample results, which was negligible according to the USEPA 6020 method criteria. One of the four CCVs had a slightly low recovery of 89.1 %(Project Limits=90-110%) for selenium. The duplicate had an elevated RPD of 46.1% (Project Limits=30%); however, the MS/MSD had an acceptable RPD of 27.2%. The method blank had a concentration of 0.192 mg/kg for silver that was slightly above the RL of 0.1 mg/kg. Two of the four CCVs had slightly low recoveries of 88.5 and 86.6% (Project Limits=85-115%). The duplicate had a slightly elevated RPD of 33.7% (Project Limits=30%) for silver. There could be a potential for positive bias for silver in the sediment samples. The standard reference material (SRM) had an elevated recovery of 173% (Project Limit=70-130%) for mercury. The SRM has an acceptable concentration of 31.3 mg/kg based on the certificate of analyses from NSI labs for the SQCI-001 which states the acceptable limits for mercury is between 12.3-35.5 mg/kg. Cr(VI) was not detected in any of the sediment samples, and both the matrix spike and matrix spike duplicate yielded a 0% recovery (Project Limits=50-150%), despite acceptable recoveries of 96.5-97% for the two LCSs. USEPA method 3060, alkaline extraction for Cr(VI), requires a post digestion spike, which was also performed, with low recovery of approximately 23%. Section 8.5.1 of method 3060 describes sediment samples that are incompatible with Cr(VI) and where no native Cr(VI) can be present. The Eh of the sediments in question was measured, with all values measured ranging from -22 to 58 mV. Section 8.5.1 and Figure 2 in method 3060 indicate any sample with an Eh less than approximately 300mV (lowest possible Eh at any relevant pH) will be incompatible with Cr(VI). Therefore, since all samples measured had Eh values substantially below this value, no Cr(VI) is present in any sample and the data cannot be qualified or rejected.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Notes and Definitions

A1065	Recovery outside method acceptance criteria due to matrix effects From 5X dilution.
CCV-L	The CCV was below acceptable limits leading to negative bias in the results for this analyte.
CCV-HA	The CCV was above acceptable limits meaning that the instrument became more sensitve during the analysis. Since the result was non-detect for all analytes, the batch was accepted based on EPA SW-846 criteria.
CCV-H	The CCV was above acceptable limits leading to positive bias in the results for this analyte.
Bb	Indicates the analyte was detected in the laboratory method blank analyzed concurrently with the sample.
Ba	Blank contamination. The recorded result is associated with a contaminated blank.
B	Analyte is found in the associated blank as well as in the sample.
A2949	Result from 5X dilution
A2946	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
*	[Undefined]
A1369	From 5X dilution.
Ja	Estimated value. This analyte was detected in the sample at a concentration less than the laboratory Limit of Quantitation, but above the Method Detection Limit.
A1	Exceedence
A0797	Recovery outside method acceptance criteria due to matrix effects
A0553	RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.
A0145	Recovery outside method acceptance criteria due to matrix effects attributed possibly to sample heterogeneity
*a	Duplicate analysis not within control limits
*	Compound recovery or percent RPD was outside of quality control limits.
U	[Undefined]
P	[Undefined]
A0550	[Undefined]
A1626	From 20X dilution.
Q	The quality control sample exceeds the associated acceptance criteria.
Z-02	Analyte could not be quantitated due to interfering peak/s.
Uc	Undetected at the limit of quantitation.
Ub	Compound was analyzed for but was not detected (non-detect)

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Notes and Definitions

Ua	Analyte included in the analysis, but not detected at or above the Reporting Limit
U	Analyte included in the analysis, but not detected
S-GC	Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate/s.
RPD-06	RPD exceeds acceptance limit.
QM-11	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to inherent analyte concentration greater than the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
QM-07	The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
E	Reported concentration exceeds the calibration range of the instrument for that specific analysis for organics. Reported value is estimated due to the presence of an interference for inorganics
Qa	Value is outside of acceptance limits.
J	Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.
P	Duplicate analysis does not meet the acceptance criteria for precision
N	Spiked sample recovery not within control limits
MB-02	The method blank contains the analyte at a concentration above the MRL due to memory interferences.
M2	Sample was diluted due to matrix interference.
M	Matrix spike recovery is outside established acceptance limits
L	LCS recovery is outside of established acceptance limits
Jc	Estimated value less than RL
Jb	Estimated concentration between the EDL and RDL
Z-03	See case narrative.
Q-CCV	The percent recovery is outside of the project limits but within DOD QSM limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-01-SD

18J0402-01 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**947.61**	71.610		150.62	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**49.9**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**26.0**	0.0385	0.0577	0.135	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0220**	0.0110	0.0183	0.0366	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.200**	0.00028	0.00243	0.00486	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**90.3**	0.216	0.985	3.94	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**4.11**	0.0084	0.0394	0.0985	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**129**	0.0394	0.0394	0.0985	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**0.992**	0.0260	0.0394	0.0985	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**0.182**	0.0047	0.0394	0.0985	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Chromium-52 [1]	**26.0**	0.0275	0.0394	0.0985	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**13.6**	0.0151	0.0394	0.0985	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**25.2**	0.0041	0.0394	0.0985	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**15.1**	0.0119	0.0394	0.0985	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**3.90**	0.0394	0.0394	0.0985	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.232**	0.0394	0.0394	0.0985	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**50.1**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**0.587**	0.039	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**0.297**	0.040	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	ND	0.032	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Aldrin	ND	0.031	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.046	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-Chlordane	**0.045**	0.041	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	J
beta-BHC	ND	0.077	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.044	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.045	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.030	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.040	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.035	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

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ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SD

18J0402-01 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.039	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.034	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.042	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.036	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.030	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.081	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.034	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.040	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Toxaphene	ND	2.90	3.48	11.6	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.044	0.093	0.290	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.41**		*44.0 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**5.34**		*97.4 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**123**	0.361	0.468	0.935	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**0.515**	0.060	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 105	ND	0.029	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 118	**0.173**	0.042	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 126	**0.338**	0.057	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 128	ND	0.042	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 138	**0.332**	0.027	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 153	**0.524**	0.070	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 169	ND	0.032	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	ND	0.028	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 18	**0.641**	0.058	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 180	**0.148**	0.051	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 187	**0.088**	0.026	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 28	**1.10**	0.056	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 44	**0.734**	0.067	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 52	**1.08**	0.062	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 66	**0.611**	0.070	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 77	**0.079**	0.065	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 8	**0.718**	0.055	0.151	0.464	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**3.4**		*62.5 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**3.5**		*64.0 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

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Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-01-SD

18J0402-01 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**7.9**	0.9	3.6	9.0	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	J
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**169**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**132**	0.14		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**20.3**	0.117		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
1,2,3,4,7,8,9-Hepta CDF	**2.66**	0.116		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDD	**1.15**	0.143		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDF	**3.84**	0.137		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDD	**2.64**	0.145		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDF	**1.54**	0.147		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDD	**4.89**	0.146		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDF	ND	0.142		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Uc
1,2,3,7,8-Penta CDD	**0.662**	0.146		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8-Penta CDF	**1.94**	0.141		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
2,3,4,6,7,8-Hexa CDF	**0.719**	0.132		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
2,3,4,7,8-Penta CDF	**1.17**	0.128		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
2,3,7,8-Tetra CDD	**18**	0.147		0.995	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDF	**46.2**	0.142		0.995	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Octa CDD	**3080**	0.126		9.95	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Octa CDF	**513**	0.102		9.95	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Hepta CDD	**451**	0.14		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Hepta CDF	**46.5**	0.117		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SD

18J0402-01 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**95.4**	0.146		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Hexa CDF	**19.9**	0.14		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Penta CDD	**16.8**	0.146		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Penta CDF	**12.8**	0.134		4.98	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Tetra CDD	**19.1**	0.147		0.995	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Tetra CDF	**74**	0.142		0.995	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**18.8**		*94 %*	*35-197*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**78**		*78 %*	*23-140*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**79**		*79 %*	*28-143*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**88**		*88 %*	*32-141*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**83**		*83 %*	*26-152*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**75**		*75 %*	*26-138*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**97**		*97 %*	*28-130*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**83**		*83 %*	*26-123*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**88**		*88 %*	*25-181*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**79**		*79 %*	*24-185*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**79**		*79 %*	*29-147*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**79**		*79 %*	*28-136*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**83**		*83 %*	*21-178*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**19.4**		*97 %*	*25-164*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**8.6**		*43 %*	*24-169*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**206**		*103 %*	*17-157*		*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**49.5**	0.12		1	pg/g	22-Oct-2018	08-Nov-2018	EPA M8290A / M1613	
Surrogate: C13-2378 TetraCDF	**43**		*43 %*	*40-135*		*22-Oct-2018*	*08-Nov-2018*	*EPA M8290A / M1613*	

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Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-01-SD

18J0402-01 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.47		1.47	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
TOC (Max)	**0.584**	0.343		0.343	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Mean)	**0.465**	0.343		0.343	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Min)	ND	0.343		0.343	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	Ua
Volatile Solids	**35800**	200		200	mg/kg	11-Oct-2018	11-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	4.82		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	17		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	ND	15.9		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,4-Dichlorobenzene	ND	16.2		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**2190**		*70 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	6.97		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	8.38		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	12.8		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	133		468	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	5.46		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	20.1		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	5.43		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	5.15		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**2100**		*67 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**1580**		*51 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	8.41		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	13.3		156	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	150		468	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	7.33		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	11.3		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	7.52		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	429		1300	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	5.76		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	506		2180	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	7.85		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	14.3		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	13		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**99.9**	20.4		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	
Butylbenzylphthalate	ND	15.8		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub

USACE ERDC-EP-C
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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SD

18J0402-01 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	7.97		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Dimethylphthalate	ND	6.08		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-butylphthalate	ND	7.43		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-octylphthalate	ND	32.3		156	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	7.6		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	**32**	15.1		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Jc
Hexachlorocyclopentadiene	ND	85.5		468	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	13		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	8.55		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	8.13		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**2020**		*65 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	19.7		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	13.3		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	5.48		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	140		468	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	7.41		78	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**1940**		*62 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**2580**		*83 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**648**		*59 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	**9.22**	3.44		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Acenaphthylene	**12.1**	3.47		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Anthracene	**19.6**	6.06		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benz(a)anthracene	**44.9**	4.36		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**62.8**	2.57		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**60.6**	4.24		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**951**		*86 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**63.9**	4.86		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**108**	5.7		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**46.4**	2.54		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**53.1**	3.22		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	**8.19**	5.25		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Jc
Fluoranthene	**126**	4.08		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluorene	**10.2**	5.24		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**58.1**	2.52		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SD

18J0402-01 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Naphthalene	**8.9**	3.47		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Phenanthrene	**44.6**	5.7		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Pyrene	**211**	4.89		8.86	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Pyrene-d10	**1020**		*92 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SD

18J0402-01RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.271**	0.0199	0.0398	0.0996	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.233**	0.0084	0.0398	0.0996	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00346		0.00346	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00346		0.00346	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.00346		0.00346	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.00346		0.00346	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.346		0.691	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	ND	0.0864		0.0864	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Benzene	ND	0.00346		0.00346	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00346		0.00346	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SD

18J0402-01RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.00346		0.00346	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl acetate	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methylene chloride	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Styrene	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00346		0.00346	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	ND	0.00346		0.00346	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0432		0.0432	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.439**		*102 %*		*80-120*	*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.395**		*91.4 %*		*85-120*	*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.460**		*106 %*		*80-119*	*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.435**		*101 %*		*85-115*	*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

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ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-01-SD

18J0402-01RE1 (Soil/Sediment)

Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
>C12-C28	**30**	11.		56.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
>C28-C35	**19**	11.		56.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
Surrogate: 1-Chlorooctane	**46.8**		*46.8 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	*
C6-C12	**19**	11.		56.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**62**	21.		110	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
Surrogate: O-TERPHENYL	**116.**		*116. %*		*30-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-02-SD

18J0402-02 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**3553.5**	47.620		100.13	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**65.1**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**22.7**	0.0393	0.0591	0.139	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0198**	0.0119	0.0198	0.0396	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.397**	0.000719	0.00624	0.0125	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**58.8**	0.215	0.983	3.93	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**2.59**	0.0084	0.0393	0.0983	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**108**	0.0393	0.0393	0.0983	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**0.749**	0.0259	0.0393	0.0983	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**0.300**	0.0047	0.0393	0.0983	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Chromium-52 [1]	**22.7**	0.0274	0.0393	0.0983	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**10.9**	0.0151	0.0393	0.0983	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**31.5**	0.0041	0.0393	0.0983	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**13.7**	0.0119	0.0393	0.0983	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**3.62**	0.0393	0.0393	0.0983	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.170**	0.0393	0.0393	0.0983	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**34.9**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**9.83**	0.031	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**3.39**	0.032	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	ND	0.025	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Aldrin	ND	0.025	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.037	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.033	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.062	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.036	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.036	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.024	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.032	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.028	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-02-SD

18J0402-02 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.032	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.027	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.034	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	**0.857**	0.029	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
gamma-Chlordane	**2.15**	0.024	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
Heptachlor	ND	0.066	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.027	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	**3.61**	0.032	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
Toxaphene	ND	2.34	2.81	9.36	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.036	0.075	0.234	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**3.28**		*74.1 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**7.04**		*159 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	*Qa*
Nutrients									
Ammonia as N	**114**	0.393	0.508	1.02	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**5.07**	0.049	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 105	**1.71**	0.023	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 118	**2.83**	0.034	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 126	ND	0.046	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 128	ND	0.034	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 138	**4.55**	0.022	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 153	**4.81**	0.056	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 169	ND	0.026	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	**1.35**	0.022	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 18	**5.52**	0.047	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 180	**1.47**	0.041	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 187	**0.990**	0.021	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 28	**2.71**	0.045	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 44	**5.13**	0.054	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 52	**6.50**	0.050	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 66	**4.81**	0.056	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 77	**0.990**	0.052	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 8	ND	0.044	0.122	0.374	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**3.0**		*68.7 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**3.6**		*82.1 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-02-SD

18J0402-02 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**49.2**	0.7	1.8	7.2	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**567**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**61.1**	0.119		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**18.4**	0.131		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
1,2,3,4,7,8,9-Hepta CDF	**2.27**	0.13		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDD	**0.497**	0.125		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDF	**6.21**	0.108		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
1,2,3,6,7,8-Hexa CDD	**2.42**	0.127		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDF	**1.66**	0.116		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDD	**1.94**	0.128		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDF	ND	0.113		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Uc
1,2,3,7,8-Penta CDD	**1.6**	0.135		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8-Penta CDF	**4.37**	0.154		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
2,3,4,6,7,8-Hexa CDF	**0.624**	0.105		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
2,3,4,7,8-Penta CDF	**3.82**	0.141		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	Jb
2,3,7,8-Tetra CDD	**130**	0.148		0.999	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDF	**306**	0.142		0.999	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Octa CDD	**1020**	0.114		9.99	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Octa CDF	**769**	0.139		9.99	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Hepta CDD	**165**	0.119		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Hepta CDF	**43.9**	0.131		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-02-SD

18J0402-02 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**31.9**	0.128		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Hexa CDF	**23.6**	0.11		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Penta CDD	**7.67**	0.135		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Penta CDF	**25.9**	0.147		5	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Tetra CDD	**137**	0.148		0.999	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Total Tetra CDF	**582**	0.142		0.999	pg/g	22-Oct-2018	07-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**20**		*100 %*		*35-197*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**84**		*84 %*		*23-140*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**82**		*82 %*		*28-143*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**101**		*101 %*		*32-141*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**93**		*93 %*		*26-152*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**82**		*82 %*		*26-138*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**104**		*104 %*		*28-130*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**92**		*92 %*		*26-123*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**98**		*98 %*		*25-181*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**84**		*84 %*		*24-185*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**87**		*87 %*		*29-147*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**88**		*88 %*		*28-136*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**88**		*88 %*		*21-178*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**21.2**		*106 %*		*25-164*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**8.6**		*43 %*		*24-169*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**206**		*103 %*		*17-157*	*22-Oct-2018*	*07-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**304**	0.63		5	pg/g	22-Oct-2018	12-Nov-2018	EPA M8290A / M1613	A1369
Surrogate: C13-2378 TetraCDF	**36**		*36 %*		*40-135*	*22-Oct-2018*	*12-Nov-2018*	*EPA M8290A / M1613*	*A1065, A1*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-02-SD

18J0402-02 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.19		1.19	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
TOC (Max)	**0.313**	0.192		0.192	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Mean)	**0.298**	0.192		0.192	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Min)	**0.266**	0.192		0.192	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
Volatile Solids	**29600**	200		200	mg/kg	11-Oct-2018	11-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	2.96		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	10.4		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	**35.7**	9.76		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Jc
1,4-Dichlorobenzene	ND	9.96		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**1140**		*60 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	4.28		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	5.14		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	7.89		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	81.6		287	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	3.35		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	12.4		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	3.33		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	3.16		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**1380**		*72 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**924**		*48 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	5.16		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	8.17		95.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	91.9		287	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	4.5		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	6.91		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	4.61		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	263		795	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	3.53		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	310		1340	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	4.82		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	8.79		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	7.98		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**229**	12.5		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	
Butylbenzylphthalate	ND	9.67		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-02-SD

18J0402-02 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	4.89		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Dimethylphthalate	ND	3.73		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-butylphthalate	ND	4.56		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-octylphthalate	ND	19.8		95.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	4.66		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	**11.3**	9.29		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Jc
Hexachlorocyclopentadiene	ND	52.5		287	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	8		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	5.25		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	4.99		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**1230**		*64 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	12.1		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	8.15		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	3.36		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	86.1		287	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	4.55		47.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**1120**		*59 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**1480**		*77 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**456**		*62 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	**66**	2.29		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Acenaphthylene	**88.6**	2.31		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Anthracene	**56**	4.03		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benz(a)anthracene	**82.3**	2.9		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**159**	1.71		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**76**	2.82		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**635**		*86 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**132**	3.23		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**526**	3.79		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**45**	1.69		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**76.1**	2.14		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	**4.62**	3.49		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Jc
Fluoranthene	**543**	2.71		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluorene	**51.4**	3.48		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**171**	1.68		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-02-SD

18J0402-02 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Naphthalene	**77.5**	2.31		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Phenanthrene	**239**	3.79		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Pyrene	**1160**	3.25		5.89	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Pyrene-d10	**667**		*91 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-02-SD

18J0402-02RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.188**	0.0198	0.0398	0.0995	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.138**	0.0084	0.0398	0.0995	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00286		0.00286	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00286		0.00286	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	**0.00792**	0.00286		0.00286	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
1,4-Dichlorobenzene	ND	0.00286		0.00286	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.286		0.571	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	**0.0794**	0.0714		0.0714	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Benzene	**0.0111**	0.00286		0.00286	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Bromodichloromethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00286		0.00286	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-02-SD

18J0402-02RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	**0.0146**	0.00286		0.00286	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Isopropylbenzene	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl acetate	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methylene chloride	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Styrene	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00286		0.00286	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	**0.00642**	0.00286		0.00286	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
trans-1,2-Dichloroethylene	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0357		0.0357	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.371**		*104 %*	*80-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.338**		*94.7 %*	*85-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.382**		*107 %*	*80-119*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.356**		*99.8 %*	*85-115*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-02-SD

18J0402-02RE1 (Soil/Sediment)

Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
>C12-C28	**250**	9.0		47.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
>C28-C35	**46**	9.0		47.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
Surrogate: 1-Chlorooctane	**67.8**		*67.8 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	*
C6-C12	**41**	9.2		47.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**340**	18.		93.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
Surrogate: O-TERPHENYL	**111.**		*111. %*		*30-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-03-SD

18J0402-03 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**107.85**	38.350		80.580	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**81.3**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**10.4**	0.0378	0.0570	0.133	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0223**	0.0111	0.0186	0.0371	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.0122**	0.000282	0.00245	0.00489	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**20.4**	0.210	0.961	3.84	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**2.08**	0.0082	0.0384	0.0961	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**65.9**	0.0384	0.0384	0.0961	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**0.414**	0.0253	0.0384	0.0961	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**0.0579**	0.0046	0.0384	0.0961	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Chromium-52 [1]	**10.4**	0.0268	0.0384	0.0961	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**4.63**	0.0147	0.0384	0.0961	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**8.43**	0.0040	0.0384	0.0961	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**7.92**	0.0116	0.0384	0.0961	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**2.75**	0.0384	0.0384	0.0961	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.0995**	0.0384	0.0384	0.0961	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**18.7**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**0.814**	0.026	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**0.404**	0.027	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	**0.082**	0.021	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	J
Aldrin	ND	0.021	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.031	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.027	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.052	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.030	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.030	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.020	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.026	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.024	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SD

18J0402-03 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.026	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.023	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.028	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.024	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-Chlordane	**0.097**	0.020	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	J
Heptachlor	ND	0.054	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.023	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.027	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Toxaphene	ND	1.94	2.33	7.76	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.030	0.062	0.194	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.10**		*57.1 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**3.51**		*95.7 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**13.3**	0.356	0.460	0.920	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**0.175**	0.040	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 105	**0.051**	0.019	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 118	**0.096**	0.028	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 126	ND	0.038	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 128	ND	0.028	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 138	**0.128**	0.018	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 153	**0.219**	0.047	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 169	ND	0.022	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	ND	0.019	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 18	ND	0.039	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 180	**0.056**	0.034	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 187	**0.034**	0.017	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 28	**0.301**	0.037	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 44	**0.153**	0.045	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 52	**0.237**	0.041	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 66	**0.158**	0.047	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 77	ND	0.043	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 8	ND	0.036	0.101	0.311	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.1**		*56.2 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**3.3**		*91.1 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SD

18J0402-03 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**2.7**	0.6	1.8	5.4	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	J
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**27.4**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**5.53**	0.149		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**0.846**	0.148		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8,9-Hepta CDF	ND	0.147		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Uc
1,2,3,4,7,8-Hexa CDD	ND	0.142		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Uc
1,2,3,4,7,8-Hexa CDF	**0.339**	0.167		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDD	**0.335**	0.144		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDF	ND	0.179		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Uc
1,2,3,7,8,9-Hexa CDD	**0.406**	0.145		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb, A0550
1,2,3,7,8,9-Hexa CDF	ND	0.174		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Uc
1,2,3,7,8-Penta CDD	ND	0.153		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Uc
1,2,3,7,8-Penta CDF	ND	0.195		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Uc
2,3,4,6,7,8-Hexa CDF	ND	0.162		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Uc
2,3,4,7,8-Penta CDF	**0.193**	0.178		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
2,3,7,8-Tetra CDD	**2.08**	0.129		0.997	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDF	**4.58**	0.148		0.997	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Octa CDD	**114**	0.141		9.97	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Octa CDF	**6.1**	0.119		9.97	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
Total Hepta CDD	**16.8**	0.149		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Hepta CDF	**1.8**	0.148		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SD

18J0402-03 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**3.95**	0.145		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
Total Hexa CDF	**0.923**	0.17		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
Total Penta CDD	**0.253**	0.153		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
Total Penta CDF	**0.462**	0.186		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
Total Tetra CDD	**2.08**	0.129		0.997	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Tetra CDF	**7.48**	0.148		0.997	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**11.4**		*57 %*	*35-197*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**58**		*58 %*	*23-140*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**59**		*59 %*	*28-143*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**63**		*63 %*	*32-141*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**63**		*63 %*	*26-152*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**55**		*55 %*	*26-138*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**77**		*77 %*	*28-130*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**67**		*67 %*	*26-123*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**73**		*73 %*	*25-181*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**61**		*61 %*	*24-185*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**61**		*61 %*	*29-147*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**63**		*63 %*	*28-136*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**69**		*69 %*	*21-178*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**12.6**		*63 %*	*25-164*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**9.8**		*49 %*	*24-169*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**128**		*64 %*	*17-157*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**5.86**	0.1		1	pg/g	22-Oct-2018	09-Nov-2018	EPA M8290A / M1613	
Surrogate: C13-2378 TetraCDF	**55**		*55 %*	*40-135*		*22-Oct-2018*	*09-Nov-2018*	*EPA M8290A / M1613*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-03-SD

18J0402-03 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.10		1.10	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
Volatile Solids	**10600**	200		200	mg/kg	11-Oct-2018	11-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	2.57		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	9.07		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	ND	8.49		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,4-Dichlorobenzene	ND	8.66		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**995**		*60 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	3.72		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	4.47		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	6.86		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	70.9		250	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	2.91		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	10.7		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	2.9		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	2.75		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**990**		*59 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**772**		*46 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	4.49		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	7.1		83.2	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	79.9		250	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	3.91		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	6.01		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	4.01		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	229		691	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	3.07		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	270		1160	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	4.19		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	7.64		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	6.94		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**22.4**	10.9		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Jc
Butylbenzylphthalate	ND	8.41		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Diethylphthalate	ND	4.25		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Dimethylphthalate	ND	3.25		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-butylphthalate	ND	3.96		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SD

18J0402-03 (Soil/Sediment)

Alpha

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC-MS									
Di-n-octylphthalate	ND	17.2		83.2	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	4.05		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	ND	8.07		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	45.6		250	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	6.96		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	4.56		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	4.34		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**966**		*58 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	10.5		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	7.08		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	2.92		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	74.8		250	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	3.95		41.6	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**946**		*57 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**1250**		*75 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**389**		*66 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	ND	1.84		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Ub
Acenaphthylene	**2.2**	1.86		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Jc
Anthracene	ND	3.24		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Ub
Benz(a)anthracene	**8.03**	2.33		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**8.9**	1.38		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**6.71**	2.27		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**523**		*88 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**6.84**	2.6		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**6.98**	3.06		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**5.21**	1.36		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**7.02**	1.72		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	ND	2.81		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Ub
Fluoranthene	**13.6**	2.19		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluorene	ND	2.8		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Ub
Indeno(1,2,3-cd)pyrene	**7.3**	1.35		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Naphthalene	**2.14**	1.86		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Jc
Phenanthrene	**4.64**	3.06		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Jc
Pyrene	**18.8**	2.62		4.74	ug/kg	11-Oct-2018	01-Nov-2018	8270D	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SD

18J0402-03 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Alpha									
PAHs by GC/MS SIM									
Surrogate: Pyrene-d10	**527**		*89 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	

USACE ERDC-EP-C
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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SD

18J0402-03RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.104**	0.0169	0.0339	0.0848	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.0485**	0.0071	0.0339	0.0848	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	J, B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00236		0.00236	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00236		0.00236	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.00236		0.00236	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.00236		0.00236	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.236		0.472	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	ND	0.0591		0.0591	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Benzene	ND	0.00236		0.00236	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00236		0.00236	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SD

18J0402-03RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.00236		0.00236	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl acetate	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methylene chloride	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Styrene	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00236		0.00236	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	ND	0.00236		0.00236	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0295		0.0295	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.294**		*99.7 %*	*80-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.272**		*92.3 %*	*85-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.312**		*106 %*	*80-119*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.298**		*101 %*	*85-115*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-SD

18J0402-03RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
TOC (Max)	**0.236**	0.0848		0.0848	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Mean)	**0.150**	0.0848		0.0848	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Min)	**0.117**	0.0848		0.0848	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TNRCC 1005									
>C12-C28	**8.3**	5.8		30.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
>C28-C35	**11**	5.8		30.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
Surrogate: 1-Chlorooctane	**48.9**		*48.9 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	*
C6-C12	**7.8**	6.0		30.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**24**	12.		61.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
Surrogate: O-TERPHENYL	**91.7**		*91.7 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-04-SD

18J0402-04 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**8703.9**	66.470		135.66	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**54.9**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**65.5**	0.0396	0.0596	0.139	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0197**	0.0118	0.0197	0.0395	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.413**	0.00069	0.00599	0.0120	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**237**	0.219	0.998	3.99	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**6.22**	0.0085	0.0399	0.0998	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**263**	0.0399	0.0399	0.0998	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**1.14**	0.0263	0.0399	0.0998	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**2.07**	0.0048	0.0399	0.0998	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Chromium-52 [1]	**65.5**	0.0278	0.0399	0.0998	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**40.1**	0.0153	0.0399	0.0998	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**80.6**	0.0042	0.0399	0.0998	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**25.7**	0.0121	0.0399	0.0998	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**4.68**	0.0399	0.0399	0.0998	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.336**	0.0399	0.0399	0.0998	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**45.1**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**10.0**	0.035	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**9.19**	0.036	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	**9.27**	0.029	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
Aldrin	ND	0.028	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.042	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.037	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.070	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.040	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.040	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.027	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.036	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.032	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-04-SD

18J0402-04 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.036	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.031	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.038	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.033	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.027	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.074	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.030	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.036	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Toxaphene	ND	2.63	3.15	10.5	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.040	0.084	0.263	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**6.20**		*125 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**7.00**		*141 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**139**	0.341	0.442	0.884	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**7.90**	0.055	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 105	**1.54**	0.026	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 118	**4.69**	0.038	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 126	ND	0.052	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 128	ND	0.038	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 138	**4.91**	0.024	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 153	**6.34**	0.063	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 169	ND	0.029	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	**2.54**	0.025	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 18	**6.29**	0.053	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 180	**2.36**	0.046	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 187	**1.74**	0.023	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 28	**12.6**	0.050	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 44	**5.92**	0.061	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 52	**7.57**	0.056	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 66	**7.57**	0.063	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 77	**1.08**	0.059	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 8	ND	0.049	0.137	0.420	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.3**		*46.6 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**3.2**		*64.6 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-04-SD

18J0402-04 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				ERDC-EL-EP-C					
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**73.8**	0.8	1.8	7.2	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**1130**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**473**	0.177		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**124**	0.33		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,7,8,9-Hepta CDF	**11.4**	0.328		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,7,8-Hexa CDD	**2.07**	0.145		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDF	**46.1**	0.137		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,6,7,8-Hexa CDD	**17.2**	0.147		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,6,7,8-Hexa CDF	**10.9**	0.147		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,7,8,9-Hexa CDD	**13.6**	0.149		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,7,8,9-Hexa CDF	ND	0.64		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	A2946, U
1,2,3,7,8-Penta CDD	**12.1**	0.114		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,7,8-Penta CDF	**32.2**	0.171		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
2,3,4,6,7,8-Hexa CDF	**3.52**	0.132		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
2,3,4,7,8-Penta CDF	**26.3**	0.155		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDD	**1070**	0.938		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	A2949
2,3,7,8-Tetra CDF	**2320**	0.181		0.998	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Octa CDD	**5350**	5.28		49.9	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	A2949
Octa CDF	**1540**	0.223		9.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hepta CDD	**1100**	0.177		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hepta CDF	**343**	0.329		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-04-SD

18J0402-04 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**206**	0.149		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hexa CDF	**175**	0.139		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Penta CDD	**36.1**	0.114		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Penta CDF	**157**	0.163		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Tetra CDD	**1180**	0.938		4.99	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Tetra CDF	**4360**	0.181		0.998	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**18.8**		*94 %*	*35-197*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**70**		*70 %*	*23-140*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**59**		*59 %*	*28-143*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**61**		*61 %*	*32-141*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**84**		*84 %*	*26-152*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**72**		*72 %*	*26-138*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**88**		*88 %*	*28-130*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**76**		*76 %*	*26-123*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**110**		*110 %*	*25-181*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**87**		*87 %*	*24-185*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**76**		*76 %*	*29-147*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**62**		*62 %*	*28-136*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**104**		*104 %*	*21-178*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**16.4**		*82 %*	*25-164*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**15.8**		*79 %*	*24-169*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**94**		*47 %*	*17-157*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**2620**	2.4		20	pg/g	11-Nov-2018	13-Nov-2018	EPA M8290A / M1613	A1626
Surrogate: C13-2378 TetraCDF	**87**		*87 %*	*40-135*		*11-Nov-2018*	*13-Nov-2018*	*EPA M8290A / M1613*	*A1626*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-04-SD

18J0402-04 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.60		1.60	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
TOC (Max)	**0.556**	0.255		0.255	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Mean)	**0.538**	0.255		0.255	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Min)	**0.497**	0.255		0.255	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
Volatile Solids	**62600**	200		200	mg/kg	11-Oct-2018	11-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	3.36		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	11.8		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	ND	11.1		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,4-Dichlorobenzene	ND	11.3		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**1220**		*56 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	4.86		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	5.84		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	8.96		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	92.6		326	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	3.81		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	14		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	3.78		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	3.59		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**2010**		*93 %*	*30-130*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**793**		*36 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	5.86		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	9.28		109	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	104		326	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	5.11		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	7.85		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	5.24		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	299		903	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	4.01		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	352		1520	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	5.47		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	9.98		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	9.07		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**2240**	14.2		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	
Butylbenzylphthalate	ND	11		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-04-SD

18J0402-04 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	5.56		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Dimethylphthalate	ND	4.24		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-butylphthalate	ND	5.18		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-octylphthalate	ND	22.5		109	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	5.3		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	ND	10.5		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	59.6		326	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	9.09		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	5.96		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	5.66		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**1450**		*67 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	13.7		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	9.25		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	3.82		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	97.8		326	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	5.16		54.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**1170**		*54 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**1690**		*78 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**550**		*68 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	**311**	2.51		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Acenaphthylene	**91.9**	2.53		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Anthracene	**162**	4.42		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benz(a)anthracene	**745**	3.18		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**539**	1.87		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**471**	3.1		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**652**		*81 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**670**	3.55		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**510**	4.16		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**238**	1.85		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**651**	2.34		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	**153**	3.83		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluoranthene	**1240**	2.98		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluorene	**200**	3.82		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**246**	1.84		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-04-SD

18J0402-04 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Naphthalene	**108**	2.53		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Phenanthrene	**888**	4.16		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Pyrene	**1550**	3.57		6.46	ug/kg	11-Oct-2018	01-Nov-2018	8270D	E
Surrogate: Pyrene-d10	**649**		*80 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-04-SD

18J0402-04RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.421**	0.0188	0.0377	0.0942	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.699**	0.0079	0.0377	0.0942	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00366		0.00366	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00366		0.00366	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	**0.0154**	0.00366		0.00366	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
1,4-Dichlorobenzene	ND	0.00366		0.00366	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.366		0.733	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	**0.255**	0.0916		0.0916	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Benzene	**0.0474**	0.00366		0.00366	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Bromodichloromethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00366		0.00366	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-04-SD

18J0402-04RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	**0.00431**	0.00366		0.00366	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Isopropylbenzene	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	**0.0465**	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Methyl acetate	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methylene chloride	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Styrene	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00366		0.00366	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	ND	0.00366		0.00366	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0458		0.0458	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.485**		*106 %*	*80-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.471**		*103 %*	*85-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.485**		*106 %*	*80-119*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.485**		*106 %*	*85-115*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-04-SD

18J0402-04RE1 (Soil/Sediment)

Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
>C12-C28	**870**	7.8		40.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
>C28-C35	**140**	7.8		40.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
Surrogate: 1-Chlorooctane	**95.1**		*95.1 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
C6-C12	**94**	8.0		40.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
C6-C35	**1100**	15.		81.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
Surrogate: O-TERPHENYL	**92.9**		*92.9 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**537**		*66 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Surrogate: Benzo(b)fluoranthene-d12	**679**		*84 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Pyrene	**1480**	17.8		32.3	ug/kg	11-Oct-2018	02-Nov-2018	8270D	
Surrogate: Pyrene-d10	**671**		*83 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-05-SD

18J0402-05 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**2632.1**	50.710		106.59	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**65.5**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**28.4**	0.0360	0.0541	0.126	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0144**	0.0108	0.0180	0.0360	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.0818**	0.000273	0.00237	0.00475	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**98.7**	0.198	0.903	3.61	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**3.86**	0.0077	0.0361	0.0903	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**137**	0.0361	0.0361	0.0903	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**0.779**	0.0238	0.0361	0.0903	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**0.563**	0.0043	0.0361	0.0903	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Chromium-52 [1]	**28.4**	0.0252	0.0361	0.0903	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**19.1**	0.0138	0.0361	0.0903	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**31.5**	0.0038	0.0361	0.0903	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**13.9**	0.0109	0.0361	0.0903	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**3.30**	0.0361	0.0361	0.0903	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.173**	0.0361	0.0361	0.0903	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**34.5**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**2.36**	0.030	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**5.05**	0.031	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	**2.62**	0.024	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
Aldrin	ND	0.024	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.036	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.031	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.060	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.034	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.034	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.023	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.031	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.027	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-05-SD

18J0402-05 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.030	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.026	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.032	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	**0.808**	0.028	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
gamma-Chlordane	ND	0.023	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.063	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.026	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.031	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Toxaphene	ND	2.24	2.69	8.96	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.034	0.072	0.224	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**5.41**		*128 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**5.43**		*128 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**117**	0.379	0.491	0.982	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**2.08**	0.047	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 105	**0.408**	0.022	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 118	**1.34**	0.032	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 126	ND	0.044	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 128	ND	0.032	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 138	**2.14**	0.021	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 153	**2.82**	0.054	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 169	ND	0.025	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	**0.869**	0.021	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 18	**2.15**	0.045	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 180	**1.25**	0.039	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 187	ND	0.020	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 28	**3.27**	0.043	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 44	**1.84**	0.052	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 52	**2.37**	0.047	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 66	**2.11**	0.054	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 77	**0.521**	0.050	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 8	ND	0.042	0.116	0.358	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.5**		*58.3 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**3.0**		*71.0 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

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ERDC -- Vicksburg (EL)
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Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-05-SD

18J0402-05 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**24.1**	0.7	1.8	7.2	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**486**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**157**	0.157		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**30.9**	0.133		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,7,8,9-Hepta CDF	**3.33**	0.132		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDD	**1.02**	0.126		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDF	**14.9**	0.182		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,6,7,8-Hexa CDD	**3.89**	0.128		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDF	**4.36**	0.196		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDD	**3.34**	0.129		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDF	**0.348**	0.189		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8-Penta CDD	**1.27**	0.169		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8-Penta CDF	**7.49**	0.145		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
2,3,4,6,7,8-Hexa CDF	**1.05**	0.176		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
2,3,4,7,8-Penta CDF	**3.9**	0.132		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
2,3,7,8-Tetra CDD	**76.4**	0.142		0.978	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDF	**214**	0.191		0.978	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Octa CDD	**2330**	0.38		9.78	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Octa CDF	**165**	0.323		9.78	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hepta CDD	**400**	0.157		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hepta CDF	**92.1**	0.132		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-05-SD

18J0402-05 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**44.7**	0.129		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hexa CDF	**48.6**	0.185		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Penta CDD	**4.22**	0.169		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
Total Penta CDF	**34**	0.138		4.89	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Tetra CDD	**86.9**	0.142		0.978	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Tetra CDF	**396**	0.191		0.978	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**19.6**		*98 %*	*35-197*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**73**		*73 %*	*23-140*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**74**		*74 %*	*28-143*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**82**		*82 %*	*32-141*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**85**		*85 %*	*26-152*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**76**		*76 %*	*26-138*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**92**		*92 %*	*28-130*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**83**		*83 %*	*26-123*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**96**		*96 %*	*25-181*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**84**		*84 %*	*24-185*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**82**		*82 %*	*29-147*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**79**		*79 %*	*28-136*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**94**		*94 %*	*21-178*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**18**		*90 %*	*25-164*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**16.6**		*83 %*	*24-169*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**150**		*75 %*	*17-157*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**230**	0.89		5	pg/g	11-Nov-2018	13-Nov-2018	EPA M8290A / M1613	A1369
Surrogate: C13-2378 TetraCDF	**80**		*80 %*	*40-135*		*11-Nov-2018*	*13-Nov-2018*	*EPA M8290A / M1613*	*A1369*

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Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-05-SD

18J0402-05 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.44		1.44	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
TOC (Max)	**0.406**	0.126		0.126	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Mean)	**0.393**	0.126		0.126	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Min)	**0.361**	0.126		0.126	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
Volatile Solids	**39300**	200		200	mg/kg	11-Oct-2018	11-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	3.39		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	12		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	ND	11.2		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,4-Dichlorobenzene	ND	11.4		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**1620**		*74 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	4.91		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	5.9		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	9.05		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	93.6		329	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	3.84		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	14.2		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	3.82		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	3.62		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**1560**		*71 %*	*30-130*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**923**		*42 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	5.92		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	9.37		110	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	105		329	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	5.16		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	7.93		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	5.29		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	302		912	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	4.05		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	356		1540	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	5.52		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	10.1		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	9.16		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**1020**	14.4		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	
Butylbenzylphthalate	ND	11.1		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-05-SD

18J0402-05 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	5.61		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Dimethylphthalate	ND	4.28		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-butylphthalate	ND	5.23		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-octylphthalate	ND	22.7		110	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	5.35		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	ND	10.6		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	60.2		329	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	9.18		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	6.02		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	5.72		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**1380**		*63 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	13.8		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	9.35		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	3.85		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	98.7		329	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	5.22		54.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**1210**		*55 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**1720**		*78 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**472**		*60 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	**34.9**	2.44		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Acenaphthylene	**22.9**	2.46		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Anthracene	**35**	4.29		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benz(a)anthracene	**201**	3.08		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**166**	1.82		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**230**	3		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**656**		*84 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**227**	3.44		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**180**	4.04		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**108**	1.8		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**210**	2.28		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	**40.7**	3.72		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluoranthene	**307**	2.89		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluorene	**49.1**	3.7		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**136**	1.79		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	

USACE ERDC-EP-C
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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-05-SD

18J0402-05 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Naphthalene	**93.5**	2.46		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Phenanthrene	**213**	4.04		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Pyrene	**378**	3.46		6.27	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Pyrene-d10	**662**		*85 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-05-SD

18J0402-05RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.282**	0.0180	0.0362	0.0905	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.399**	0.0076	0.0362	0.0905	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00253		0.00253	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00253		0.00253	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.00253		0.00253	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.00253		0.00253	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.253		0.506	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	**0.125**	0.0632		0.0632	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Benzene	ND	0.00253		0.00253	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00253		0.00253	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-05-SD

18J0402-05RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.00253		0.00253	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl acetate	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methylene chloride	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Styrene	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00253		0.00253	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	ND	0.00253		0.00253	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0316		0.0316	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.322**		*102 %*	*80-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.308**		*97.4 %*	*85-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.333**		*105 %*	*80-119*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.318**		*101 %*	*85-115*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-05-SD

18J0402-05RE1 (Soil/Sediment)

Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
>C12-C28	**7.3**	5.0		26.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
>C28-C35	**12**	5.0		26.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
Surrogate: 1-Chlorooctane	**61.0**		*61.0 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	*
C6-C12	**7.3**	5.1		26.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**24**	9.8		52.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
Surrogate: O-TERPHENYL	**106.**		*106. %*		*30-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-06-SD

18J0402-06 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**4783.3**	43.490		91.460	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**67.5**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**31.8**	0.0398	0.0599	0.140	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0199**	0.0119	0.0199	0.0397	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.124**	0.00028	0.00243	0.00485	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**122**	0.219	1.00	4.00	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**3.56**	0.0086	0.0400	0.100	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**130**	0.0400	0.0400	0.100	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**0.638**	0.0264	0.0400	0.100	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**0.947**	0.0048	0.0400	0.100	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Chromium-52 [1]	**31.8**	0.0279	0.0400	0.100	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**23.4**	0.0153	0.0400	0.100	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**47.8**	0.0042	0.0400	0.100	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**14.5**	0.0121	0.0400	0.100	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**3.41**	0.0400	0.0400	0.100	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.153**	0.0400	0.0400	0.100	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**32.6**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**2.45**	0.028	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**8.94**	0.029	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	ND	0.023	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Aldrin	ND	0.023	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.033	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-Chlordane	**1.90**	0.030	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
beta-BHC	ND	0.056	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.032	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.032	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.022	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.029	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.026	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-06-SD

18J0402-06 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.028	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.025	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.030	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	**0.419**	0.026	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
gamma-Chlordane	ND	0.022	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.059	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.024	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.029	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Toxaphene	ND	2.10	2.52	8.41	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	**1.37**	0.032	0.067	0.210	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**3.72**		*93.6 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**5.65**		*142 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**149**	0.345	0.447	0.894	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**5.67**	0.044	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 105	**0.982**	0.021	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 118	**3.25**	0.030	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 126	ND	0.041	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 128	ND	0.030	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 138	**5.46**	0.019	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 153	**6.87**	0.050	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 169	ND	0.024	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	**2.00**	0.020	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 18	**3.13**	0.042	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 180	**2.95**	0.037	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 187	**1.46**	0.018	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 28	**4.43**	0.040	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 44	**3.96**	0.049	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 52	**3.33**	0.045	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 66	**2.72**	0.050	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 77	**0.503**	0.047	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 8	ND	0.040	0.109	0.336	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.3**		*57.5 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**2.8**		*71.7 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-06-SD

18J0402-06 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**47.4**	0.6	1.8	5.4	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**235**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**286**	0.143		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**45**	0.168		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,7,8,9-Hepta CDF	**3.64**	0.167		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDD	**1.32**	0.16		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDF	**5.18**	0.159		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,6,7,8-Hexa CDD	**6.9**	0.163		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,6,7,8-Hexa CDF	**2.23**	0.171		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDD	**4.36**	0.164		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDF	ND	0.165		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Uc
1,2,3,7,8-Penta CDD	**1**	0.152		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8-Penta CDF	**1.93**	0.125		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
2,3,4,6,7,8-Hexa CDF	**1.26**	0.154		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
2,3,4,7,8-Penta CDF	**1.63**	0.113		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
2,3,7,8-Tetra CDD	**19.1**	0.139		0.996	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDF	**58.4**	0.135		0.996	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Octa CDD	**3660**	0.22		9.96	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Octa CDF	**180**	0.2		9.96	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hepta CDD	**713**	0.143		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hepta CDF	**164**	0.168		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-06-SD

18J0402-06 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**61.5**	0.164		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hexa CDF	**60**	0.162		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Penta CDD	**4.06**	0.152		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
Total Penta CDF	**27.9**	0.119		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Tetra CDD	**25.7**	0.139		0.996	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Tetra CDF	**118**	0.135		0.996	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**19.2**		*96 %*	*35-197*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**80**		*80 %*	*23-140*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**81**		*81 %*	*28-143*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**85**		*85 %*	*32-141*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**89**		*89 %*	*26-152*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**83**		*83 %*	*26-138*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**106**		*106 %*	*28-130*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**91**		*91 %*	*26-123*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**106**		*106 %*	*25-181*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**93**		*93 %*	*24-185*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**91**		*91 %*	*29-147*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**85**		*85 %*	*28-136*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**102**		*102 %*	*21-178*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**20.8**		*104 %*	*25-164*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**18**		*90 %*	*24-169*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**162**		*81 %*	*17-157*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**65.7**	0.11		1	pg/g	11-Nov-2018	13-Nov-2018	EPA M8290A / M1613	
Surrogate: C13-2378 TetraCDF	**109**		*109 %*	*40-135*		*11-Nov-2018*	*13-Nov-2018*	*EPA M8290A / M1613*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-06-SD

18J0402-06 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.15		1.15	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
TOC (Max)	**0.382**	0.121		0.121	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Mean)	**0.306**	0.121		0.121	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Min)	**0.257**	0.121		0.121	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
Volatile Solids	**41800**	200		200	mg/kg	11-Oct-2018	11-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	2.95		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	10.4		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	ND	9.73		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,4-Dichlorobenzene	ND	9.92		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**1500**		*79 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	4.26		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	5.12		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	7.86		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	81.2		286	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	3.34		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	12.3		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	3.32		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	3.15		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**1420**		*75 %*	*30-130*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**988**		*52 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	5.14		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	8.14		95.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	91.6		286	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	4.48		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	6.88		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	4.6		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	262		792	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	3.52		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	309		1340	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	4.8		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	8.76		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	7.95		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**1800**	12.5		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	
Butylbenzylphthalate	ND	9.63		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-06-SD

18J0402-06 (Soil/Sediment)

Alpha

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	4.87		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Dimethylphthalate	ND	3.72		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-butylphthalate	ND	4.54		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-octylphthalate	ND	19.7		95.4	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	4.64		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	ND	9.25		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	52.3		286	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	7.97		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	5.23		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	4.97		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**1320**		*69 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	12		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	8.12		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	3.35		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	85.7		286	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	4.53		47.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**1220**		*64 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**1550**		*81 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**432**		*64 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	**56.8**	2.09		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Acenaphthylene	**20.6**	2.11		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Anthracene	**44.3**	3.68		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benz(a)anthracene	**390**	2.65		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**327**	1.56		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**502**	2.58		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**574**		*85 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**361**	2.95		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**307**	3.46		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**270**	1.54		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**370**	1.95		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	**65.8**	3.19		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluoranthene	**739**	2.48		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluorene	**76.6**	3.18		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**283**	1.53		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-06-SD

18J0402-06 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Naphthalene	**9.24**	2.11		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Phenanthrene	**317**	3.46		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Pyrene	**644**	2.97		5.38	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Pyrene-d10	**551**		*82 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-06-SD

18J0402-06RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.369**	0.0199	0.0399	0.0998	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.766**	0.0084	0.0399	0.0998	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00284		0.00284	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00284		0.00284	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.00284		0.00284	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.00284		0.00284	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.284		0.568	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	**0.206**	0.0711		0.0711	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Benzene	ND	0.00284		0.00284	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00284		0.00284	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-06-SD

18J0402-06RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.00284		0.00284	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl acetate	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methylene chloride	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Styrene	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00284		0.00284	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	ND	0.00284		0.00284	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0355		0.0355	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.366**		*103 %*	*80-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.352**		*99.2 %*	*85-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.369**		*104 %*	*80-119*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.360**		*101 %*	*85-115*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-06-SD

18J0402-06RE1 (Soil/Sediment)

Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
>C12-C28	**150**	8.6		44.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
>C28-C35	**81**	8.6		44.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Bb
Surrogate: 1-Chlorooctane	**70.1**		*70.1 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
C6-C12	**15**	8.8		44.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**240**	17.		89.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
Surrogate: O-TERPHENYL	**109.**		*109. %*		*30-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-07-SD

18J0402-07 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**11220**	68.590		141.35	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**68.1**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**28.5**	0.0393	0.0590	0.138	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0159**	0.0120	0.0199	0.0398	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.219**	0.000269	0.00233	0.00467	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**168**	0.214	0.979	3.91	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**3.01**	0.0084	0.0391	0.0979	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**140**	0.0391	0.0391	0.0979	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**0.677**	0.0258	0.0391	0.0979	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**0.820**	0.0047	0.0391	0.0979	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Chromium-52 [1]	**28.5**	0.0273	0.0391	0.0979	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**26.6**	0.0150	0.0391	0.0979	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**70.0**	0.0041	0.0391	0.0979	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**11.4**	0.0118	0.0391	0.0979	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**2.43**	0.0391	0.0391	0.0979	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.153**	0.0391	0.0391	0.0979	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**31.9**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**4.46**	0.028	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**14.9**	0.029	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	ND	0.023	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Aldrin	ND	0.023	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.033	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-Chlordane	**1.89**	0.029	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
beta-BHC	ND	0.056	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.032	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.032	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.021	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.029	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.025	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-07-SD

18J0402-07 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.028	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.024	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.030	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	**0.756**	0.026	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
gamma-Chlordane	ND	0.021	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.059	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.024	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.029	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Toxaphene	ND	2.09	2.51	8.38	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.032	0.067	0.209	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.55**		*64.3 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**5.41**		*137 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**235**	0.378	0.489	0.979	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**6.69**	0.044	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 105	**1.51**	0.021	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 118	**3.81**	0.030	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 126	ND	0.041	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 128	ND	0.030	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 138	**6.07**	0.019	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 153	**7.31**	0.050	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 169	ND	0.023	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	**1.68**	0.020	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 18	**7.34**	0.042	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 180	**2.79**	0.037	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 187	**1.49**	0.018	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 28	**5.39**	0.040	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 44	**4.89**	0.049	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 52	**5.96**	0.044	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 66	**3.40**	0.050	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 77	**0.644**	0.047	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 8	**4.18**	0.039	0.109	0.335	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.4**		*59.8 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**3.3**		*82.1 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-07-SD

18J0402-07 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**63.6**	0.6	1.8	5.4	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**485**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**438**	0.16		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**81.3**	0.13		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,7,8,9-Hepta CDF	**6.41**	0.13		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,7,8-Hexa CDD	**2.16**	0.129		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDF	**8.65**	0.13		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,6,7,8-Hexa CDD	**11.4**	0.131		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,6,7,8-Hexa CDF	**5.07**	0.139		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,7,8,9-Hexa CDD	**6.47**	0.132		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,7,8,9-Hexa CDF	ND	0.135		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Uc
1,2,3,7,8-Penta CDD	**2.05**	0.163		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8-Penta CDF	**3.04**	0.125		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
2,3,4,6,7,8-Hexa CDF	**2.46**	0.125		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
2,3,4,7,8-Penta CDF	**3.41**	0.113		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
2,3,7,8-Tetra CDD	**45.8**	0.141		0.996	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDF	**142**	0.208		0.996	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Octa CDD	**7480**	2.11		49.8	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	A2949
Octa CDF	**330**	0.265		9.96	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hepta CDD	**1070**	0.16		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hepta CDF	**301**	0.13		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-07-SD

18J0402-07 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**103**	0.132		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hexa CDF	**120**	0.132		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Penta CDD	**9.71**	0.163		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Penta CDF	**83.2**	0.119		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Tetra CDD	**57.1**	0.141		0.996	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Tetra CDF	**298**	0.208		0.996	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**20.6**		*103 %*	*35-197*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**72**		*72 %*	*23-140*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**72**		*72 %*	*28-143*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**81**		*81 %*	*32-141*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**86**		*86 %*	*26-152*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**74**		*74 %*	*26-138*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**95**		*95 %*	*28-130*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**84**		*84 %*	*26-123*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**101**		*101 %*	*25-181*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**88**		*88 %*	*24-185*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**86**		*86 %*	*29-147*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**77**		*77 %*	*28-136*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**99**		*99 %*	*21-178*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**19.6**		*98 %*	*25-164*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**16**		*80 %*	*24-169*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**102**		*51 %*	*17-157*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**162**	0.14		1	pg/g	11-Nov-2018	13-Nov-2018	EPA M8290A / M1613	
Surrogate: C13-2378 TetraCDF	**98**		*98 %*	*40-135*		*11-Nov-2018*	*13-Nov-2018*	*EPA M8290A / M1613*	

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-07-SD

18J0402-07 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.21		1.21	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
TOC (Max)	**0.559**	0.141		0.141	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Mean)	**0.492**	0.141		0.141	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Min)	**0.444**	0.141		0.141	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
Volatile Solids	**45200**	200		200	mg/kg	16-Oct-2018	16-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	3.03		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	10.7		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	ND	10		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,4-Dichlorobenzene	ND	10.2		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**1600**		*81 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	4.39		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	5.27		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	8.09		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	83.6		294	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	3.44		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	12.7		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	3.42		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	3.24		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**1520**		*77 %*	*30-130*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**991**		*50 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	5.29		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	8.37		98.2	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	94.2		294	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	4.61		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	7.09		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	4.73		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	270		815	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	3.62		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	318		1370	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	4.94		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	9.01		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	8.19		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**1250**	12.9		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	
Butylbenzylphthalate	ND	9.92		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-07-SD

18J0402-07 (Soil/Sediment)

Alpha

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	5.02		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Dimethylphthalate	ND	3.83		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-butylphthalate	ND	4.67		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-octylphthalate	ND	20.3		98.2	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	4.78		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	ND	9.52		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	53.8		294	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	8.21		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	5.38		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	5.11		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**1420**		*72 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	12.4		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	8.35		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	3.44		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	88.3		294	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	4.66		49.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**1240**		*63 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**1570**		*80 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**465**		*66 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	**206**	2.2		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Acenaphthylene	**38.9**	2.22		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Anthracene	**179**	3.87		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benz(a)anthracene	**902**	2.78		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**709**	1.64		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**1110**	2.71		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**566**		*80 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**810**	3.1		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**671**	3.64		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**545**	1.62		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**850**	2.05		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	**147**	3.35		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluoranthene	**2050**	2.61		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	E
Fluorene	**252**	3.34		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**563**	1.61		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-07-SD

18J0402-07 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Naphthalene	**25.6**	2.22		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Phenanthrene	**952**	3.64		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Pyrene	**1560**	3.12		5.65	ug/kg	11-Oct-2018	01-Nov-2018	8270D	E
Surrogate: Pyrene-d10	**562**		*79 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-07-SD

18J0402-07RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.499**	0.0195	0.0391	0.0978	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.824**	0.0082	0.0391	0.0978	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.294		0.588	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	**0.119**	0.0735		0.0735	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Benzene	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-07-SD

18J0402-07RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	**0.00367**	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Isopropylbenzene	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl acetate	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methylene chloride	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Styrene	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0367		0.0367	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.355**		*96.7 %*	*80-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.373**		*102 %*	*85-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.382**		*104 %*	*80-119*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.379**		*103 %*	*85-115*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-07-SD

18J0402-07RE1 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
			Katahdin						
TNRCC 1005									
>C12-C28	**77**	6.3		33.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
>C28-C35	**49**	6.3		33.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Bb
Surrogate: 1-Chlorooctane	**67.6**		*67.6 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	*
C6-C12	**12**	6.5		33.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**140**	12.		66.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Bb
Surrogate: O-TERPHENYL	**122.**		*122. %*		*30-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**419**		*59 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Surrogate: Benzo(b)fluoranthene-d12	**527**		*75 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Fluoranthene	**1830**	13		28.3	ug/kg	11-Oct-2018	02-Nov-2018	8270D	
Pyrene	**1430**	15.6		28.3	ug/kg	11-Oct-2018	02-Nov-2018	8270D	
Surrogate: Pyrene-d10	**534**		*76 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-08-SD

18J0402-08 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**9957.0**	89.580		176.46	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**69.1**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**33.9**	0.0379	0.0570	0.133	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0148**	0.0111	0.0184	0.0369	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.156**	0.000272	0.00236	0.00473	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**133**	0.211	0.965	3.86	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**4.49**	0.0083	0.0386	0.0965	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**216**	0.0386	0.0386	0.0965	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**0.942**	0.0254	0.0386	0.0965	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**0.772**	0.0046	0.0386	0.0965	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Chromium-52 [1]	**33.9**	0.0269	0.0386	0.0965	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**25.3**	0.0148	0.0386	0.0965	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**59.6**	0.0041	0.0386	0.0965	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**18.9**	0.0117	0.0386	0.0965	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**3.32**	0.0386	0.0386	0.0965	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.213**	0.0386	0.0386	0.0965	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**30.9**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**4.32**	0.023	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**7.23**	0.024	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	**4.68**	0.019	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
Aldrin	ND	0.019	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.027	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-Chlordane	**1.07**	0.024	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
beta-BHC	ND	0.046	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.026	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.027	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.018	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.024	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.021	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SD

18J0402-08 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.023	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.020	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.025	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.022	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.018	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.048	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.020	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.024	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Toxaphene	ND	1.72	2.07	6.90	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.026	0.055	0.172	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.80**		*85.9 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**4.65**		*143 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**165**	0.381	0.493	0.987	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**3.77**	0.036	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 105	**0.875**	0.017	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 118	**2.60**	0.025	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 126	ND	0.034	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 128	ND	0.025	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 138	**3.72**	0.016	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 153	**4.44**	0.041	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 169	ND	0.019	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	**1.13**	0.017	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 18	**3.05**	0.034	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 180	**1.81**	0.030	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 187	**0.927**	0.015	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 28	**2.13**	0.033	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 44	**2.04**	0.040	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 52	**2.85**	0.037	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 66	**1.48**	0.041	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 77	**0.466**	0.039	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 8	ND	0.032	0.090	0.276	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**1.8**		*53.8 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**2.0**		*62.4 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-08-SD

18J0402-08 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**31.7**	0.5	1.6	5.4	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**311**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**294**	0.131		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**71.6**	0.0645		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,7,8,9-Hepta CDF	**5.31**	0.0642		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,4,7,8-Hexa CDD	**0.806**	0.129		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDF	**12.7**	0.133		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,6,7,8-Hexa CDD	**8.39**	0.131		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
1,2,3,6,7,8-Hexa CDF	**4.51**	0.143		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDD	**4.11**	0.132		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDF	ND	0.169		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	A2946, U
1,2,3,7,8-Penta CDD	**1.17**	0.148		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8-Penta CDF	**5.34**	0.177		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
2,3,4,6,7,8-Hexa CDF	**2.25**	0.128		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
2,3,4,7,8-Penta CDF	**3.2**	0.161		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	Jb
2,3,7,8-Tetra CDD	**39**	0.148		0.997	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDF	**136**	0.207		0.997	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Octa CDD	**3810**	0.304		9.97	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Octa CDF	**211**	0.183		9.97	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hepta CDD	**724**	0.131		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hepta CDF	**248**	0.0644		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SD

18J0402-08 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**72.6**	0.132		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Hexa CDF	**117**	0.135		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Penta CDD	**5.49**	0.148		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Penta CDF	**76.6**	0.169		4.98	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Tetra CDD	**47.2**	0.148		0.997	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Total Tetra CDF	**268**	0.207		0.997	pg/g	22-Oct-2018	12-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**24**		*120 %*	*35-197*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**90**		*90 %*	*23-140*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**88**		*88 %*	*28-143*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**104**		*104 %*	*32-141*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**108**		*108 %*	*26-152*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**91**		*91 %*	*26-138*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**111**		*111 %*	*28-130*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**103**		*103 %*	*26-123*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**128**		*128 %*	*25-181*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**112**		*112 %*	*24-185*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**105**		*105 %*	*29-147*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**92**		*92 %*	*28-136*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**119**		*119 %*	*21-178*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**24.8**		*124 %*	*25-164*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**19.6**		*98 %*	*24-169*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**174**		*87 %*	*17-157*		*22-Oct-2018*	*12-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**156**	0.12		1	pg/g	11-Nov-2018	13-Nov-2018	EPA M8290A / M1613	
Surrogate: C13-2378 TetraCDF	**125**		*125 %*	*40-135*		*11-Nov-2018*	*13-Nov-2018*	*EPA M8290A / M1613*	

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-08-SD

18J0402-08 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.34		1.34	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
TOC (Max)	**0.400**	0.122		0.122	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Mean)	**0.370**	0.122		0.122	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Min)	**0.333**	0.122		0.122	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
Volatile Solids	**56800**	200		200	mg/kg	16-Oct-2018	16-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	3.13		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	11		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	ND	10.3		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,4-Dichlorobenzene	ND	10.5		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**1320**		*65 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	4.53		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	5.45		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	8.36		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	86.4		304	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	3.55		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	13.1		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	3.53		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	3.35		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**1720**		*85 %*	*30-130*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**1080**		*54 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	5.47		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	8.65		101	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	97.4		304	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	4.77		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	7.32		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	4.89		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	279		842	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	3.74		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	329		1420	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	5.1		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	9.31		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	8.46		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**598**	13.3		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	
Butylbenzylphthalate	ND	10.2		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SD

18J0402-08 (Soil/Sediment)

Alpha

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	5.18		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Dimethylphthalate	ND	3.96		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-butylphthalate	ND	4.83		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-octylphthalate	ND	21		101	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	4.94		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	ND	9.84		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	55.6		304	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	8.48		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	5.56		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	5.28		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**1750**		*86 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	12.8		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	8.63		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	3.56		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	91.2		304	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	4.82		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**1370**		*68 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**1650**		*82 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**572**		*75 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	**476**	2.37		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Acenaphthylene	**55.4**	2.39		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Anthracene	**733**	4.17		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benz(a)anthracene	**640**	3		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**292**	1.77		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**406**	2.92		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**653**		*86 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**360**	3.34		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**222**	3.92		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**250**	1.75		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**536**	2.21		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	**40.5**	3.61		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluoranthene	**2090**	2.81		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	E
Fluorene	**614**	3.6		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**181**	1.74		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SD

18J0402-08 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Naphthalene	**61.1**	2.39		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Phenanthrene	**2080**	3.92		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	E
Pyrene	**1600**	3.36		6.09	ug/kg	11-Oct-2018	01-Nov-2018	8270D	E
Surrogate: Pyrene-d10	**639**		*84 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SD

18J0402-08RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.431**	0.0168	0.0336	0.0841	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.621**	0.0071	0.0336	0.0841	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.294		0.588	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	**0.134**	0.0735		0.0735	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Benzene	**0.0262**	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Bromodichloromethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SD

18J0402-08RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	**0.0419**	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Isopropylbenzene	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	**0.0782**	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Methyl acetate	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	**0.137**	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Methylene chloride	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	**0.0751**	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Styrene	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	**0.0149**	0.00294		0.00294	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
trans-1,2-Dichloroethylene	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0368		0.0368	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.373**		*101 %*	*80-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.379**		*103 %*	*85-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.372**		*101 %*	*80-119*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.382**		*104 %*	*85-115*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-08-SD

18J0402-08RE1 (Soil/Sediment)

Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
>C12-C28	**130**	5.0		26.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
>C28-C35	**44**	5.0		26.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Bb
Surrogate: 1-Chlorooctane	**67.8**		*67.8 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	*
C6-C12	**17**	5.1		26.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**190**	9.8		52.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
Surrogate: O-TERPHENYL	**112.**		*112. %*		*30-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**503**		*66 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Surrogate: Benzo(b)fluoranthene-d12	**609**		*80 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Fluoranthene	**1800**	14		30.4	ug/kg	11-Oct-2018	02-Nov-2018	8270D	
Phenanthrene	**1860**	19.6		30.4	ug/kg	11-Oct-2018	02-Nov-2018	8270D	
Pyrene	**1430**	16.8		30.4	ug/kg	11-Oct-2018	02-Nov-2018	8270D	
Surrogate: Pyrene-d10	**618**		*81 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-09-SD

18J0402-09 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**7173.4**	68.980		138.00	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**69.3**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**31.0**	0.0377	0.0567	0.132	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0183**	0.0110	0.0183	0.0366	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.0478**	0.000275	0.00239	0.00478	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**96.1**	0.210	0.959	3.84	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**4.86**	0.0082	0.0384	0.0959	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**211**	0.0384	0.0384	0.0959	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**1.79**	0.0253	0.0384	0.0959	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**0.388**	0.0046	0.0384	0.0959	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Chromium-52 [1]	**31.0**	0.0267	0.0384	0.0959	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**18.9**	0.0147	0.0384	0.0959	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**26.0**	0.0040	0.0384	0.0959	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**22.0**	0.0116	0.0384	0.0959	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**10.9**	0.0384	0.0384	0.0959	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.239**	0.0384	0.0384	0.0959	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**30.7**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**0.857**	0.030	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**1.60**	0.031	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	ND	0.025	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Aldrin	**0.466**	0.025	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
alpha-BHC	**0.475**	0.036	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
alpha-Chlordane	**0.706**	0.032	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
beta-BHC	ND	0.061	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.035	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.035	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.023	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.031	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.028	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-09-SD

18J0402-09 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.031	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.027	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.033	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.028	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-Chlordane	**1.16**	0.023	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
Heptachlor	ND	0.064	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.026	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.031	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Toxaphene	ND	2.27	2.73	9.09	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	**0.786**	0.035	0.073	0.227	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.56**		*59.7 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**4.89**		*114 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**110**	0.345	0.446	0.892	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**1.62**	0.047	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 105	**0.240**	0.023	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 118	**0.852**	0.033	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 126	**0.244**	0.045	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 128	ND	0.033	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 138	**1.47**	0.021	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 153	**2.01**	0.055	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 169	ND	0.025	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	**0.438**	0.022	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 18	**1.07**	0.045	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 180	**0.958**	0.040	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 187	**0.559**	0.020	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 28	**1.29**	0.044	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 44	**1.09**	0.053	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 52	**0.886**	0.048	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 66	**0.547**	0.055	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 77	**0.126**	0.051	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 8	**0.492**	0.043	0.118	0.364	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.4**		*55.5 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**2.5**		*57.1 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-09-SD

18J0402-09 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**14.3**	0.7	1.8	7.2	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**48.0**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**102**	0.128		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**16.4**	0.149		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
1,2,3,4,7,8,9-Hepta CDF	**1**	0.148		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDD	ND	0.311		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	A2946, U
1,2,3,4,7,8-Hexa CDF	**1.31**	0.147		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDD	**2.62**	0.137		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDF	**0.762**	0.157		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDD	**1.74**	0.138		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb, A0550
1,2,3,7,8,9-Hexa CDF	ND	0.152		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Uc
1,2,3,7,8-Penta CDD	**0.349**	0.143		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8-Penta CDF	ND	0.404		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	A0553, U
2,3,4,6,7,8-Hexa CDF	**0.505**	0.142		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
2,3,4,7,8-Penta CDF	**0.389**	0.132		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
2,3,7,8-Tetra CDD	**1.94**	0.135		0.998	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDF	**6.05**	0.138		0.998	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Octa CDD	**1490**	0.133		9.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Octa CDF	**51.8**	0.103		9.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Hepta CDD	**284**	0.128		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Hepta CDF	**55.3**	0.149		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-09-SD

18J0402-09 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**23.7**	0.138		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Hexa CDF	**20.3**	0.149		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Penta CDD	**1.93**	0.143		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
Total Penta CDF	**13.7**	0.138		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Tetra CDD	**2.46**	0.135		0.998	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Tetra CDF	**9.34**	0.138		0.998	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**15**		*75 %*	*35-197*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**65**		*65 %*	*23-140*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**63**		*63 %*	*28-143*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**73**		*73 %*	*32-141*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**63**		*63 %*	*26-152*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**62**		*62 %*	*26-138*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**84**		*84 %*	*28-130*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**66**		*66 %*	*26-123*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**78**		*78 %*	*25-181*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**64**		*64 %*	*24-185*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**66**		*66 %*	*29-147*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**67**		*67 %*	*28-136*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**70**		*70 %*	*21-178*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**16**		*80 %*	*25-164*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**9.4**		*47 %*	*24-169*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**126**		*63 %*	*17-157*		*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**7.35**	0.1		1	pg/g	22-Oct-2018	09-Nov-2018	EPA M8290A / M1613	
Surrogate: C13-2378 TetraCDF	**50**		*50 %*	*40-135*		*22-Oct-2018*	*09-Nov-2018*	*EPA M8290A / M1613*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-09-SD

18J0402-09 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.19		1.19	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
TOC (Max)	**0.424**	0.125		0.125	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Mean)	**0.377**	0.125		0.125	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Min)	**0.344**	0.125		0.125	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
Volatile Solids	**50500**	200		200	mg/kg	16-Oct-2018	16-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	3.02		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	10.6		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	ND	9.97		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,4-Dichlorobenzene	ND	10.2		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**1330**		*68 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	4.37		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	5.25		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	8.05		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	83.3		293	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	3.42		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	12.6		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	3.4		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	3.22		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**1400**		*72 %*	*30-130*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**997**		*51 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	5.27		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	8.34		97.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	93.8		293	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	4.59		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	7.06		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	4.71		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	269		811	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	3.61		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	317		1370	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	4.92		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	8.97		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	8.15		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**293**	12.8		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	
Butylbenzylphthalate	**17.3**	9.87		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Jc

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-09-SD

18J0402-09 (Soil/Sediment)

Alpha

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC-MS									
Diethylphthalate	**8.11**	4.99		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Jc
Dimethylphthalate	ND	3.81		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-butylphthalate	ND	4.65		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-octylphthalate	ND	20.2		97.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	4.76		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	ND	9.48		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	53.6		293	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	8.17		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	5.36		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	5.09		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**1340**		*69 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	12.3		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	8.32		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	3.43		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	87.9		293	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	4.64		48.9	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**1260**		*65 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**1620**		*83 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
TNRCC 1005									
>C12-C28	**640**	15.		77.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
>C28-C35	**190**	15.		77.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
Surrogate: 1-Chlorooctane	**83.5**		*83.5 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
C6-C12	**48**	15.		77.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**870**	29.		150	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
Surrogate: O-TERPHENYL	**99.0**		*99.0 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-09-SD

18J0402-09 (Soil/Sediment)

Alpha

PAHs by GC/MS SIM

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Surrogate: 2-Methylnaphthalene-d10	**438**		*64 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	**683**	2.14		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Acenaphthylene	**21**	2.16		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Anthracene	**465**	3.77		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benz(a)anthracene	**351**	2.71		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**187**	1.6		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**263**	2.64		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**584**		*85 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**201**	3.03		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**149**	3.55		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**164**	1.58		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**291**	2		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	**31.8**	3.27		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluoranthene	**1220**	2.54		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	E
Fluorene	**602**	3.26		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**142**	1.57		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Naphthalene	**17.6**	2.16		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Phenanthrene	**1740**	3.55		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	E
Pyrene	**865**	3.04		5.52	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Pyrene-d10	**580**		*84 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-09-SD

18J0402-09RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.405**	0.0189	0.0378	0.0946	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.318**	0.0079	0.0378	0.0946	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00281		0.00281	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00281		0.00281	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.00281		0.00281	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.00281		0.00281	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.281		0.563	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	**0.151**	0.0703		0.0703	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Benzene	ND	0.00281		0.00281	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00281		0.00281	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-09-SD

18J0402-09RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.00281		0.00281	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl acetate	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methylene chloride	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Styrene	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00281		0.00281	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	ND	0.00281		0.00281	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0352		0.0352	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.354**		*101 %*	*80-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.345**		*98.1 %*	*85-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.363**		*103 %*	*80-119*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.356**		*101 %*	*85-115*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-09-SD

18J0402-09RE1 (Soil/Sediment)

Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
>C12-C28	**310**	7.8		41.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
>C28-C35	**100**	7.8		41.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
Surrogate: 1-Chlorooctane	**74.7**		*74.7 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
C6-C12	**23**	8.1		41.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**430**	16.		82.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
Surrogate: O-TERPHENYL	**113.**		*113. %*		*30-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**408**		*59 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Surrogate: Benzo(b)fluoranthene-d12	**555**		*81 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Fluoranthene	**1120**	12.7		27.6	ug/kg	11-Oct-2018	02-Nov-2018	8270D	
Phenanthrene	**1620**	17.8		27.6	ug/kg	11-Oct-2018	02-Nov-2018	8270D	
Surrogate: Pyrene-d10	**543**		*79 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-10-SD

18J0402-10 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**9643.2**	82.750		162.98	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**66.1**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**25.9**	0.0388	0.0582	0.136	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0148**	0.0111	0.0185	0.0369	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.109**	0.000273	0.00237	0.00473	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**139**	0.218	0.994	3.97	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**4.13**	0.0085	0.0397	0.0994	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**178**	0.0397	0.0397	0.0994	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**0.855**	0.0262	0.0397	0.0994	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**0.638**	0.0047	0.0397	0.0994	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Chromium-52 [1]	**25.9**	0.0277	0.0397	0.0994	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**25.0**	0.0152	0.0397	0.0994	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**37.7**	0.0042	0.0397	0.0994	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**15.0**	0.0120	0.0397	0.0994	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**3.36**	0.0397	0.0397	0.0994	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.174**	0.0397	0.0397	0.0994	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**33.9**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**1.81**	0.025	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**2.03**	0.025	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	ND	0.020	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Aldrin	ND	0.020	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.029	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-Chlordane	**0.756**	0.026	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
beta-BHC	ND	0.049	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.028	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.028	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.019	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.025	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.022	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SD

18J0402-10 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.025	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.021	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.026	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.023	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.019	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.052	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.021	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.025	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Toxaphene	ND	1.84	2.21	7.36	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	**0.606**	0.028	0.059	0.184	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.15**		*61.8 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**3.90**		*112 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**170**	0.342	0.443	0.886	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**2.27**	0.038	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 105	**0.582**	0.018	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 118	**1.14**	0.026	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 126	ND	0.036	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 128	ND	0.026	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 138	**1.97**	0.017	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 153	**2.72**	0.044	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 169	ND	0.021	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	**0.636**	0.018	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 18	**1.68**	0.037	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 180	**1.33**	0.032	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 187	**0.573**	0.016	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 28	**2.60**	0.035	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 44	**1.54**	0.043	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 52	**1.65**	0.039	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 66	**0.799**	0.044	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 77	**0.310**	0.041	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 8	**1.36**	0.035	0.096	0.294	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.3**		*67.1 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**2.3**		*66.4 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SD

18J0402-10 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**21.6**	0.6	1.8	5.4	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**188**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**311**	0.192		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**52.4**	0.186		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
1,2,3,4,7,8,9-Hepta CDF	**3.18**	0.185		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDD	**1.02**	0.15		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDF	**3.86**	0.14		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDD	**6.83**	0.153		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
1,2,3,6,7,8-Hexa CDF	ND	1.96		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	A2946, U
1,2,3,7,8,9-Hexa CDD	**3.89**	0.154		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDF	ND	0.145		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	Uc
1,2,3,7,8-Penta CDD	**0.892**	0.143		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8-Penta CDF	**1.03**	0.155		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	Jb
2,3,4,6,7,8-Hexa CDF	**1.35**	0.135		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	Jb
2,3,4,7,8-Penta CDF	**1.45**	0.142		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	Jb
2,3,7,8-Tetra CDD	**4.83**	0.143		0.999	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDF	**16.5**	0.162		0.999	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
Octa CDD	**4730**	1.7		50	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	A2949
Octa CDF	**191**	0.199		9.99	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
Total Hepta CDD	**891**	0.192		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
Total Hepta CDF	**204**	0.186		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SD

18J0402-10 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**68.4**	0.154		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
Total Hexa CDF	**66.3**	0.142		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
Total Penta CDD	**5**	0.143		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	Jb
Total Penta CDF	**36.1**	0.148		5	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
Total Tetra CDD	**9.67**	0.143		0.999	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
Total Tetra CDF	**47**	0.162		0.999	pg/g	22-Oct-2018	13-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**17**		*85 %*	*35-197*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**83**		*83 %*	*23-140*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**83**		*83 %*	*28-143*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**97**		*97 %*	*32-141*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**99**		*99 %*	*26-152*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**76**		*76 %*	*26-138*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**111**		*111 %*	*28-130*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**97**		*97 %*	*26-123*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**119**		*119 %*	*25-181*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**102**		*102 %*	*24-185*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**100**		*100 %*	*29-147*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**91**		*91 %*	*28-136*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**116**		*116 %*	*21-178*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**22.6**		*113 %*	*25-164*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**18.6**		*93 %*	*24-169*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**132**		*66 %*	*17-157*		*22-Oct-2018*	*13-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**19**	0.11		1	pg/g	11-Nov-2018	13-Nov-2018	EPA M8290A / M1613	
Surrogate: C13-2378 TetraCDF	**116**		*116 %*	*40-135*		*11-Nov-2018*	*13-Nov-2018*	*EPA M8290A / M1613*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-10-SD

18J0402-10 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.24		1.24	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
TOC (Max)	**0.696**	0.165		0.165	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Mean)	**0.608**	0.165		0.165	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
TOC (Min)	**0.548**	0.165		0.165	% by Weight dry	23-Oct-2018	23-Oct-2018	SW9060A	
Volatile Solids	**46300**	200		200	mg/kg	16-Oct-2018	16-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	3.13		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	11		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	ND	10.3		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,4-Dichlorobenzene	ND	10.5		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**2290**		*113 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	4.53		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	5.44		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	8.35		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	86.3		304	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	3.55		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	13.1		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	3.53		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	3.34		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**1910**		*94 %*	*30-130*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**911**		*45 %*	*15-115*		*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	5.46		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	8.64		101	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	97.3		304	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	4.76		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	7.32		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	4.88		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	279		841	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	3.74		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	328		1420	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	5.1		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	9.3		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	8.45		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**1160**	13.3		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	
Butylbenzylphthalate	ND	10.2		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SD

18J0402-10 (Soil/Sediment)

Alpha

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	5.18		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Dimethylphthalate	ND	3.95		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-butylphthalate	ND	4.82		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-octylphthalate	ND	21		101	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	4.94		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	ND	9.83		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	55.5		304	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	8.47		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	5.55		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	5.28		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**1460**		*72 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	12.8		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	8.62		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	3.56		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	91.1		304	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	4.81		50.7	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**1180**		*58 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**1780**		*88 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
TNRCC 1005									
>C12-C28	**84**	15.		79.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Bb
>C28-C35	**71**	15.		79.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
Surrogate: 1-Chlorooctane	**89.0**		*89.0 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
C6-C12	**26**	16.		79.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**170**	30.		160	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Bb
Surrogate: O-TERPHENYL	**101.**		*101. %*		*30-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SD

18J0402-10 (Soil/Sediment)

Alpha

PAHs by GC/MS SIM

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Surrogate: 2-Methylnaphthalene-d10	**496**		*71 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	**410**	2.19		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Acenaphthylene	**39**	2.2		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Anthracene	**288**	3.85		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benz(a)anthracene	**524**	2.77		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**434**	1.63		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**604**	2.69		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**621**		*88 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**488**	3.09		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**420**	3.62		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**439**	1.61		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**585**	2.04		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	**80.2**	3.34		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluoranthene	**1780**	2.59		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	E
Fluorene	**436**	3.32		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**393**	1.6		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Naphthalene	**463**	2.2		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Phenanthrene	**1410**	3.62		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	E
Pyrene	**1260**	3.1		5.62	ug/kg	11-Oct-2018	01-Nov-2018	8270D	E
Surrogate: Pyrene-d10	**622**		*88 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	

USACE ERDC-EP-C
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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SD

18J0402-10RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.520**	0.0167	0.0336	0.0840	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.526**	0.0071	0.0336	0.0840	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00264		0.00264	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00264		0.00264	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.00264		0.00264	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.00264		0.00264	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.264		0.528	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	**0.187**	0.0660		0.0660	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Benzene	ND	0.00264		0.00264	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00264		0.00264	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SD

18J0402-10RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.00264		0.00264	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl acetate	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methylene chloride	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Styrene	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00264		0.00264	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	ND	0.00264		0.00264	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0330		0.0330	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.339**		*103 %*	*80-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.310**		*94.0 %*	*85-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.349**		*106 %*	*80-119*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.325**		*98.4 %*	*85-115*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-10-SD

18J0402-10RE1 (Soil/Sediment)

Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
>C12-C28	**42**	7.4		39.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Bb
>C28-C35	**33**	7.4		39.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
Surrogate: 1-Chlorooctane	**91.9**		*91.9 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
C6-C12	**12**	7.7		39.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**84**	15.		78.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Bb
Surrogate: O-TERPHENYL	**128.**		*128. %*		*30-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**448**		*64 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Surrogate: Benzo(b)fluoranthene-d12	**581**		*83 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Fluoranthene	**1580**	13		28.1	ug/kg	11-Oct-2018	02-Nov-2018	8270D	
Phenanthrene	**1300**	18.1		28.1	ug/kg	11-Oct-2018	02-Nov-2018	8270D	
Pyrene	**1160**	15.5		28.1	ug/kg	11-Oct-2018	02-Nov-2018	8270D	
Surrogate: Pyrene-d10	**585**		*83 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-11-SD

18J0402-11 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**5491.1**	43.420		91.290	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**72.3**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**16.9**	0.0388	0.0584	0.137	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0185**	0.0111	0.0185	0.0371	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.0630**	0.000266	0.00231	0.00463	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**90.5**	0.218	0.997	3.99	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**2.64**	0.0085	0.0399	0.0997	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**124**	0.0399	0.0399	0.0997	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**0.488**	0.0263	0.0399	0.0997	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**0.502**	0.0048	0.0399	0.0997	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Chromium-52 [1]	**16.9**	0.0278	0.0399	0.0997	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**14.4**	0.0153	0.0399	0.0997	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**32.6**	0.0042	0.0399	0.0997	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**10.7**	0.0120	0.0399	0.0997	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**2.20**	0.0399	0.0399	0.0997	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.107**	0.0399	0.0399	0.0997	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**27.7**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**2.87**	0.028	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**5.72**	0.030	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	ND	0.023	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Aldrin	ND	0.023	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.034	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-Chlordane	**1.59**	0.030	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
beta-BHC	ND	0.057	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.033	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.033	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.022	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.029	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.026	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-11-SD

18J0402-11 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.029	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.025	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.031	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.027	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.022	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.060	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.025	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.029	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Toxaphene	ND	2.14	2.56	8.54	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	**1.27**	0.033	0.068	0.214	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.97**		*73.7 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**5.55**		*138 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**133**	0.349	0.452	0.903	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**5.25**	0.044	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 105	**0.663**	0.021	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 118	**2.25**	0.031	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 126	ND	0.042	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 128	ND	0.031	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 138	**6.98**	0.020	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 153	**9.45**	0.051	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 169	ND	0.024	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	**2.97**	0.021	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 18	**2.24**	0.043	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 180	**5.95**	0.038	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 187	**3.05**	0.019	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 28	**3.88**	0.041	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 44	**2.46**	0.050	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 52	**2.59**	0.045	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 66	**1.88**	0.051	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 77	**0.402**	0.048	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 8	**1.59**	0.040	0.111	0.342	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.2**		*54.6 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**2.1**		*50.8 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-11-SD

18J0402-11 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**52.0**	0.6	1.8	5.4	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**161**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**198**	0.119		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**27.9**	0.13		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
1,2,3,4,7,8,9-Hepta CDF	**2.17**	0.129		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDD	**0.639**	0.143		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDF	**2.17**	0.144		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDD	**4.51**	0.145		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDF	**1.8**	0.154		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDD	**2.98**	0.146		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDF	ND	0.149		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Uc
1,2,3,7,8-Penta CDD	**0.523**	0.133		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8-Penta CDF	**0.621**	0.155		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
2,3,4,6,7,8-Hexa CDF	**0.991**	0.139		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
2,3,4,7,8-Penta CDF	**0.668**	0.141		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
2,3,7,8-Tetra CDD	**2.22**	0.118		0.999	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDF	**6.9**	0.149		0.999	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Octa CDD	**2870**	0.138		9.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Octa CDF	**97.9**	0.144		9.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Hepta CDD	**567**	0.119		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Hepta CDF	**106**	0.129		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-11-SD

18J0402-11 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**45.7**	0.146		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Hexa CDF	**37.6**	0.146		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Penta CDD	**4.11**	0.133		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
Total Penta CDF	**17.4**	0.147		4.99	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Tetra CDD	**2.34**	0.118		0.999	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Tetra CDF	**8.75**	0.149		0.999	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**20.4**		*102 %*		*35-197*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**77**		*77 %*		*23-140*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**75**		*75 %*		*28-143*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**87**		*87 %*		*32-141*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**77**		*77 %*		*26-152*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**72**		*72 %*		*26-138*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**95**		*95 %*		*28-130*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**79**		*79 %*		*26-123*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**93**		*93 %*		*25-181*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**73**		*73 %*		*24-185*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**78**		*78 %*		*29-147*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**80**		*80 %*		*28-136*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**81**		*81 %*		*21-178*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**19**		*95 %*		*25-164*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**5.8**		*29 %*		*24-169*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**148**		*74 %*		*17-157*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**8.66**	0.11		1	pg/g	22-Oct-2018	09-Nov-2018	EPA M8290A / M1613	
Surrogate: C13-2378 TetraCDF	**32**		*32 %*		*40-135*	*22-Oct-2018*	*09-Nov-2018*	*EPA M8290A / M1613*	*A0797, A1*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-11-SD

18J0402-11 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.29		1.29	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
TOC (Max)	**0.413**	0.122		0.122	% by Weight dry	24-Oct-2018	24-Oct-2018	SW9060A	
TOC (Mean)	**0.405**	0.122		0.122	% by Weight dry	24-Oct-2018	24-Oct-2018	SW9060A	
TOC (Min)	**0.383**	0.122		0.122	% by Weight dry	24-Oct-2018	24-Oct-2018	SW9060A	
Volatile Solids	**32500**	200		200	mg/kg	16-Oct-2018	16-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	2.8		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	9.87		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	ND	9.23		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,4-Dichlorobenzene	ND	9.41		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**1100**		*61 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	4.05		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	4.86		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	7.46		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	77.1		272	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	3.17		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	11.7		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	3.15		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	2.99		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**1270**		*70 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**746**		*41 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	4.88		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	7.72		90.5	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	86.9		272	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	4.25		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	6.54		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	4.36		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	249		751	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	3.34		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	293		1270	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	4.55		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	8.31		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	7.55		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**726**	11.8		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	
Butylbenzylphthalate	**15.7**	9.14		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Jc

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-11-SD

18J0402-11 (Soil/Sediment)

Alpha

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	4.62		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Dimethylphthalate	**23.5**	3.53		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Jc
Di-n-butylphthalate	ND	4.31		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-octylphthalate	ND	18.7		90.5	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	4.41		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	ND	8.78		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	49.6		272	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	7.57		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	4.96		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	4.72		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**1090**		*60 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	11.4		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	7.7		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	3.18		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	81.4		272	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	4.3		45.3	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**992**		*55 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**1450**		*80 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
TNRCC 1005									
>C12-C28	**120**	14.		75.	mg/Kgdrywt	11-Oct-2018	19-Oct-2018	TNRCC 1005	
>C28-C35	**100**	14.		75.	mg/Kgdrywt	11-Oct-2018	19-Oct-2018	TNRCC 1005	
Surrogate: 1-Chlorooctane	**90.0**		*90.0 %*		*70-130*	*11-Oct-2018*	*19-Oct-2018*	*TNRCC 1005*	
C6-C12	**24**	15.		75.	mg/Kgdrywt	11-Oct-2018	19-Oct-2018	TNRCC 1005	Ja
C6-C35	**240**	29.		150	mg/Kgdrywt	11-Oct-2018	19-Oct-2018	TNRCC 1005	Bb
Surrogate: O-TERPHENYL	**104.**		*104. %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*TNRCC 1005*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-11-SD

18J0402-11 (Soil/Sediment)

Alpha

PAHs by GC/MS SIM

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Surrogate: 2-Methylnaphthalene-d10	**483**		*72 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	**118**	2.09		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Acenaphthylene	**56.8**	2.1		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Anthracene	**136**	3.67		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benz(a)anthracene	**381**	2.64		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**324**	1.56		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**405**	2.57		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**581**		*87 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**335**	2.95		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**290**	3.46		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**311**	1.54		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**389**	1.95		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	**61.6**	3.18		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluoranthene	**990**	2.48		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluorene	**126**	3.18		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**268**	1.53		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Naphthalene	**19.7**	2.1		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Phenanthrene	**528**	3.46		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Pyrene	**752**	2.96		5.37	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Pyrene-d10	**585**		*87 %*	*30-130*		*11-Oct-2018*	*01-Nov-2018*	*8270D*	

USACE ERDC-EP-C
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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-11-SD

18J0402-11RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.318**	0.0193	0.0388	0.0970	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.362**	0.0082	0.0388	0.0970	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00266		0.00266	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00266		0.00266	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.00266		0.00266	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.00266		0.00266	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.266		0.531	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	**0.0781**	0.0664		0.0664	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	
Benzene	ND	0.00266		0.00266	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00266		0.00266	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-11-SD

18J0402-11RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.00266		0.00266	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl acetate	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methylene chloride	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Styrene	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00266		0.00266	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	ND	0.00266		0.00266	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0332		0.0332	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.338**		*102 %*	*80-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.333**		*100 %*	*85-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.331**		*99.7 %*	*80-119*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.343**		*103 %*	*85-115*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-11-SD

18J0402-11RE1 (Soil/Sediment)

Katahdin

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
TNRCC 1005									
>C12-C28	**44**	6.4		33.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Bb
>C28-C35	**26**	6.4		33.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
Surrogate: 1-Chlorooctane	**77.7**		*77.7 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
C6-C12	**11**	6.6		33.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**71**	13.		67.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Bb
Surrogate: O-TERPHENYL	**119.**		*119. %*		*30-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

HSCNew-NMP-03-DUP

18J0402-12 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC/MS Selective Ion Monitoring									
Total PAH-CALC	**317.30**	40.070		84.320	ug/kg	11-Oct-2018	01-Nov-2018	EPA 8270C	
Classical Chemistry Parameters									
% Solids	**79.6**	0.500		0.500	% Solids	15-Oct-2018	15-Oct-2018	% Calculation	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	**11.5**	0.0380	0.0573	0.133	mg/kg	20-Dec-2018	21-Dec-2018	EPA 7199M	
Chromium (VI)	**0.0196**	0.0117	0.0196	0.0391	mg/kg	10-Oct-2018	11-Oct-2018	EPA 7199M	J
Mercury	**0.0257**	0.000245	0.00213	0.00425	mg/kg	25-Oct-2018	29-Oct-2018	EPA 7474	
Zinc	**35.6**	0.206	0.942	3.77	mg/kg	23-Oct-2018	23-Oct-2018	SW 846/6010	
Arsenic-75 [2]	**1.87**	0.0081	0.0377	0.0942	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**109**	0.0377	0.0377	0.0942	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	MB-02, B
Beryllium-9 [1]	**0.477**	0.0248	0.0377	0.0942	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Cadmium-111 [1]	**0.132**	0.0045	0.0377	0.0942	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Chromium-52 [1]	**11.5**	0.0263	0.0377	0.0942	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Copper-63 [1]	**7.02**	0.0144	0.0377	0.0942	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Lead-206 [1]	**16.4**	0.0040	0.0377	0.0942	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**7.01**	0.0114	0.0377	0.0942	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Selenium	**2.81**	0.0377	0.0377	0.0942	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	**0.102**	0.0377	0.0377	0.0942	mg/kg	15-Nov-2018	15-Nov-2018	SW 846/6020	
Miscellaneous Physical/Conventional Chemistry Parameters									
% Moisture	**20.4**	0.500	0.500	0.500	% by Volume	15-Oct-2018	17-Dec-2018	ASTM D2216-98	
Organochlorine Pesticides by EPA Method 8081A									
4,4´-DDD	**2.53**	0.023	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDE	**1.62**	0.024	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
4,4´-DDT	ND	0.019	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Aldrin	ND	0.019	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.028	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.025	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.047	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.027	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.027	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Dieldrin	**0.793**	0.018	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	
Endosulfan I	ND	0.024	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.021	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-DUP

18J0402-12 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
Endosulfan sulfate	ND	0.024	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin	ND	0.021	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.025	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.022	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.018	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.049	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.020	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.024	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Toxaphene	ND	1.76	2.12	7.05	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.027	0.056	0.176	ug/kg dry	12-Oct-2018	20-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.43**		*72.8 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**4.20**		*126 %*		*30-150*	*12-Oct-2018*	*20-Nov-2018*	*EPA 8081A*	
Nutrients									
Ammonia as N	**22.2**	0.378	0.489	0.978	mg/kg	15-Oct-2018	20-Oct-2018	EPA 350.1	B
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	**1.52**	0.037	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 105	**0.284**	0.018	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 118	**1.09**	0.025	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 126	**0.168**	0.035	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 128	**0.226**	0.025	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 138	**1.01**	0.016	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 153	**1.28**	0.042	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 169	ND	0.020	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	U
PCB 170	**0.258**	0.017	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 18	**1.20**	0.035	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 180	**0.399**	0.031	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 187	**0.289**	0.016	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 28	**2.24**	0.034	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 44	**1.20**	0.041	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 52	**1.73**	0.037	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 66	**1.21**	0.042	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
PCB 77	**0.099**	0.040	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	J
PCB 8	**0.966**	0.033	0.092	0.282	ug/kg dry	12-Oct-2018	19-Nov-2018	EPA 8082	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**2.4**		*72.1 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	
Surrogate: PCB 198	**2.2**		*67.0 %*		*30-150*	*12-Oct-2018*	*19-Nov-2018*	*EPA 8082*	

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-DUP

18J0402-12 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
Total PCB Congeners-CALC	**15.4**	0.6	1.6	5.4	ug/kg	12-Oct-2018	19-Nov-2018	EPA 8082	
AVS and SEM Metals by EPA 6000/7000 Series Methods									
Acid Volatile Sulfide	**27.1**	5.00	5.00	10.0	mg/kg	15-Oct-2018	14-Nov-2018	EPA 9030	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**25.8**	0.105		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
1,2,3,4,6,7,8-Hepta CDF	**4.72**	0.125		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8,9-Hepta CDF	**0.608**	0.124		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDD	**0.212**	0.138		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,4,7,8-Hexa CDF	**1.75**	0.137		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDD	**1.02**	0.14		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,6,7,8-Hexa CDF	**0.462**	0.147		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDD	**0.881**	0.141		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8,9-Hexa CDF	ND	0.142		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Uc
1,2,3,7,8-Penta CDD	**0.642**	0.146		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
1,2,3,7,8-Penta CDF	**1.37**	0.156		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
2,3,4,6,7,8-Hexa CDF	**0.215**	0.132		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
2,3,4,7,8-Penta CDF	**1.34**	0.142		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
2,3,7,8-Tetra CDD	**39.5**	0.132		0.996	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
2,3,7,8-Tetra CDF	**113**	0.113		0.996	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Octa CDD	**623**	0.148		9.96	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Octa CDF	**44.8**	0.12		9.96	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Hepta CDD	**67.7**	0.105		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Hepta CDF	**12.3**	0.124		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-DUP

18J0402-12 (Soil/Sediment)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA 1613B m									
Total Hexa CDD	**12.2**	0.141		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Hexa CDF	**7.48**	0.139		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Penta CDD	**2.21**	0.146		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	Jb
Total Penta CDF	**8.51**	0.149		4.98	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Tetra CDD	**43.4**	0.132		0.996	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Total Tetra CDF	**203**	0.113		0.996	pg/g	22-Oct-2018	08-Nov-2018	EPA 1613B m	
Surrogate: 37CL4 2378 Tetra CDD	**20.4**		*102 %*		*35-197*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**81**		*81 %*		*23-140*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**79**		*79 %*		*28-143*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**90**		*90 %*		*32-141*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**87**		*87 %*		*26-152*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**78**		*78 %*		*26-138*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**107**		*107 %*		*28-130*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**87**		*87 %*		*26-123*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**99**		*99 %*		*25-181*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**79**		*79 %*		*24-185*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**86**		*86 %*		*29-147*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**87**		*87 %*		*28-136*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**90**		*90 %*		*21-178*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**20.2**		*101 %*		*25-164*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**16.2**		*81 %*		*24-169*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**170**		*85 %*		*17-157*	*22-Oct-2018*	*08-Nov-2018*	*EPA 1613B m*	
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**122**	0.093		1	pg/g	22-Oct-2018	09-Nov-2018	EPA M8290A / M1613	
Surrogate: C13-2378 TetraCDF	**93**		*93 %*		*40-135*	*22-Oct-2018*	*09-Nov-2018*	*EPA M8290A / M1613*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-DUP

18J0402-12 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Wet Chemistry Analysis									
Cyanide	ND	1.06		1.06	mg/kg dry	15-Oct-2018	15-Oct-2018	SW9012B	Ua
TOC (Max)	**0.226**	0.130		0.130	% by Weight dry	24-Oct-2018	24-Oct-2018	SW9060A	
TOC (Mean)	**0.216**	0.130		0.130	% by Weight dry	24-Oct-2018	24-Oct-2018	SW9060A	
TOC (Min)	**0.202**	0.130		0.130	% by Weight dry	24-Oct-2018	24-Oct-2018	SW9060A	
Volatile Solids	**17600**	200		200	mg/kg	11-Oct-2018	11-Oct-2018	SM22 2540G-2011	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	2.6		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,2-Dichlorobenzene	ND	9.16		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,3-Dichlorobenzene	ND	8.57		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
1,4-Dichlorobenzene	ND	8.74		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**1260**		*75 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	3.76		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dichlorophenol	ND	4.51		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dimethylphenol	ND	6.93		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrophenol	ND	71.6		252	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,4-Dinitrotoluene	ND	2.94		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2,6-Dinitrotoluene	ND	10.8		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chloronaphthalene	ND	2.92		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
2-Chlorophenol	ND	2.77		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**1100**		*66 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**861**		*51 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
2-Nitrophenol	ND	4.53		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	7.17		84.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	80.7		252	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	3.95		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	6.07		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	4.05		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
4-Nitrophenol	ND	231		698	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Azobenzene	ND	3.1		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Benzidine	ND	272		1180	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	4.23		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	7.72		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	7.01		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**26.1**	11		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Jc
Butylbenzylphthalate	ND	8.49		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-DUP

18J0402-12 (Soil/Sediment)

Alpha

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	4.3		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Dimethylphthalate	ND	3.28		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-butylphthalate	ND	4		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Di-n-octylphthalate	ND	17.4		84.1	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobenzene	ND	4.09		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorobutadiene	ND	8.15		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	46.1		252	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Hexachloroethane	ND	7.03		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Isophorone	ND	4.61		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Nitrobenzene	ND	4.38		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**1040**		*62 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
N-Nitrosodimethylamine	ND	10.6		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	7.15		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	2.95		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Pentachlorophenol	ND	75.6		252	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Phenol	ND	3.99		42	ug/kg	11-Oct-2018	19-Oct-2018	8270D	Ub
Surrogate: Phenol-d5	**1020**		*61 %*		*15-115*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
Surrogate: Terphenyl-d14	**1460**		*87 %*		*30-130*	*11-Oct-2018*	*19-Oct-2018*	*8270D*	
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**310**		*50 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Acenaphthene	**5.68**	1.93		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Acenaphthylene	**3.16**	1.94		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Jc
Anthracene	**11.5**	3.39		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benz(a)anthracene	**20.6**	2.44		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(a)pyrene	**21.8**	1.44		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(b)fluoranthene	**23.3**	2.37		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**539**		*87 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	
Benzo(e)pyrene	**19.8**	2.72		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(g,h,i)perylene	**20.7**	3.19		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Benzo(k)fluoranthene	**17.1**	1.42		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Chrysene	**22.8**	1.8		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Dibenz(a,h)anthracene	**4.11**	2.94		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Jc
Fluoranthene	**48.6**	2.28		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Fluorene	**5.27**	2.93		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**18.2**	1.41		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-DUP

18J0402-12 (Soil/Sediment)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Naphthalene	ND	1.94		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	Ub
Phenanthrene	**19.7**	3.19		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Pyrene	**52.5**	2.74		4.96	ug/kg	11-Oct-2018	01-Nov-2018	8270D	
Surrogate: Pyrene-d10	**491**		*79 %*		*30-130*	*11-Oct-2018*	*01-Nov-2018*	*8270D*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-DUP

18J0402-12RE1 (Soil/Sediment)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.138**	0.0195	0.0392	0.0980	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	
Silver-109 [1]	**0.109**	0.0082	0.0392	0.0980	mg/kg	17-Oct-2018	16-Nov-2018	SW 846/6020	B
Volatile Organic Compounds by GCMS									
1,1,1-Trichloroethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.00246		0.00246	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.00246		0.00246	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.00246		0.00246	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.00246		0.00246	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
1,4-Dioxane	ND	0.246		0.492	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Butanone (MEK)	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Acetone	ND	0.0615		0.0615	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Benzene	ND	0.00246		0.00246	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromodichloromethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromoform	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Bromomethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon disulfide	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chlorobenzene	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloroform	ND	0.00246		0.00246	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Chloromethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-DUP

18J0402-12RE1 (Soil/Sediment)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
cis-1,3-Dichloropropene	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Cyclohexane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dibromochloromethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Ethylbenzene	ND	0.00246		0.00246	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Isopropylbenzene	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
m+p-Xylenes	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl acetate	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methylene chloride	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
o-Xylene	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Styrene	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.00246		0.00246	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Toluene	ND	0.00246		0.00246	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichloroethylene	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Vinyl chloride	ND	0.0308		0.0308	mg/kg dry	12-Oct-2018	12-Oct-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**0.320**		*104 %*	*80-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**0.289**		*94.1 %*	*85-120*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**0.326**		*106 %*	*80-119*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**0.311**		*101 %*	*85-115*		*12-Oct-2018*	*12-Oct-2018*	*SW8260B*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

HSCNew-NMP-03-DUP

18J0402-12RE1 (Soil/Sediment)

Katahdin

TNRCC 1005

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
>C12-C28	**100**	6.2		32.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	
>C28-C35	**28**	6.2		32.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
Surrogate: 1-Chlorooctane	**77.2**		*77.2 %*		*70-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	
C6-C12	**16**	6.4		32.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Ja
C6-C35	**140**	12.		65.	mg/Kgdrywt	11-Oct-2018	18-Oct-2018	TNRCC 1005	Bb
Surrogate: O-TERPHENYL	**122.**		*122. %*		*30-130*	*11-Oct-2018*	*18-Oct-2018*	*TNRCC 1005*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J213 - Default Prep Metals												
Blank (B18J213-BLK1)						Prepared & Analyzed: 23-Oct-2018						
Zinc	ND	0.219	1.00	4.00	mg/kg							U
LCS (B18J213-BS1)						Prepared & Analyzed: 23-Oct-2018						
Zinc	101	0.219	1.00	4.00	mg/kg	100.0		101	80-120			
Calibration Check (B18J213-CCV1)						Prepared & Analyzed: 23-Oct-2018						
Zinc	3.93	0.0022	0.0100	0.0400	mg/kg	4.000		98.3	90-110			
Calibration Check (B18J213-CCV2)						Prepared & Analyzed: 23-Oct-2018						
Zinc	5.19	0.0022	0.0100	0.0400	mg/kg	5.000		104	90-110			
Calibration Check (B18J213-CCV3)						Prepared & Analyzed: 23-Oct-2018						
Zinc	5.33	0.0022	0.0100	0.0400	mg/kg	5.000		107	90-110			
Calibration Check (B18J213-CCV4)						Prepared & Analyzed: 23-Oct-2018						
Zinc	5.31	0.0022	0.0100	0.0400	mg/kg	5.000		106	90-110			
Duplicate (B18J213-DUP1)			**Source: 18J0402-12**			Prepared & Analyzed: 23-Oct-2018						
Zinc	34.4	0.211	0.964	3.86	mg/kg		35.6			3.41	20	
Matrix Spike (B18J213-MS1)			**Source: 18J0402-12**			Prepared & Analyzed: 23-Oct-2018						
Zinc	126	0.210	0.959	3.83	mg/kg	95.86	35.6	94.7	80-120			
Matrix Spike Dup (B18J213-MSD1)			**Source: 18J0402-12**			Prepared & Analyzed: 23-Oct-2018						
Zinc	124	0.208	0.950	3.80	mg/kg	94.99	35.6	93.5	80-120	1.30	20	
Reference (B18J213-SRM1)						Prepared & Analyzed: 23-Oct-2018						
Zinc	493	1.04	4.77	19.1	mg/kg	469.4		105	60-140			

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Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J233 - Default Prep Metals												
Blank (B18J233-BLK1)						Prepared: 25-Oct-2018 Analyzed: 29-Oct-2018						
Mercury	ND	0.000288	0.00250	0.00500	mg/kg							U
LCS (B18J233-BS1)						Prepared: 25-Oct-2018 Analyzed: 29-Oct-2018						
Mercury	0.0512	0.000288	0.00250	0.00500	mg/kg	0.05000		102	75-125			
Calibration Check (B18J233-CCV1)						Prepared: 25-Oct-2018 Analyzed: 29-Oct-2018						
Mercury	0.0550	0.000144	0.00125	0.00250	mg/kg	0.05000		110	90-110			
Calibration Check (B18J233-CCV2)						Prepared: 25-Oct-2018 Analyzed: 29-Oct-2018						
Mercury	0.0203	0.000144	0.00125	0.00250	mg/kg	0.02000		102	90-110			
Calibration Check (B18J233-CCV3)						Prepared: 25-Oct-2018 Analyzed: 29-Oct-2018						
Mercury	0.0190	0.000144	0.00125	0.00250	mg/kg	0.02000		94.9	90-110			
Calibration Check (B18J233-CCV4)						Prepared: 25-Oct-2018 Analyzed: 29-Oct-2018						
Mercury	0.0202	0.000144	0.00125	0.00250	mg/kg	0.02000		101	90-110			
Duplicate (B18J233-DUP1)			**Source: 18J0402-12**			Prepared: 25-Oct-2018 Analyzed: 29-Oct-2018						
Mercury	0.0270	0.000276	0.00240	0.00479	mg/kg		0.0257			4.98	25	
Matrix Spike (B18J233-MS1)			**Source: 18J0402-12**			Prepared: 25-Oct-2018 Analyzed: 29-Oct-2018						
Mercury	0.0618	0.000239	0.00207	0.00415	mg/kg	0.04148	0.0257	86.9	75-125			
Matrix Spike Dup (B18J233-MSD1)			**Source: 18J0402-12**			Prepared: 25-Oct-2018 Analyzed: 29-Oct-2018						
Mercury	0.0706	0.000279	0.00242	0.00485	mg/kg	0.04850	0.0257	92.5	75-125	6.20	25	
Reference (B18J233-SRM1)						Prepared: 29-Oct-2018 Analyzed: 06-Dec-2018						
Mercury	31.3	0.118	1.02	2.04	mg/kg	18.06		173	50-150			Z-03

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K087 - Default Prep Metals												
Blank (B18K087-BLK1)						Prepared & Analyzed: 15-Nov-2018						
Arsenic-75 [2]	0.0107	0.0086	0.0400	0.100	mg/kg							J
Barium-135 [1]	2.40	0.0400	0.0400	0.100	mg/kg							MB-02
Beryllium-9 [1]	ND	0.0264	0.0400	0.100	mg/kg							U
Cadmium-111 [1]	ND	0.0048	0.0400	0.100	mg/kg							U
Chromium-52 [1]	ND	0.0279	0.0400	0.100	mg/kg							U
Copper-63 [1]	0.0256	0.0153	0.0400	0.100	mg/kg							J
Lead-206 [1]	0.0082	0.0042	0.0400	0.100	mg/kg							J
Nickel-60 [1]	ND	0.0121	0.0400	0.100	mg/kg							U
Selenium	ND	0.0400	0.0400	0.100	mg/kg							U
Thallium-203 [1]	ND	0.0400	0.0400	0.100	mg/kg							U
LCS (B18K087-BS1)						Prepared & Analyzed: 15-Nov-2018						
Arsenic-75 [2]	24.2	0.0214	0.100	0.250	mg/kg	25.00		97.0	70-130			
Barium-135 [1]	96.4	0.100	0.100	0.250	mg/kg	100.0		96.4	70-130			MB-02, B
Beryllium-9 [1]	22.2	0.0659	0.100	0.250	mg/kg	25.00		88.9	70-130			
Cadmium-111 [1]	24.7	0.0119	0.100	0.250	mg/kg	25.00		98.8	70-130			
Chromium-52 [1]	24.8	0.0697	0.100	0.250	mg/kg	25.00		99.0	70-130			
Copper-63 [1]	49.4	0.0383	0.100	0.250	mg/kg	50.00		98.8	70-130			
Lead-206 [1]	51.1	0.0105	0.100	0.250	mg/kg	50.00		102	70-130			
Nickel-60 [1]	48.1	0.0302	0.100	0.250	mg/kg	50.00		96.2	70-130			
Selenium	20.4	0.100	0.100	0.250	mg/kg	25.00		81.8	70-130			
Thallium-203 [1]	25.5	0.100	0.100	0.250	mg/kg	25.00		102	70-130			
Duplicate (B18K087-DUP1)			**Source: 18J0402-12**			Prepared & Analyzed: 15-Nov-2018						
Arsenic-75 [2]	1.68	0.0083	0.0386	0.0964	mg/kg		1.87			10.4	30	
Barium-135 [1]	110	0.0386	0.0386	0.0964	mg/kg		109			1.34	30	MB-02, B
Beryllium-9 [1]	0.358	0.0254	0.0386	0.0964	mg/kg		0.477			28.5	30	
Cadmium-111 [1]	0.129	0.0046	0.0386	0.0964	mg/kg		0.132			2.50	30	
Chromium-52 [1]	11.3	0.0269	0.0386	0.0964	mg/kg		11.5			2.29	30	
Copper-63 [1]	6.66	0.0148	0.0386	0.0964	mg/kg		7.02			5.25	30	

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K087 - Default Prep Metals												
Duplicate (B18K087-DUP1)		**Source: 18J0402-12**				Prepared & Analyzed: 15-Nov-2018						
Lead-206 [1]	16.0	0.0040	0.0386	0.0964	mg/kg		16.4			2.89	30	
Nickel-60 [1]	7.53	0.0116	0.0386	0.0964	mg/kg		7.01			7.18	30	
Selenium	1.76	0.0386	0.0386	0.0964	mg/kg		2.81			46.1	30	RPD-06
Thallium-203 [1]	0.0976	0.0386	0.0386	0.0964	mg/kg		0.102			3.97	30	
Matrix Spike (B18K087-MS1)		**Source: 18J0402-12**				Prepared & Analyzed: 15-Nov-2018						
Arsenic-75 [2]	24.2	0.0205	0.0959	0.240	mg/kg	23.96	1.87	93.1	70-130			
Barium-135 [1]	226	0.0959	0.0959	0.240	mg/kg	95.86	109	122	70-130			MB-02, B
Beryllium-9 [1]	21.8	0.0632	0.0959	0.240	mg/kg	23.96	0.477	89.0	70-130			
Cadmium-111 [1]	23.9	0.0114	0.0959	0.240	mg/kg	23.96	0.132	99.3	70-130			
Chromium-52 [1]	38.0	0.0668	0.0959	0.240	mg/kg	23.96	11.5	111	70-130			
Copper-63 [1]	55.6	0.0368	0.0959	0.240	mg/kg	47.93	7.02	101	70-130			
Lead-206 [1]	61.0	0.0101	0.0959	0.240	mg/kg	47.93	16.4	93.0	70-130			
Nickel-60 [1]	52.7	0.0289	0.0959	0.240	mg/kg	47.93	7.01	95.3	70-130			
Selenium	27.3	0.0959	0.0959	0.240	mg/kg	23.96	2.81	102	70-130			
Thallium-203 [1]	23.3	0.0959	0.0959	0.240	mg/kg	23.96	0.102	96.9	70-130			
Matrix Spike Dup (B18K087-MSD1)		**Source: 18J0402-12**				Prepared & Analyzed: 15-Nov-2018						
Arsenic-75 [2]	24.1	0.0203	0.0950	0.237	mg/kg	23.75	1.87	93.7	70-130	0.644	30	
Barium-135 [1]	197	0.0950	0.0950	0.237	mg/kg	94.99	109	92.9	70-130	27.0	30	MB-02, B
Beryllium-9 [1]	19.5	0.0626	0.0950	0.237	mg/kg	23.75	0.477	80.3	70-130	10.4	30	
Cadmium-111 [1]	23.4	0.0113	0.0950	0.237	mg/kg	23.75	0.132	98.1	70-130	1.20	30	
Chromium-52 [1]	37.0	0.0662	0.0950	0.237	mg/kg	23.75	11.5	107	70-130	2.98	30	
Copper-63 [1]	46.7	0.0364	0.0950	0.237	mg/kg	47.50	7.02	83.5	70-130	19.3	30	
Lead-206 [1]	62.1	0.0100	0.0950	0.237	mg/kg	47.50	16.4	96.1	70-130	3.25	30	
Nickel-60 [1]	49.7	0.0287	0.0950	0.237	mg/kg	47.50	7.01	89.9	70-130	5.80	30	
Selenium	21.3	0.0950	0.0950	0.237	mg/kg	23.75	2.81	77.7	70-130	27.2	30	
Thallium-203 [1]	23.6	0.0950	0.0950	0.237	mg/kg	23.75	0.102	98.8	70-130	1.99	30	

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ERDC -- Vicksburg (EL)
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Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K087 - Default Prep Metals												
Reference (B18K087-SRM1)						Prepared & Analyzed: 15-Nov-2018						
Arsenic-75 [2]	78.3	0.0204	0.0954	0.239	mg/kg	79.85		98.1	70-130			
Barium-135 [1]	214	0.0954	0.0954	0.239	mg/kg	221.3		96.9	70-130			MB-02, B
Beryllium-9 [1]	100	0.0629	0.0954	0.239	mg/kg	123.1		81.5	70-130			
Cadmium-111 [1]	191	0.0114	0.0954	0.239	mg/kg	187.0		102	70-130			
Chromium-52 [1]	195	0.0665	0.0954	0.239	mg/kg	210.8		92.4	70-130			
Copper-63 [1]	263	0.0366	0.0954	0.239	mg/kg	303.4		86.7	70-130			
Lead-206 [1]	109	0.0100	0.0954	0.239	mg/kg	114.5		94.9	70-130			
Nickel-60 [1]	382	0.0288	0.0954	0.239	mg/kg	374.0		102	70-130			
Selenium	277	0.0954	0.0954	0.239	mg/kg	344.4		80.5	60-140			
Thallium-203 [1]	291	0.0954	0.0954	0.239	mg/kg	270.9		107	70-130			
Batch B18K112 - Default Prep Metals												
Blank (B18K112-BLK1)						Prepared: 17-Oct-2018 Analyzed: 16-Nov-2018						
Antimony-121 [1]	0.0792	0.0199	0.0400	0.100	mg/kg							J
Silver-109 [1]	0.192	0.0084	0.0400	0.100	mg/kg							
LCS (B18K112-BS1)						Prepared: 17-Oct-2018 Analyzed: 16-Nov-2018						
Antimony-121 [1]	50.0	0.0498	0.100	0.250	mg/kg	50.00		100	70-130			
Silver-109 [1]	23.1	0.0210	0.100	0.250	mg/kg	25.00		92.6	80-120			B
Calibration Check (B18K112-CCV1)						Prepared: 17-Oct-2018 Analyzed: 16-Nov-2018						
Antimony-121 [1]	0.0413	0.0001	0.0002	0.0005	mg/kg	0.04000		103	90-110			
Silver-109 [1]	0.0394	0.00004	0.0002	0.0005	mg/kg	0.04000		98.5	90-110			J, B
Calibration Check (B18K112-CCV2)						Prepared: 17-Oct-2018 Analyzed: 16-Nov-2018						
Antimony-121 [1]	0.0473	0.0001	0.0002	0.0005	mg/kg	0.05000		94.6	90-110			
Silver-109 [1]	0.0442	0.00004	0.0002	0.0005	mg/kg	0.05000		88.3	90-110			CCV-L, J, B

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Project Manager: Cheryl Montgomery

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K112 - Default Prep Metals												
Calibration Check (B18K112-CCV3)						Prepared: 17-Oct-2018 Analyzed: 16-Nov-2018						
Antimony-121 [1]	0.0476	0.0001	0.0002	0.0005	mg/kg	0.05000		95.2	90-110			
Silver-109 [1]	0.0433	0.00004	0.0002	0.0005	mg/kg	0.05000		86.6	90-110			CCV-L, J, B
Calibration Check (B18K112-CCV4)						Prepared: 17-Oct-2018 Analyzed: 16-Nov-2018						
Antimony-121 [1]	0.0460	0.0001	0.0002	0.0005	mg/kg	0.05000		92.0	90-110			
Silver-109 [1]	0.0455	0.00004	0.0002	0.0005	mg/kg	0.05000		90.9	90-110			J, B
Duplicate (B18K112-DUP1)			**Source: 18J0402-12RE1**			Prepared: 17-Oct-2018 Analyzed: 16-Nov-2018						
Antimony-121 [1]	0.136	0.0189	0.0378	0.0946	mg/kg		0.138			1.84	30	
Silver-109 [1]	0.0776	0.0080	0.0378	0.0946	mg/kg		0.109			33.7	20	RPD-06, B, J
Matrix Spike (B18K112-MS1)			**Source: 18J0402-12RE1**			Prepared: 17-Oct-2018 Analyzed: 16-Nov-2018						
Antimony-121 [1]	27.6	0.0495	0.0994	0.248	mg/kg	49.68	0.138	55.3	70-130			Z-03
Silver-109 [1]	21.7	0.0209	0.0994	0.248	mg/kg	24.84	0.109	87.1	80-120			B
Matrix Spike Dup (B18K112-MSD1)			**Source: 18J0402-12RE1**			Prepared: 17-Oct-2018 Analyzed: 16-Nov-2018						
Antimony-121 [1]	24.9	0.0454	0.0910	0.228	mg/kg	45.51	0.138	54.4	70-130	1.52	30	Z-03
Silver-109 [1]	19.0	0.0191	0.0910	0.228	mg/kg	22.76	0.109	82.9	80-120	4.84	20	B
Reference (B18K112-SRM1)						Prepared: 17-Oct-2018 Analyzed: 16-Nov-2018						
Antimony-121 [1]	168	0.0461	0.0924	0.231	mg/kg	144.1		116	70-130			
Silver-109 [1]	50.8	0.0194	0.0924	0.231	mg/kg	47.39		107	60-140			B
Batch B18L042 - Default Prep Metals												
Blank (B18L042-BLK1)						Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	0.0280	0.0120	0.0200	0.0400	mg/kg							J

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18L042 - Default Prep Metals												
Blank (B18L042-BLK2)						Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	0.0160	0.0120	0.0200	0.0400	mg/kg							J
LCS (B18L042-BS1)						Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	0.772	0.0120	0.0200	0.0400	mg/kg	0.8000		96.5	80-120			
LCS (B18L042-BS2)						Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	0.776	0.0120	0.0200	0.0400	mg/kg	0.8000		97.0	80-120			
Calibration Check (B18L042-CCV1)						Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	18.4	0.0300	0.0500	0.100	mg/kg	20.00		92.2	90-110			
Calibration Check (B18L042-CCV2)						Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	2.67	0.0300	0.0500	0.100	mg/kg	2.500		107	90-110			
Calibration Check (B18L042-CCV3)						Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	2.58	0.0300	0.0500	0.100	mg/kg	2.500		103	90-110			
Calibration Check (B18L042-CCV4)						Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	2.72	0.0300	0.0500	0.100	mg/kg	2.500		109	90-110			
Duplicate (B18L042-DUP1)			**Source: 18J0402-02**			Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	0.0218	0.0109	0.0182	0.0364	mg/kg		0.0198			9.63	20	J
Matrix Spike (B18L042-MS1)			**Source: 18J0402-02**			Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	0.0319	0.0120	0.0199	0.0399	mg/kg	0.9973	0.0198	1.21	80-120			QM-07, Z-03, J
Matrix Spike (B18L042-MS2)			**Source: 18J0402-01**			Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	24.3				ug/L	100.0	0.549	23.8	80-120			QM-07, Z-03

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18L042 - Default Prep Metals												
Matrix Spike Dup (B18L042-MSD1)		**Source: 18J0402-02**				Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	0.0240	0.0120	0.0200	0.0400	mg/kg	1.000	0.0198	0.418	80-120	97.5	20	QM-07, RPD-06,
Matrix Spike Dup (B18L042-MSD2)		**Source: 18J0402-01**				Prepared: 10-Oct-2018 Analyzed: 11-Oct-2018						
Chromium (VI)	24.1				ug/L	100.0	0.549	23.6	80-120	0.846	20	QM-07, Z-03

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0023 - B18J145												
Calibration Check (18K0023-CCV1)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
Toxaphene	291				ug/L	300.0		97.0	85-115			
Calibration Check (18K0023-CCV3)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
4,4´-DDT	88.1				ug/L	75.00		117	85-115			Q-CCV
Aldrin	86.0				ug/L	75.00		115	85-115			
alpha-BHC	89.9				ug/L	75.00		120	85-115			Q-CCV
alpha-Chlordane	166				ug/L	150.0		111	85-115			
beta-BHC	83.2				ug/L	75.00		111	85-115			
cis-Nonachlor	85.8				ug/L	75.00		114	85-115			
delta-BHC	90.8				ug/L	75.00		121	85-115			CCV-HA
Dieldrin	87.6				ug/L	75.00		117	85-115			Q-CCV
Endosulfan I	176				ug/L	150.0		117	85-115			Q-CCV
Endosulfan II	84.4				ug/L	75.00		113	85-115			
Endosulfan sulfate	87.0				ug/L	75.00		116	85-115			Q-CCV
Endrin	90.6				ug/L	75.00		121	85-115			CCV-HA
Endrin aldehyde	85.6				ug/L	75.00		114	85-115			
gamma-BHC (Lindane)	90.5				ug/L	75.00		121	85-115			CCV-H
gamma-Chlordane	87.3				ug/L	75.00		116	85-115			Q-CCV
Heptachlor	89.2				ug/L	75.00		119	85-115			Q-CCV
Heptachlor epoxide	82.8				ug/L	75.00		110	85-115			
Methoxychlor	78.8				ug/L	75.00		105	85-115			
Oxychlordane	85.3				ug/L	75.00		114	85-115			
trans-Nonachlor	165				ug/L	150.0		110	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*85.4*				*ug/L*	*75.00*		*114*	*30-150*			
Surrogate: PCB 198	*82.5*				*ug/L*	*75.00*		*110*	*30-150*			
Calibration Check (18K0023-CCV4)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
Toxaphene	278				ug/L	300.0		92.7	85-115			

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0023 - B18J145												
Calibration Check (18K0023-CCV5)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
4,4´-DDT	17.4				ug/L	20.00		87.0	85-115			
Aldrin	21.1				ug/L	20.00		106	85-115			
alpha-BHC	23.0				ug/L	20.00		115	85-115			
alpha-Chlordane	43.2				ug/L	40.00		108	85-115			
beta-BHC	22.0				ug/L	20.00		110	85-115			
cis-Nonachlor	19.8				ug/L	20.00		99.0	85-115			
delta-BHC	22.8				ug/L	20.00		114	85-115			
Dieldrin	21.3				ug/L	20.00		106	85-115			
Endosulfan I	45.4				ug/L	40.00		114	85-115			
Endosulfan II	19.8				ug/L	20.00		99.0	85-115			
Endosulfan sulfate	19.4				ug/L	20.00		97.0	85-115			
Endrin	20.4				ug/L	20.00		102	85-115			
Endrin aldehyde	19.5				ug/L	20.00		97.5	85-115			
gamma-BHC (Lindane)	22.3				ug/L	20.00		112	85-115			
gamma-Chlordane	21.2				ug/L	20.00		106	85-115			
Heptachlor	21.8				ug/L	20.00		109	85-115			
Heptachlor epoxide	21.3				ug/L	20.00		106	85-115			
Methoxychlor	18.1				ug/L	20.00		90.5	85-115			
Oxychlordane	20.9				ug/L	20.00		104	85-115			
trans-Nonachlor	43.1				ug/L	40.00		108	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*21.4*				*ug/L*	*20.00*		*107*	*30-150*			
Surrogate: PCB 198	*18.6*				*ug/L*	*20.00*		*93.0*	*30-150*			
Calibration Check (18K0023-CCV6)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
4,4´-DDT	17.7				ug/L	20.00		88.5	85-115			
Aldrin	22.1				ug/L	20.00		110	85-115			
alpha-BHC	23.0				ug/L	20.00		115	85-115			
alpha-Chlordane	44.8				ug/L	40.00		112	85-115			
beta-BHC	22.1				ug/L	20.00		110	85-115			

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0023 - B18J145												
Calibration Check (18K0023-CCV6)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
cis-Nonachlor	21.4				ug/L	20.00		107	85-115			
delta-BHC	22.9				ug/L	20.00		114	85-115			
Dieldrin	22.7				ug/L	20.00		114	85-115			
Endosulfan I	46.7				ug/L	40.00		117	85-115			Q-CCV
Endosulfan II	21.3				ug/L	20.00		106	85-115			
Endosulfan sulfate	20.2				ug/L	20.00		101	85-115			
Endrin	21.5				ug/L	20.00		108	85-115			
Endrin aldehyde	20.8				ug/L	20.00		104	85-115			
gamma-BHC (Lindane)	23.0				ug/L	20.00		115	85-115			
gamma-Chlordane	21.8				ug/L	20.00		109	85-115			
Heptachlor	22.1				ug/L	20.00		110	85-115			
Heptachlor epoxide	21.8				ug/L	20.00		109	85-115			
Methoxychlor	17.1				ug/L	20.00		85.5	85-115			
Oxychlordane	22.0				ug/L	20.00		110	85-115			
trans-Nonachlor	44.7				ug/L	40.00		112	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*20.6*				*ug/L*	*20.00*		*103*	*30-150*			
Surrogate: PCB 198	*18.7*				*ug/L*	*20.00*		*93.5*	*30-150*			
Calibration Check (18K0023-CCV7)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
Toxaphene	287				ug/L	300.0		95.7	85-115			
Calibration Check (18K0023-CCV8)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
4,4´-DDT	17.2				ug/L	20.00		86.0	85-115			
Aldrin	23.0				ug/L	20.00		115	85-115			
alpha-BHC	24.1				ug/L	20.00		120	85-115			Q-CCV
alpha-Chlordane	47.4				ug/L	40.00		118	85-115			Q-CCV
beta-BHC	22.6				ug/L	20.00		113	85-115			
cis-Nonachlor	20.3				ug/L	20.00		102	85-115			
delta-BHC	23.5				ug/L	20.00		118	85-115			Q-CCV
Dieldrin	23.3				ug/L	20.00		116	85-115			Q-CCV

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ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0023 - B18J145												
Calibration Check (18K0023-CCV8)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
Endosulfan I	50.2				ug/L	40.00		126	85-115			CCV-HA
Endosulfan II	23.0				ug/L	20.00		115	85-115			
Endosulfan sulfate	22.6				ug/L	20.00		113	85-115			
Endrin	23.0				ug/L	20.00		115	85-115			
Endrin aldehyde	22.9				ug/L	20.00		114	85-115			
gamma-BHC (Lindane)	24.6				ug/L	20.00		123	85-115			CCV-HA
gamma-Chlordane	22.1				ug/L	20.00		110	85-115			
Heptachlor	22.8				ug/L	20.00		114	85-115			
Heptachlor epoxide	22.8				ug/L	20.00		114	85-115			
Methoxychlor	18.9				ug/L	20.00		94.5	85-115			
Oxychlordane	23.0				ug/L	20.00		115	85-115			
trans-Nonachlor	47.4				ug/L	40.00		118	85-115			Q-CCV
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*21.6*				*ug/L*	*20.00*		*108*	*30-150*			
Surrogate: PCB 198	*20.4*				*ug/L*	*20.00*		*102*	*30-150*			
Calibration Check (18K0023-CCV9)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
Toxaphene	267				ug/L	300.0		89.0	85-115			
Initial Cal Blank (18K0023-ICB1)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
4,4´-DDT	0.00				ug/L							U
Aldrin	0.00				ug/L							U
alpha-BHC	0.00				ug/L							U
alpha-Chlordane	0.00				ug/L							U
beta-BHC	0.00				ug/L							U
cis-Nonachlor	0.00				ug/L							U
delta-BHC	0.00				ug/L							U
Dieldrin	0.00				ug/L							U
Endosulfan I	0.00				ug/L							U
Endosulfan II	0.00				ug/L							U
Endosulfan sulfate	0.00				ug/L							U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0023 - B18J145												
Initial Cal Blank (18K0023-ICB1)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
Endrin	0.00				ug/L							U
Endrin aldehyde	0.00				ug/L							U
gamma-BHC (Lindane)	0.00				ug/L							U
gamma-Chlordane	0.00				ug/L							U
Heptachlor	0.00				ug/L							U
Heptachlor epoxide	0.00				ug/L							U
Methoxychlor	0.00				ug/L							U
Oxychlordane	0.00				ug/L							U
Toxaphene	0.00				ug/L							U
trans-Nonachlor	0.00				ug/L							U
Initial Cal Check (18K0023-ICV1)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
4,4´-DDT	16.1				ug/L	20.00		80.5	80-120			
Aldrin	18.0				ug/L	20.00		90.0	80-120			
alpha-BHC	18.4				ug/L	20.00		92.0	80-120			
alpha-Chlordane	34.8				ug/L	40.00		87.0	80-120			
beta-BHC	16.5				ug/L	20.00		82.5	80-120			
cis-Nonachlor	16.8				ug/L	20.00		84.0	80-120			
delta-BHC	22.6				ug/L	20.00		113	80-120			
Dieldrin	18.4				ug/L	20.00		92.0	80-120			
Endosulfan I	37.0				ug/L	40.00		92.5	80-120			
Endosulfan II	16.7				ug/L	20.00		83.5	80-120			
Endosulfan sulfate	18.3				ug/L	20.00		91.5	80-120			
Endrin	19.1				ug/L	20.00		95.5	80-120			
Endrin aldehyde	17.6				ug/L	20.00		88.0	80-120			
gamma-BHC (Lindane)	18.2				ug/L	20.00		91.0	80-120			
gamma-Chlordane	17.0				ug/L	20.00		85.0	80-120			
Heptachlor	17.3				ug/L	20.00		86.5	80-120			
Heptachlor epoxide	18.2				ug/L	20.00		91.0	80-120			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0023 - B18J145												
Initial Cal Check (18K0023-ICV1)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
Methoxychlor	16.7				ug/L	20.00		83.5	80-120			
Oxychlordane	17.3				ug/L	20.00		86.5	80-120			
trans-Nonachlor	34.8				ug/L	40.00		87.0	80-120			
Initial Cal Check (18K0023-ICV2)						Prepared: 18-Nov-2018 Analyzed: 20-Nov-2018						
Toxaphene	0.00				ug/L	300.0			80-120			Z-03, U
Batch B18J145 - EPA 3545												
Blank (B18J145-BLK1)						Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
4,4´-DDD	ND	0.028	0.068	0.169	ug/kg wet							U
4,4´-DDE	ND	0.029	0.068	0.169	ug/kg wet							U
4,4´-DDT	ND	0.023	0.068	0.169	ug/kg wet							U
Aldrin	ND	0.023	0.068	0.169	ug/kg wet							U
alpha-BHC	ND	0.034	0.068	0.169	ug/kg wet							U
alpha-Chlordane	ND	0.030	0.068	0.169	ug/kg wet							U
beta-BHC	ND	0.056	0.068	0.169	ug/kg wet							U
cis-Nonachlor	ND	0.032	0.068	0.169	ug/kg wet							U
delta-BHC	ND	0.033	0.068	0.169	ug/kg wet							U
Dieldrin	ND	0.022	0.068	0.169	ug/kg wet							U
Endosulfan I	ND	0.029	0.068	0.169	ug/kg wet							U
Endosulfan II	ND	0.026	0.068	0.169	ug/kg wet							U
Endosulfan sulfate	ND	0.029	0.068	0.169	ug/kg wet							U
Endrin	ND	0.025	0.068	0.169	ug/kg wet							U
Endrin aldehyde	ND	0.030	0.068	0.169	ug/kg wet							U
Endrin ketone	ND	0.021	0.053	0.133	ug/kg wet							U
gamma-BHC (Lindane)	ND	0.026	0.068	0.169	ug/kg wet							U
gamma-Chlordane	ND	0.022	0.068	0.169	ug/kg wet							U
Heptachlor	ND	0.059	0.068	0.169	ug/kg wet							U
Heptachlor epoxide	ND	0.025	0.068	0.169	ug/kg wet							U
Methoxychlor	ND	0.029	0.068	0.169	ug/kg wet							U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Blank (B18J145-BLK1)						Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
Oxychlordane	ND	0.029	0.068	0.169	ug/kg wet							U
Toxaphene	ND	1.90	2.54	8.47	ug/kg wet							U
trans-Nonachlor	ND	0.032	0.068	0.169	ug/kg wet							U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*3.22*				*ug/kg wet*	*4.000*		*80.4*	*30-150*			
Surrogate: PCB 198	*4.81*				*ug/kg wet*	*4.000*		*120*	*30-150*			
LCS (B18J145-BS1)						Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
4,4´-DDD	4.13	0.028	0.068	0.169	ug/kg wet	4.000		103	50-150		30	
4,4´-DDE	5.86	0.029	0.068	0.169	ug/kg wet	8.000		73.2	50-150		30	
4,4´-DDT	3.64	0.023	0.068	0.169	ug/kg wet	4.000		91.0	50-150		30	
Aldrin	2.95	0.023	0.068	0.169	ug/kg wet	4.000		73.7	50-150		30	
alpha-BHC	3.44	0.034	0.068	0.169	ug/kg wet	4.000		85.9	50-150		30	
alpha-Chlordane	7.08	0.030	0.068	0.169	ug/kg wet	8.000		88.5	50-150		30	
beta-BHC	3.01	0.056	0.068	0.169	ug/kg wet	4.000		75.4	50-150		30	
cis-Nonachlor	3.47	0.032	0.068	0.169	ug/kg wet	4.000		86.8	50-150		30	
delta-BHC	2.95	0.033	0.068	0.169	ug/kg wet	4.000		73.7	50-150		30	
Dieldrin	3.23	0.022	0.068	0.169	ug/kg wet	4.000		80.9	50-150		30	
Endosulfan I	5.88	0.029	0.068	0.169	ug/kg wet	8.000		73.4	50-150		30	
Endosulfan II	2.74	0.026	0.068	0.169	ug/kg wet	4.000		68.6	50-150		30	
Endosulfan sulfate	2.62	0.029	0.068	0.169	ug/kg wet	4.000		65.6	50-150		30	
Endrin	3.25	0.025	0.068	0.169	ug/kg wet	4.000		81.3	50-150		30	
Endrin aldehyde	1.02	0.030	0.068	0.169	ug/kg wet	4.000		25.4	50-150		30	Qa
Endrin ketone	ND	0.021	0.053	0.133	ug/kg wet	4.000			50-150		30	U
gamma-BHC (Lindane)	2.96	0.026	0.068	0.169	ug/kg wet	4.000		74.1	50-150		30	
gamma-Chlordane	3.29	0.022	0.068	0.169	ug/kg wet	4.000		82.1	50-150		30	
Heptachlor	3.39	0.059	0.068	0.169	ug/kg wet	4.000		84.7	50-150		30	
Heptachlor epoxide	3.23	0.025	0.068	0.169	ug/kg wet	4.000		80.9	50-150		30	
Methoxychlor	3.66	0.029	0.068	0.169	ug/kg wet	4.000		91.4	50-150		30	
Oxychlordane	4.25	0.029	0.068	0.169	ug/kg wet	4.000		106	50-150		30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
LCS (B18J145-BS1)						Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
Toxaphene	ND	1.90	2.54	8.47	ug/kg wet				50-150		30	U
trans-Nonachlor	7.06	0.032	0.068	0.169	ug/kg wet	8.000		88.3	50-150		30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*2.44*				*ug/kg wet*	*4.000*		*61.0*	*50-150*			
Surrogate: PCB 198	*4.17*				*ug/kg wet*	*4.000*		*104*	*50-150*			
LCS (B18J145-BS2)						Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
4,4´-DDD	ND	0.022	0.053	0.133	ug/kg wet				50-150		30	U
4,4´-DDE	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
4,4´-DDT	ND	0.018	0.053	0.133	ug/kg wet				50-150		30	U
Aldrin	ND	0.018	0.053	0.133	ug/kg wet				50-150		30	U
alpha-BHC	ND	0.026	0.053	0.133	ug/kg wet				50-150		30	U
alpha-Chlordane	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
beta-BHC	ND	0.044	0.053	0.133	ug/kg wet				50-150		30	U
cis-Nonachlor	ND	0.025	0.053	0.133	ug/kg wet				50-150		30	U
delta-BHC	ND	0.026	0.053	0.133	ug/kg wet				50-150		30	U
Dieldrin	ND	0.017	0.053	0.133	ug/kg wet				50-150		30	U
Endosulfan I	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Endosulfan II	ND	0.020	0.053	0.133	ug/kg wet				50-150		30	U
Endosulfan sulfate	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Endrin	ND	0.019	0.053	0.133	ug/kg wet				50-150		30	U
Endrin aldehyde	ND	0.024	0.053	0.133	ug/kg wet				50-150		30	U
Endrin ketone	ND	0.021	0.053	0.133	ug/kg wet				50-150		30	U
gamma-BHC (Lindane)	ND	0.021	0.053	0.133	ug/kg wet				50-150		30	U
gamma-Chlordane	ND	0.017	0.053	0.133	ug/kg wet				50-150		30	U
Heptachlor	ND	0.047	0.053	0.133	ug/kg wet				50-150		30	U
Heptachlor epoxide	ND	0.019	0.053	0.133	ug/kg wet				50-150		30	U
Methoxychlor	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Oxychlordane	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Toxaphene	39.5	1.90	2.54	8.47	ug/kg wet	40.00		98.6	50-150		30	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
LCS (B18J145-BS2)					Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018							
trans-Nonachlor	ND	0.026	0.053	0.133	ug/kg wet				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*2.52*				*ug/kg wet*	*4.000*		*63.1*	*50-150*			
Surrogate: PCB 198	*5.16*				*ug/kg wet*	*4.000*		*129*	*50-150*			
LCS (B18J145-BS3)					Prepared: 12-Oct-2018 Analyzed: 13-Nov-2018							
4,4´-DDD	ND	0.022	0.053	0.133	ug/kg wet				50-150		30	U
4,4´-DDE	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
4,4´-DDT	ND	0.018	0.053	0.133	ug/kg wet				50-150		30	U
Aldrin	ND	0.018	0.053	0.133	ug/kg wet				50-150		30	U
alpha-BHC	ND	0.026	0.053	0.133	ug/kg wet				50-150		30	U
alpha-Chlordane	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
beta-BHC	ND	0.044	0.053	0.133	ug/kg wet				50-150		30	U
cis-Nonachlor	ND	0.025	0.053	0.133	ug/kg wet				50-150		30	U
delta-BHC	ND	0.026	0.053	0.133	ug/kg wet				50-150		30	U
Dieldrin	ND	0.017	0.053	0.133	ug/kg wet				50-150		30	U
Endosulfan I	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Endosulfan II	ND	0.020	0.053	0.133	ug/kg wet				50-150		30	U
Endosulfan sulfate	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Endrin	ND	0.019	0.053	0.133	ug/kg wet				50-150		30	U
Endrin aldehyde	ND	0.024	0.053	0.133	ug/kg wet				50-150		30	U
Endrin ketone	ND	0.021	0.053	0.133	ug/kg wet				50-150		30	U
gamma-BHC (Lindane)	ND	0.021	0.053	0.133	ug/kg wet				50-150		30	U
gamma-Chlordane	ND	0.017	0.053	0.133	ug/kg wet				50-150		30	U
Heptachlor	ND	0.047	0.053	0.133	ug/kg wet				50-150		30	U
Heptachlor epoxide	ND	0.019	0.053	0.133	ug/kg wet				50-150		30	U
Methoxychlor	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Oxychlordane	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Toxaphene	ND	1.50	2.00	6.67	ug/kg wet				50-150		30	U
trans-Nonachlor	ND	0.026	0.053	0.133	ug/kg wet				50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
LCS (B18J145-BS3)						Prepared: 12-Oct-2018 Analyzed: 13-Nov-2018						
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/kg wet*	*4.000*			*50-150*			*U*
Surrogate: PCB 198	*0.00*				*ug/kg wet*	*4.000*			*50-150*			*U*
LCS Dup (B18J145-BSD1)						Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
4,4´-DDD	4.13	0.028	0.068	0.169	ug/kg wet	4.000		103	50-150	0.00	30	
4,4´-DDE	6.49	0.029	0.068	0.169	ug/kg wet	8.000		81.1	50-150	10.2	30	
4,4´-DDT	3.96	0.023	0.068	0.169	ug/kg wet	4.000		99.1	50-150	8.46	30	
Aldrin	3.12	0.023	0.068	0.169	ug/kg wet	4.000		77.9	50-150	5.59	30	
alpha-BHC	3.66	0.034	0.068	0.169	ug/kg wet	4.000		91.4	50-150	6.21	30	
alpha-Chlordane	7.72	0.030	0.068	0.169	ug/kg wet	8.000		96.5	50-150	8.70	30	
beta-BHC	3.05	0.056	0.068	0.169	ug/kg wet	4.000		76.2	50-150	1.12	30	
cis-Nonachlor	3.73	0.032	0.068	0.169	ug/kg wet	4.000		93.1	50-150	7.06	30	
delta-BHC	3.20	0.033	0.068	0.169	ug/kg wet	4.000		80.0	50-150	8.26	30	
Dieldrin	3.67	0.022	0.068	0.169	ug/kg wet	4.000		91.9	50-150	12.7	30	
Endosulfan I	6.50	0.029	0.068	0.169	ug/kg wet	8.000		81.3	50-150	10.1	30	
Endosulfan II	3.35	0.026	0.068	0.169	ug/kg wet	4.000		83.8	50-150	20.0	30	
Endosulfan sulfate	3.37	0.029	0.068	0.169	ug/kg wet	4.000		84.2	50-150	24.9	30	
Endrin	3.79	0.025	0.068	0.169	ug/kg wet	4.000		94.8	50-150	15.4	30	
Endrin aldehyde	1.69	0.030	0.068	0.169	ug/kg wet	4.000		42.3	50-150	50.0	30	Qa
Endrin ketone	ND	0.021	0.053	0.133	ug/kg wet	4.000			50-150		30	U
gamma-BHC (Lindane)	3.27	0.026	0.068	0.169	ug/kg wet	4.000		81.7	50-150	9.78	30	
gamma-Chlordane	3.56	0.022	0.068	0.169	ug/kg wet	4.000		88.9	50-150	7.92	30	
Heptachlor	3.71	0.059	0.068	0.169	ug/kg wet	4.000		92.7	50-150	9.07	30	
Heptachlor epoxide	3.67	0.025	0.068	0.169	ug/kg wet	4.000		91.9	50-150	12.7	30	
Methoxychlor	3.98	0.029	0.068	0.169	ug/kg wet	4.000		99.5	50-150	8.43	30	
Oxychlordane	4.79	0.029	0.068	0.169	ug/kg wet	4.000		120	50-150	12.0	30	
Toxaphene	ND	1.50	2.00	6.67	ug/kg wet				50-150		30	U
trans-Nonachlor	7.72	0.032	0.068	0.169	ug/kg wet	8.000		96.5	50-150	8.93	30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*2.61*				*ug/kg wet*	*4.000*		*65.2*	*50-150*			

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
LCS Dup (B18J145-BSD1)						Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
Surrogate: PCB 198	*4.71*				*ug/kg wet*	*4.000*		*118*	*50-150*			
LCS Dup (B18J145-BSD2)						Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
4,4´-DDD	ND	0.022	0.053	0.133	ug/kg wet				50-150		30	U
4,4´-DDE	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
4,4´-DDT	ND	0.018	0.053	0.133	ug/kg wet				50-150		30	U
Aldrin	ND	0.018	0.053	0.133	ug/kg wet				50-150		30	U
alpha-BHC	ND	0.026	0.053	0.133	ug/kg wet				50-150		30	U
alpha-Chlordane	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
beta-BHC	ND	0.044	0.053	0.133	ug/kg wet				50-150		30	U
cis-Nonachlor	ND	0.025	0.053	0.133	ug/kg wet				50-150		30	U
delta-BHC	ND	0.026	0.053	0.133	ug/kg wet				50-150		30	U
Dieldrin	ND	0.017	0.053	0.133	ug/kg wet				50-150		30	U
Endosulfan I	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Endosulfan II	ND	0.020	0.053	0.133	ug/kg wet				50-150		30	U
Endosulfan sulfate	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Endrin	ND	0.019	0.053	0.133	ug/kg wet				50-150		30	U
Endrin aldehyde	ND	0.024	0.053	0.133	ug/kg wet				50-150		30	U
Endrin ketone	ND	0.021	0.053	0.133	ug/kg wet				50-150		30	U
gamma-BHC (Lindane)	ND	0.021	0.053	0.133	ug/kg wet				50-150		30	U
gamma-Chlordane	ND	0.017	0.053	0.133	ug/kg wet				50-150		30	U
Heptachlor	ND	0.047	0.053	0.133	ug/kg wet				50-150		30	U
Heptachlor epoxide	ND	0.019	0.053	0.133	ug/kg wet				50-150		30	U
Methoxychlor	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Oxychlordane	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Toxaphene	31.7	1.50	2.00	6.67	ug/kg wet	40.00		79.3	50-150	21.7	30	
trans-Nonachlor	ND	0.026	0.053	0.133	ug/kg wet				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*2.01*				*ug/kg wet*	*4.000*		*50.3*	*50-150*			
Surrogate: PCB 198	*3.73*				*ug/kg wet*	*4.000*		*93.3*	*50-150*			

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
LCS Dup (B18J145-BSD3)					Prepared: 12-Oct-2018 Analyzed: 13-Nov-2018							
4,4´-DDD	ND	0.028	0.068	0.169	ug/kg wet				50-150		30	U
4,4´-DDE	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
4,4´-DDT	ND	0.023	0.068	0.169	ug/kg wet				50-150		30	U
Aldrin	ND	0.023	0.068	0.169	ug/kg wet				50-150		30	U
alpha-BHC	ND	0.034	0.068	0.169	ug/kg wet				50-150		30	U
alpha-Chlordane	ND	0.030	0.068	0.169	ug/kg wet				50-150		30	U
beta-BHC	ND	0.056	0.068	0.169	ug/kg wet				50-150		30	U
cis-Nonachlor	ND	0.025	0.053	0.133	ug/kg wet				50-150		30	U
delta-BHC	ND	0.033	0.068	0.169	ug/kg wet				50-150		30	U
Dieldrin	ND	0.022	0.068	0.169	ug/kg wet				50-150		30	U
Endosulfan I	ND	0.029	0.068	0.169	ug/kg wet				50-150		30	U
Endosulfan II	ND	0.026	0.068	0.169	ug/kg wet				50-150		30	U
Endosulfan sulfate	ND	0.029	0.068	0.169	ug/kg wet				50-150		30	U
Endrin	ND	0.025	0.068	0.169	ug/kg wet				50-150		30	U
Endrin aldehyde	ND	0.030	0.068	0.169	ug/kg wet				50-150		30	U
Endrin ketone	ND	0.027	0.068	0.169	ug/kg wet				50-150		30	U
gamma-BHC (Lindane)	ND	0.026	0.068	0.169	ug/kg wet				50-150		30	U
gamma-Chlordane	ND	0.022	0.068	0.169	ug/kg wet				50-150		30	U
Heptachlor	ND	0.059	0.068	0.169	ug/kg wet				50-150		30	U
Heptachlor epoxide	ND	0.025	0.068	0.169	ug/kg wet				50-150		30	U
Methoxychlor	ND	0.029	0.068	0.169	ug/kg wet				50-150		30	U
Oxychlordane	ND	0.023	0.053	0.133	ug/kg wet				50-150		30	U
Toxaphene	ND	1.90	2.54	8.47	ug/kg wet				50-150		30	U
trans-Nonachlor	ND	0.026	0.053	0.133	ug/kg wet				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/kg wet*	*4.000*			*50-150*			*U*
Surrogate: PCB 198	*0.00*				*ug/kg wet*	*4.000*			*50-150*			*U*
Duplicate (B18J145-DUP1)			**Source: 18J0402-02**		Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018							
4,4´-DDD	7.52	0.025	0.060	0.150	ug/kg dry		9.83			26.6	30	

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Duplicate (B18J145-DUP1)		**Source: 18J0402-02**			Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018							
4,4´-DDE	2.10	0.026	0.060	0.150	ug/kg dry		3.39			47.1	30	RPD-06
4,4´-DDT	ND	0.020	0.060	0.150	ug/kg dry		ND				30	U
Aldrin	ND	0.020	0.060	0.150	ug/kg dry		ND				30	U
alpha-BHC	ND	0.030	0.060	0.150	ug/kg dry		ND				30	U
alpha-Chlordane	ND	0.026	0.060	0.150	ug/kg dry		ND				30	U
beta-BHC	ND	0.050	0.060	0.150	ug/kg dry		ND				30	U
cis-Nonachlor	ND	0.029	0.060	0.150	ug/kg dry		ND				30	U
delta-BHC	ND	0.029	0.060	0.150	ug/kg dry		ND				30	U
Dieldrin	ND	0.019	0.060	0.150	ug/kg dry		ND				30	U
Endosulfan I	ND	0.026	0.060	0.150	ug/kg dry		ND				30	U
Endosulfan II	ND	0.023	0.060	0.150	ug/kg dry		ND				30	U
Endosulfan sulfate	ND	0.025	0.060	0.150	ug/kg dry		ND				30	U
Endrin	ND	0.022	0.060	0.150	ug/kg dry		ND				30	U
Endrin aldehyde	ND	0.027	0.060	0.150	ug/kg dry		ND				30	U
Endrin ketone	ND	0.019	0.047	0.118	ug/kg dry		ND				30	U
gamma-BHC (Lindane)	0.637	0.023	0.060	0.150	ug/kg dry		0.857			29.5	30	
gamma-Chlordane	ND	0.019	0.060	0.150	ug/kg dry		2.15				30	U
Heptachlor	ND	0.052	0.060	0.150	ug/kg dry		ND				30	U
Heptachlor epoxide	ND	0.022	0.060	0.150	ug/kg dry		ND				30	U
Methoxychlor	ND	0.026	0.060	0.150	ug/kg dry		ND				30	U
Oxychlordane	ND	0.026	0.060	0.150	ug/kg dry		3.61				30	U
Toxaphene	ND	1.69	2.25	7.49	ug/kg dry		ND				30	U
trans-Nonachlor	ND	0.029	0.060	0.150	ug/kg dry		ND				30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*2.26*				*ug/kg dry*	*3.540*		*63.9*	*30-150*			
Surrogate: PCB 198	*3.99*				*ug/kg dry*	*3.540*		*113*	*30-150*			
Matrix Spike (B18J145-MS1)		**Source: 18J0402-02**			Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018							
4,4´-DDD	14.1	0.031	0.075	0.189	ug/kg dry	4.457	9.83	97.0	50-150		30	
4,4´-DDE	10.3	0.033	0.075	0.189	ug/kg dry	8.913	3.39	77.6	50-150		30	

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Matrix Spike (B18J145-MS1)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
4,4´-DDT	3.17	0.026	0.075	0.189	ug/kg dry	4.457	ND	71.1	50-150		30	
Aldrin	3.15	0.025	0.075	0.189	ug/kg dry	4.457	ND	70.7	50-150		30	
alpha-BHC	2.34	0.037	0.075	0.189	ug/kg dry	4.457	ND	52.5	50-150		30	
alpha-Chlordane	7.47	0.033	0.075	0.189	ug/kg dry	8.913	ND	83.8	50-150		30	
beta-BHC	ND	0.063	0.075	0.189	ug/kg dry	4.457	ND		50-150		30	Z-02, U
cis-Nonachlor	2.58	0.036	0.075	0.189	ug/kg dry	4.457	ND	58.0	50-150		30	
delta-BHC	2.55	0.036	0.075	0.189	ug/kg dry	4.457	ND	57.2	50-150		30	
Dieldrin	3.43	0.024	0.075	0.189	ug/kg dry	4.457	ND	77.0	50-150		30	
Endosulfan I	5.17	0.032	0.075	0.189	ug/kg dry	8.913	ND	58.0	50-150		30	
Endosulfan II	1.01	0.029	0.075	0.189	ug/kg dry	4.457	ND	22.6	50-150		30	QM-07
Endosulfan sulfate	3.08	0.032	0.075	0.189	ug/kg dry	4.457	ND	69.0	50-150		30	
Endrin	3.47	0.028	0.075	0.189	ug/kg dry	4.457	ND	77.9	50-150		30	
Endrin aldehyde	2.33	0.034	0.075	0.189	ug/kg dry	4.457	ND	52.3	50-150		30	
Endrin ketone	ND	0.023	0.059	0.149	ug/kg dry	4.457	ND		50-150		30	U
gamma-BHC (Lindane)	3.41	0.029	0.075	0.189	ug/kg dry	4.457	0.857	57.4	50-150		30	
gamma-Chlordane	5.47	0.024	0.075	0.189	ug/kg dry	4.457	2.15	74.5	50-150		30	
Heptachlor	2.40	0.066	0.075	0.189	ug/kg dry	4.457	ND	53.8	50-150		30	
Heptachlor epoxide	2.66	0.027	0.075	0.189	ug/kg dry	4.457	ND	59.7	50-150		30	
Methoxychlor	6.38	0.032	0.075	0.189	ug/kg dry	4.457	ND	143	50-150		30	
Oxychlordane	7.64	0.032	0.075	0.189	ug/kg dry	4.457	3.61	90.4	50-150		30	
Toxaphene	ND	2.12	2.83	9.43	ug/kg dry		ND		50-150		30	U
trans-Nonachlor	7.47	0.036	0.075	0.189	ug/kg dry	8.913	ND	83.8	50-150		30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*3.53*				*ug/kg dry*	*4.457*		*79.2*	*50-150*			
Surrogate: PCB 198	*5.58*				*ug/kg dry*	*4.457*		*125*	*50-150*			
Matrix Spike (B18J145-MS2)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
4,4´-DDD	ND	0.029	0.070	0.176	ug/kg dry		9.83		50-150		30	U
4,4´-DDE	ND	0.030	0.070	0.176	ug/kg dry		3.39		50-150		30	U
4,4´-DDT	ND	0.024	0.070	0.176	ug/kg dry		ND		50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Matrix Spike (B18J145-MS2)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
Aldrin	ND	0.024	0.070	0.176	ug/kg dry		ND		50-150		30	U
alpha-BHC	ND	0.035	0.070	0.176	ug/kg dry		ND		50-150		30	U
alpha-Chlordane	ND	0.031	0.070	0.176	ug/kg dry		ND		50-150		30	U
beta-BHC	ND	0.059	0.070	0.176	ug/kg dry		ND		50-150		30	U
cis-Nonachlor	ND	0.034	0.070	0.176	ug/kg dry		ND		50-150		30	U
delta-BHC	ND	0.034	0.070	0.176	ug/kg dry		ND		50-150		30	U
Dieldrin	ND	0.023	0.070	0.176	ug/kg dry		ND		50-150		30	U
Endosulfan I	ND	0.030	0.070	0.176	ug/kg dry		ND		50-150		30	U
Endosulfan II	ND	0.027	0.070	0.176	ug/kg dry		ND		50-150		30	U
Endosulfan sulfate	ND	0.030	0.070	0.176	ug/kg dry		ND		50-150		30	U
Endrin	ND	0.026	0.070	0.176	ug/kg dry		ND		50-150		30	U
Endrin aldehyde	ND	0.032	0.070	0.176	ug/kg dry		ND		50-150		30	U
Endrin ketone	ND	0.022	0.055	0.139	ug/kg dry		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.027	0.070	0.176	ug/kg dry		0.857		50-150		30	U
gamma-Chlordane	ND	0.023	0.070	0.176	ug/kg dry		2.15		50-150		30	U
Heptachlor	ND	0.062	0.070	0.176	ug/kg dry		ND		50-150		30	U
Heptachlor epoxide	ND	0.026	0.070	0.176	ug/kg dry		ND		50-150		30	U
Methoxychlor	ND	0.030	0.070	0.176	ug/kg dry		ND		50-150		30	U
Oxychlordane	ND	0.030	0.070	0.176	ug/kg dry		3.61		50-150		30	U
Toxaphene	ND	1.98	2.64	8.81	ug/kg dry	41.61	ND		50-150		30	U
trans-Nonachlor	ND	0.034	0.070	0.176	ug/kg dry		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/kg dry*	*4.161*			*50-150*			*U*
Surrogate: PCB 198	*0.00*				*ug/kg dry*	*4.161*			*50-150*			*U*
Matrix Spike (B18J145-MS3)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 13-Nov-2018						
4,4´-DDD	ND	0.032	0.077	0.193	ug/kg dry		9.83		50-150		30	U
4,4´-DDE	ND	0.033	0.077	0.193	ug/kg dry		3.39		50-150		30	U
4,4´-DDT	ND	0.026	0.077	0.193	ug/kg dry		ND		50-150		30	U
Aldrin	ND	0.026	0.077	0.193	ug/kg dry		ND		50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Matrix Spike (B18J145-MS3)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 13-Nov-2018						
alpha-BHC	ND	0.038	0.077	0.193	ug/kg dry		ND		50-150		30	U
alpha-Chlordane	ND	0.034	0.077	0.193	ug/kg dry		ND		50-150		30	U
beta-BHC	ND	0.064	0.077	0.193	ug/kg dry		ND		50-150		30	U
cis-Nonachlor	ND	0.037	0.077	0.193	ug/kg dry		ND		50-150		30	U
delta-BHC	ND	0.037	0.077	0.193	ug/kg dry		ND		50-150		30	U
Dieldrin	ND	0.025	0.077	0.193	ug/kg dry		ND		50-150		30	U
Endosulfan I	ND	0.033	0.077	0.193	ug/kg dry		ND		50-150		30	U
Endosulfan II	ND	0.029	0.077	0.193	ug/kg dry		ND		50-150		30	U
Endosulfan sulfate	ND	0.033	0.077	0.193	ug/kg dry		ND		50-150		30	U
Endrin	ND	0.028	0.077	0.193	ug/kg dry		ND		50-150		30	U
Endrin aldehyde	ND	0.035	0.077	0.193	ug/kg dry		ND		50-150		30	U
Endrin ketone	ND	0.024	0.061	0.152	ug/kg dry		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.030	0.077	0.193	ug/kg dry		0.857		50-150		30	U
gamma-Chlordane	ND	0.025	0.077	0.193	ug/kg dry		2.15		50-150		30	U
Heptachlor	ND	0.068	0.077	0.193	ug/kg dry		ND		50-150		30	U
Heptachlor epoxide	ND	0.028	0.077	0.193	ug/kg dry		ND		50-150		30	U
Methoxychlor	ND	0.033	0.077	0.193	ug/kg dry		ND		50-150		30	U
Oxychlordane	ND	0.033	0.077	0.193	ug/kg dry		3.61		50-150		30	U
Toxaphene	ND	2.17	2.90	9.65	ug/kg dry		ND		50-150		30	U
trans-Nonachlor	ND	0.037	0.077	0.193	ug/kg dry		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/kg dry*	*4.560*			*50-150*			*U*
Surrogate: PCB 198	*0.00*				*ug/kg dry*	*4.560*			*50-150*			*U*
Matrix Spike Dup (B18J145-MSD1)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
4,4´-DDD	13.1	0.029	0.070	0.175	ug/kg dry	4.140	9.83	80.1	50-150	7.36	30	
4,4´-DDE	9.57	0.030	0.070	0.175	ug/kg dry	8.281	3.39	74.6	50-150	7.36	30	
4,4´-DDT	3.49	0.024	0.070	0.175	ug/kg dry	4.140	ND	84.2	50-150	9.57	30	
Aldrin	3.19	0.024	0.070	0.175	ug/kg dry	4.140	ND	77.0	50-150	1.24	30	
alpha-BHC	2.63	0.035	0.070	0.175	ug/kg dry	4.140	ND	63.5	50-150	11.7	30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Matrix Spike Dup (B18J145-MSD1)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
alpha-Chlordane	7.29	0.031	0.070	0.175	ug/kg dry	8.281	ND	88.1	50-150	2.43	30	
beta-BHC	ND	0.058	0.070	0.175	ug/kg dry	4.140	ND		50-150		30	Z-02, U
cis-Nonachlor	2.42	0.033	0.070	0.175	ug/kg dry	4.140	ND	58.4	50-150	6.63	30	
delta-BHC	2.77	0.034	0.070	0.175	ug/kg dry	4.140	ND	66.9	50-150	8.37	30	
Dieldrin	3.24	0.022	0.070	0.175	ug/kg dry	4.140	ND	78.3	50-150	5.72	30	
Endosulfan I	6.36	0.030	0.070	0.175	ug/kg dry	8.281	ND	76.8	50-150	20.7	30	
Endosulfan II	0.939	0.027	0.070	0.175	ug/kg dry	4.140	ND	22.7	50-150	7.17	30	QM-07
Endosulfan sulfate	2.72	0.030	0.070	0.175	ug/kg dry	4.140	ND	65.6	50-150	12.4	30	
Endrin	3.58	0.026	0.070	0.175	ug/kg dry	4.140	ND	86.4	50-150	2.96	30	
Endrin aldehyde	2.16	0.031	0.070	0.175	ug/kg dry	4.140	ND	52.3	50-150	7.36	30	
Endrin ketone	ND	0.022	0.055	0.138	ug/kg dry	4.140	ND		50-150		30	U
gamma-BHC (Lindane)	3.17	0.027	0.070	0.175	ug/kg dry	4.140	0.857	55.8	50-150	7.52	30	
gamma-Chlordane	4.68	0.022	0.070	0.175	ug/kg dry	4.140	2.15	61.0	50-150	15.6	30	
Heptachlor	2.23	0.061	0.070	0.175	ug/kg dry	4.140	ND	53.8	50-150	7.36	30	
Heptachlor epoxide	2.59	0.025	0.070	0.175	ug/kg dry	4.140	ND	62.7	50-150	2.51	30	
Methoxychlor	5.94	0.030	0.070	0.175	ug/kg dry	4.140	ND	144	50-150	7.06	30	
Oxychlordane	7.94	0.030	0.070	0.175	ug/kg dry	4.140	3.61	105	50-150	3.84	30	
Toxaphene	ND	1.97	2.63	8.76	ug/kg dry		ND		50-150		30	U
trans-Nonachlor	7.27	0.034	0.070	0.175	ug/kg dry	8.281	ND	87.8	50-150	2.67	30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*3.07*				*ug/kg dry*	*4.140*		*74.1*	*50-150*			
Surrogate: PCB 198	*5.26*				*ug/kg dry*	*4.140*		*127*	*50-150*			
Matrix Spike Dup (B18J145-MSD2)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
4,4´-DDD	ND	0.030	0.073	0.182	ug/kg dry		9.83		50-150		30	U
4,4´-DDE	ND	0.032	0.073	0.182	ug/kg dry		3.39		50-150		30	U
4,4´-DDT	ND	0.025	0.073	0.182	ug/kg dry		ND		50-150		30	U
Aldrin	ND	0.025	0.073	0.182	ug/kg dry		ND		50-150		30	U
alpha-BHC	ND	0.036	0.073	0.182	ug/kg dry		ND		50-150		30	U
alpha-Chlordane	ND	0.032	0.073	0.182	ug/kg dry		ND		50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Matrix Spike Dup (B18J145-MSD2)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 20-Nov-2018						
beta-BHC	ND	0.061	0.073	0.182	ug/kg dry		ND		50-150		30	U
cis-Nonachlor	ND	0.035	0.073	0.182	ug/kg dry		ND		50-150		30	U
delta-BHC	ND	0.035	0.073	0.182	ug/kg dry		ND		50-150		30	U
Dieldrin	ND	0.023	0.073	0.182	ug/kg dry		ND		50-150		30	U
Endosulfan I	ND	0.031	0.073	0.182	ug/kg dry		ND		50-150		30	U
Endosulfan II	ND	0.028	0.073	0.182	ug/kg dry		ND		50-150		30	U
Endosulfan sulfate	ND	0.031	0.073	0.182	ug/kg dry		ND		50-150		30	U
Endrin	ND	0.027	0.073	0.182	ug/kg dry		ND		50-150		30	U
Endrin aldehyde	ND	0.033	0.073	0.182	ug/kg dry		ND		50-150		30	U
Endrin ketone	ND	0.023	0.057	0.143	ug/kg dry		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.028	0.073	0.182	ug/kg dry		0.857		50-150		30	U
gamma-Chlordane	ND	0.023	0.073	0.182	ug/kg dry		2.15		50-150		30	U
Heptachlor	ND	0.064	0.073	0.182	ug/kg dry		ND		50-150		30	U
Heptachlor epoxide	ND	0.026	0.073	0.182	ug/kg dry		ND		50-150		30	U
Methoxychlor	ND	0.031	0.073	0.182	ug/kg dry		ND		50-150		30	U
Oxychlordane	ND	0.031	0.073	0.182	ug/kg dry		3.61		50-150		30	U
Toxaphene	ND	2.05	2.73	9.11	ug/kg dry	43.05	ND		50-150		30	U
trans-Nonachlor	ND	0.035	0.073	0.182	ug/kg dry		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/kg dry*	*4.305*			*50-150*			*U*
Surrogate: PCB 198	*0.00*				*ug/kg dry*	*4.305*			*50-150*			*U*
Matrix Spike Dup (B18J145-MSD3)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 13-Nov-2018						
4,4´-DDD	ND	0.032	0.077	0.192	ug/kg dry		9.83		50-150		30	U
4,4´-DDE	ND	0.033	0.077	0.192	ug/kg dry		3.39		50-150		30	U
4,4´-DDT	ND	0.026	0.077	0.192	ug/kg dry		ND		50-150		30	U
Aldrin	ND	0.026	0.077	0.192	ug/kg dry		ND		50-150		30	U
alpha-BHC	ND	0.038	0.077	0.192	ug/kg dry		ND		50-150		30	U
alpha-Chlordane	ND	0.034	0.077	0.192	ug/kg dry		ND		50-150		30	U
beta-BHC	ND	0.064	0.077	0.192	ug/kg dry		ND		50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Matrix Spike Dup (B18J145-MSD3)		**Source: 18J0402-02**			Prepared: 12-Oct-2018 Analyzed: 13-Nov-2018							
cis-Nonachlor	ND	0.029	0.060	0.151	ug/kg dry		ND		50-150		30	U
delta-BHC	ND	0.037	0.077	0.192	ug/kg dry		ND		50-150		30	U
Dieldrin	ND	0.025	0.077	0.192	ug/kg dry		ND		50-150		30	U
Endosulfan I	ND	0.033	0.077	0.192	ug/kg dry		ND		50-150		30	U
Endosulfan II	ND	0.029	0.077	0.192	ug/kg dry		ND		50-150		30	U
Endosulfan sulfate	ND	0.032	0.077	0.192	ug/kg dry		ND		50-150		30	U
Endrin	ND	0.028	0.077	0.192	ug/kg dry		ND		50-150		30	U
Endrin aldehyde	ND	0.034	0.077	0.192	ug/kg dry		ND		50-150		30	U
Endrin ketone	ND	0.030	0.077	0.192	ug/kg dry		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.030	0.077	0.192	ug/kg dry		0.857		50-150		30	U
gamma-Chlordane	ND	0.025	0.077	0.192	ug/kg dry		2.15		50-150		30	U
Heptachlor	ND	0.067	0.077	0.192	ug/kg dry		ND		50-150		30	U
Heptachlor epoxide	ND	0.028	0.077	0.192	ug/kg dry		ND		50-150		30	U
Methoxychlor	ND	0.033	0.077	0.192	ug/kg dry		ND		50-150		30	U
Oxychlordane	ND	0.026	0.060	0.151	ug/kg dry		3.61		50-150		30	U
Toxaphene	ND	2.16	2.88	9.60	ug/kg dry		ND		50-150		30	U
trans-Nonachlor	ND	0.029	0.060	0.151	ug/kg dry		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*ND*				*ug/kg dry*	*4.533*			*50-150*			*U*
Surrogate: PCB 198	*0.00*				*ug/kg dry*	*4.533*			*50-150*			*U*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Nutrients - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J109 - Default Prep Metals												
Blank (B18J109-BLK1)						Prepared: 15-Oct-2018 Analyzed: 20-Oct-2018						
Ammonia as N	0.164	0.0386	0.0500	0.100	mg/kg							
LCS (B18J109-BS1)						Prepared: 15-Oct-2018 Analyzed: 20-Oct-2018						
Ammonia as N	1.10	0.0386	0.0500	0.100	mg/kg	1.000		110	80-120			B
Calibration Check (B18J109-CCV1)						Prepared: 15-Oct-2018 Analyzed: 20-Oct-2018						
Ammonia as N	0.391	0.00386	0.00500	0.0100	mg/kg	0.4000		97.8	90-110			B
Calibration Check (B18J109-CCV2)						Prepared: 15-Oct-2018 Analyzed: 20-Oct-2018						
Ammonia as N	0.497	0.00386	0.00500	0.0100	mg/kg	0.5000		99.4	90-110			B
Calibration Check (B18J109-CCV3)						Prepared: 15-Oct-2018 Analyzed: 20-Oct-2018						
Ammonia as N	0.496	0.00386	0.00500	0.0100	mg/kg	0.5000		99.2	90-110			B
Calibration Check (B18J109-CCV4)						Prepared: 15-Oct-2018 Analyzed: 20-Oct-2018						
Ammonia as N	0.504	0.00386	0.00500	0.0100	mg/kg	0.5000		101	90-110			B
Duplicate (B18J109-DUP1)			**Source: 18J0402-02**			Prepared: 15-Oct-2018 Analyzed: 20-Oct-2018						
Ammonia as N	114	0.396	0.513	1.03	mg/kg		114			0.0288	20	B
Matrix Spike (B18J109-MS1)			**Source: 18J0402-02**			Prepared: 15-Oct-2018 Analyzed: 20-Oct-2018						
Ammonia as N	113	0.361	0.468	0.935	mg/kg	9.353	114	NR	80-120			QM-11, B
Matrix Spike Dup (B18J109-MSD1)			**Source: 18J0402-02**			Prepared: 15-Oct-2018 Analyzed: 20-Oct-2018						
Ammonia as N	113	0.361	0.468	0.935	mg/kg	9.353	114	NR	80-120	0.00	20	QM-11, B
Reference (B18J109-SRM1)						Prepared: 15-Oct-2018 Analyzed: 20-Oct-2018						
Ammonia as N	1.10	0.00386	0.00500	0.0100	mg/kg	1.000		110	80-120			B

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0023 - B18J145												
Calibration Check (18K0023-CCVA)						Prepared: 18-Nov-2018 Analyzed: 29-Nov-2018						
PCB 101	32				ng/mL	30.00		106	80-120			
PCB 105	11				ng/mL	10.00		109	80-120			
PCB 118	10				ng/mL	10.00		103	80-120			
PCB 126	19				ng/mL	20.00		96.4	80-120			
PCB 128	11				ng/mL	10.00		106	80-120			
PCB 138	31				ng/mL	30.00		103	80-120			
PCB 153	20				ng/mL	20.00		101	80-120			
PCB 169	11				ng/mL	10.00		111	80-120			
PCB 170	22				ng/mL	20.00		109	80-120			
PCB 18	9.5				ng/mL	10.00		95.4	80-120			
PCB 180	10				ng/mL	10.00		100	80-120			
PCB 187	10				ng/mL	10.00		105	80-120			
PCB 28	19				ng/mL	20.00		97.1	80-120			
PCB 44	9.9				ng/mL	10.00		98.7	80-120			
PCB 52	21				ng/mL	20.00		107	80-120			
PCB 66	20				ng/mL	20.00		99.7	80-120			
PCB 77	9.7				ng/mL	10.00		96.6	80-120			
PCB 8	20				ng/mL	20.00		99.5	80-120			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*9.0*				*ng/mL*	*10.00*		*90.0*	*80-120*			
Surrogate: PCB 198	*11*				*ng/mL*	*10.00*		*107*	*0-200*			
Calibration Check (18K0023-CCVB)						Prepared: 18-Nov-2018 Analyzed: 29-Nov-2018						
PCB 101	30				ng/mL	30.00		98.5	80-120			
PCB 105	10				ng/mL	10.00		104	80-120			
PCB 118	10				ng/mL	10.00		100	80-120			
PCB 126	18				ng/mL	20.00		89.7	80-120			
PCB 128	9.7				ng/mL	10.00		96.7	80-120			
PCB 138	29				ng/mL	30.00		95.3	80-120			
PCB 153	19				ng/mL	20.00		97.5	80-120			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0023 - B18J145												
Calibration Check (18K0023-CCVB)						Prepared: 18-Nov-2018 Analyzed: 29-Nov-2018						
PCB 169	10				ng/mL	10.00		101	80-120			
PCB 170	19				ng/mL	20.00		92.9	80-120			
PCB 18	10				ng/mL	10.00		99.8	80-120			
PCB 180	8.9				ng/mL	10.00		88.8	80-120			
PCB 187	9.9				ng/mL	10.00		98.6	80-120			
PCB 28	19				ng/mL	20.00		95.7	80-120			
PCB 44	10				ng/mL	10.00		101	80-120			
PCB 52	20				ng/mL	20.00		99.1	80-120			
PCB 66	20				ng/mL	20.00		99.8	80-120			
PCB 77	11				ng/mL	10.00		108	80-120			
PCB 8	20				ng/mL	20.00		98.1	80-120			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*9.8*				*ng/mL*	*10.00*		*97.6*	*80-120*			
Surrogate: PCB 198	*9.3*				*ng/mL*	*10.00*		*93.3*	*0-200*			
Calibration Check (18K0023-CCVC)						Prepared: 18-Nov-2018 Analyzed: 29-Nov-2018						
PCB 101	31				ng/mL	30.00		103	80-120			
PCB 105	12				ng/mL	10.00		116	80-120			
PCB 118	12				ng/mL	10.00		115	80-120			
PCB 126	21				ng/mL	20.00		103	80-120			
PCB 128	11				ng/mL	10.00		115	80-120			
PCB 138	31				ng/mL	30.00		102	80-120			
PCB 153	21				ng/mL	20.00		107	80-120			
PCB 169	12				ng/mL	10.00		118	80-120			
PCB 170	21				ng/mL	20.00		103	80-120			
PCB 18	11				ng/mL	10.00		106	80-120			
PCB 180	11				ng/mL	10.00		105	80-120			
PCB 187	10				ng/mL	10.00		103	80-120			
PCB 28	22				ng/mL	20.00		108	80-120			
PCB 44	11				ng/mL	10.00		108	80-120			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0023 - B18J145												
Calibration Check (18K0023-CCVC)						Prepared: 18-Nov-2018 Analyzed: 29-Nov-2018						
PCB 52	21				ng/mL	20.00		104	80-120			
PCB 66	22				ng/mL	20.00		108	80-120			
PCB 77	11				ng/mL	10.00		105	80-120			
PCB 8	22				ng/mL	20.00		108	80-120			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*11*				*ng/mL*	*10.00*		*107*	*80-120*			
Surrogate: PCB 198	*11*				*ng/mL*	*10.00*		*108*	*0-200*			
Initial Cal Blank (18K0023-ICB1)						Prepared: 18-Nov-2018 Analyzed: 29-Nov-2018						
PCB 101	0.0				ng/mL							U
PCB 105	0.0				ng/mL							U
PCB 118	0.0				ng/mL							U
PCB 126	0.0				ng/mL							U
PCB 128	0.0				ng/mL							U
PCB 138	0.0				ng/mL							U
PCB 153	0.0				ng/mL							U
PCB 169	0.0				ng/mL							U
PCB 170	0.0				ng/mL							U
PCB 18	0.0				ng/mL							U
PCB 180	0.0				ng/mL							U
PCB 187	0.0				ng/mL							U
PCB 28	0.0				ng/mL							U
PCB 44	0.0				ng/mL							U
PCB 52	0.0				ng/mL							U
PCB 66	0.0				ng/mL							U
PCB 77	0.0				ng/mL							U
PCB 8	0.0				ng/mL							U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0*				*ng/mL*				*30-150*			*U*
Surrogate: PCB 198	*0.0*				*ng/mL*				*30-150*			*U*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0023 - B18J145												
Initial Cal Check (18K0023-ICV3)						Prepared: 18-Nov-2018 Analyzed: 29-Nov-2018						
PCB 101	50				ng/mL	60.00		82.9	80-120			
PCB 105	19				ng/mL	20.00		93.4	80-120			
PCB 118	18				ng/mL	20.00		90.6	80-120			
PCB 126	34				ng/mL	40.00		86.0	80-120			
PCB 128	19				ng/mL	20.00		96.5	80-120			
PCB 138	48				ng/mL	60.00		80.6	80-120			
PCB 153	35				ng/mL	40.00		86.9	80-120			
PCB 169	15				ng/mL	20.00		76.3	80-120			Q-CCV
PCB 170	31				ng/mL	40.00		77.4	80-120			Q-CCV
PCB 18	18				ng/mL	20.00		91.6	80-120			
PCB 180	17				ng/mL	20.00		83.6	80-120			
PCB 187	18				ng/mL	20.00		87.8	80-120			
PCB 28	34				ng/mL	40.00		84.6	80-120			
PCB 44	19				ng/mL	20.00		92.8	80-120			
PCB 52	38				ng/mL	40.00		95.4	80-120			
PCB 66	34				ng/mL	40.00		85.5	80-120			
PCB 77	21				ng/mL	20.00		107	80-120			
PCB 8	38				ng/mL	40.00		94.3	80-120			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*16*				*ng/mL*	*20.00*		*80.8*	*80-120*			
Surrogate: PCB 198	*17*				*ng/mL*	*20.00*		*86.8*	*0-200*			
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCV7)						Prepared & Analyzed: 13-Nov-2018						
PCB 101	120				ng/mL	120.0		102	85-115			
PCB 105	37				ng/mL	40.00		93.5	85-115			
PCB 118	38				ng/mL	40.00		95.0	85-115			
PCB 126	86				ng/mL	80.00		108	85-115			
PCB 128	39				ng/mL	40.00		97.1	85-115			
PCB 138	110				ng/mL	120.0		90.6	85-115			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCV7)						Prepared & Analyzed: 13-Nov-2018						
PCB 153	73				ng/mL	80.00		91.6	85-115			
PCB 169	36				ng/mL	40.00		90.8	85-115			
PCB 170	72				ng/mL	80.00		90.6	85-115			
PCB 18	38				ng/mL	40.00		96.2	85-115			
PCB 180	36				ng/mL	40.00		91.1	85-115			
PCB 187	37				ng/mL	40.00		93.4	85-115			
PCB 28	72				ng/mL	80.00		89.7	85-115			
PCB 44	38				ng/mL	40.00		94.1	85-115			
PCB 52	78				ng/mL	80.00		97.6	85-115			
PCB 66	78				ng/mL	80.00		96.9	85-115			
PCB 77	42				ng/mL	40.00		105	85-115			
PCB 8	75				ng/mL	80.00		94.1	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*43*				*ng/mL*	*40.00*		*108*	*85-115*			
Surrogate: PCB 198	*36*				*ng/mL*	*40.00*		*90.9*	*85-115*			
Calibration Check (18K0025-CCV8)						Prepared: 13-Nov-2018 Analyzed: 14-Nov-2018						
PCB 101	100				ng/mL	120.0		86.9	85-115			
PCB 105	39				ng/mL	40.00		97.2	85-115			
PCB 118	38				ng/mL	40.00		93.9	85-115			
PCB 126	80				ng/mL	80.00		100	85-115			
PCB 128	39				ng/mL	40.00		97.5	85-115			
PCB 138	110				ng/mL	120.0		92.1	85-115			
PCB 153	73				ng/mL	80.00		91.0	85-115			
PCB 169	40				ng/mL	40.00		99.6	85-115			
PCB 170	80				ng/mL	80.00		99.7	85-115			
PCB 18	38				ng/mL	40.00		96.2	85-115			
PCB 180	39				ng/mL	40.00		98.5	85-115			
PCB 187	38				ng/mL	40.00		95.0	85-115			
PCB 28	76				ng/mL	80.00		94.8	85-115			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCV8)						Prepared: 13-Nov-2018 Analyzed: 14-Nov-2018						
PCB 44	37				ng/mL	40.00		92.6	85-115			
PCB 52	81				ng/mL	80.00		102	85-115			
PCB 66	77				ng/mL	80.00		96.0	85-115			
PCB 77	38				ng/mL	40.00		95.2	85-115			
PCB 8	79				ng/mL	80.00		99.2	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*49*				*ng/mL*	*40.00*		*122*	*85-115*			*Qa*
Surrogate: PCB 198	*39*				*ng/mL*	*40.00*		*97.1*	*85-115*			
Calibration Check (18K0025-CCV9)						Prepared: 13-Nov-2018 Analyzed: 16-Nov-2018						
PCB 101	100				ng/mL	120.0		85.6	85-115			
PCB 105	36				ng/mL	40.00		91.2	85-115			
PCB 118	37				ng/mL	40.00		92.3	85-115			
PCB 126	83				ng/mL	80.00		104	85-115			
PCB 128	39				ng/mL	40.00		98.4	85-115			
PCB 138	110				ng/mL	120.0		92.5	85-115			
PCB 153	74				ng/mL	80.00		93.0	85-115			
PCB 169	37				ng/mL	40.00		93.5	85-115			
PCB 170	75				ng/mL	80.00		93.4	85-115			
PCB 18	39				ng/mL	40.00		98.0	85-115			
PCB 180	40				ng/mL	40.00		98.8	85-115			
PCB 187	37				ng/mL	40.00		92.7	85-115			
PCB 28	82				ng/mL	80.00		102	85-115			
PCB 44	38				ng/mL	40.00		95.1	85-115			
PCB 52	78				ng/mL	80.00		98.0	85-115			
PCB 66	83				ng/mL	80.00		103	85-115			
PCB 77	42				ng/mL	40.00		104	85-115			
PCB 8	84				ng/mL	80.00		106	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*44*				*ng/mL*	*40.00*		*109*	*85-115*			
Surrogate: PCB 198	*37*				*ng/mL*	*40.00*		*92.6*	*85-115*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCVA)						Prepared: 13-Nov-2018 Analyzed: 16-Nov-2018						
PCB 101	110				ng/mL	120.0		90.1	85-115			
PCB 105	37				ng/mL	40.00		91.3	85-115			
PCB 118	37				ng/mL	40.00		92.7	85-115			
PCB 126	80				ng/mL	80.00		100	85-115			
PCB 128	39				ng/mL	40.00		96.5	85-115			
PCB 138	110				ng/mL	120.0		91.4	85-115			
PCB 153	74				ng/mL	80.00		92.5	85-115			
PCB 169	37				ng/mL	40.00		93.1	85-115			
PCB 170	73				ng/mL	80.00		91.7	85-115			
PCB 18	38				ng/mL	40.00		94.5	85-115			
PCB 180	38				ng/mL	40.00		95.0	85-115			
PCB 187	38				ng/mL	40.00		95.4	85-115			
PCB 28	79				ng/mL	80.00		98.3	85-115			
PCB 44	37				ng/mL	40.00		93.2	85-115			
PCB 52	73				ng/mL	80.00		90.7	85-115			
PCB 66	79				ng/mL	80.00		98.5	85-115			
PCB 77	45				ng/mL	40.00		112	85-115			
PCB 8	79				ng/mL	80.00		99.1	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*44*				*ng/mL*	*40.00*		*111*	*85-115*			
Surrogate: PCB 198	*36*				*ng/mL*	*40.00*		*90.6*	*85-115*			
Calibration Check (18K0025-CCVB)						Prepared: 13-Nov-2018 Analyzed: 19-Nov-2018						
PCB 101	110				ng/mL	120.0		89.3	85-115			
PCB 105	36				ng/mL	40.00		89.3	85-115			
PCB 118	37				ng/mL	40.00		92.8	85-115			
PCB 126	78				ng/mL	80.00		97.0	85-115			
PCB 128	37				ng/mL	40.00		91.8	85-115			
PCB 138	100				ng/mL	120.0		85.8	85-115			
PCB 153	80				ng/mL	80.00		100	85-115			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCVB)						Prepared: 13-Nov-2018 Analyzed: 19-Nov-2018						
PCB 169	35				ng/mL	40.00		88.3	85-115			
PCB 170	70				ng/mL	80.00		87.9	85-115			
PCB 18	38				ng/mL	40.00		93.8	85-115			
PCB 180	35				ng/mL	40.00		87.7	85-115			
PCB 187	35				ng/mL	40.00		87.7	85-115			
PCB 28	74				ng/mL	80.00		92.9	85-115			
PCB 44	38				ng/mL	40.00		96.2	85-115			
PCB 52	75				ng/mL	80.00		94.2	85-115			
PCB 66	78				ng/mL	80.00		97.2	85-115			
PCB 77	44				ng/mL	40.00		109	85-115			
PCB 8	78				ng/mL	80.00		97.6	85-115			
Surrogate: PCB 198	*35*				*ng/mL*	*40.00*		*87.5*	*85-115*			
Calibration Check (18K0025-CCVI)						Prepared: 13-Nov-2018 Analyzed: 17-Dec-2018						
PCB 101	110				ng/mL	120.0		94.2	85-115			
PCB 105	36				ng/mL	40.00		91.0	85-115			
PCB 118	37				ng/mL	40.00		91.5	85-115			
PCB 126	76				ng/mL	80.00		95.1	85-115			
PCB 128	43				ng/mL	40.00		107	85-115			
PCB 138	120				ng/mL	120.0		98.3	85-115			
PCB 153	72				ng/mL	80.00		90.5	85-115			
PCB 169	40				ng/mL	40.00		99.0	85-115			
PCB 170	82				ng/mL	80.00		103	85-115			
PCB 18	41				ng/mL	40.00		102	85-115			
PCB 180	42				ng/mL	40.00		106	85-115			
PCB 187	39				ng/mL	40.00		96.5	85-115			
PCB 28	82				ng/mL	80.00		103	85-115			
PCB 44	40				ng/mL	40.00		99.0	85-115			
PCB 52	82				ng/mL	80.00		102	85-115			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Calibration Check (18K0025-CCVI)						Prepared: 13-Nov-2018 Analyzed: 17-Dec-2018						
PCB 66	84				ng/mL	80.00		105	85-115			
PCB 77	45				ng/mL	40.00		113	85-115			
PCB 8	85				ng/mL	80.00		107	85-115			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*48*				*ng/mL*	*40.00*		*119*	*85-115*			*Qa*
Surrogate: PCB 198	*40*				*ng/mL*	*40.00*		*99.5*	*85-115*			
Calibration Check (18K0025-CCVJ)						Prepared: 13-Nov-2018 Analyzed: 17-Dec-2018						
PCB 101	120				ng/mL	120.0		98.3	85-115			
PCB 105	39				ng/mL	40.00		98.0	85-115			
PCB 118	38				ng/mL	40.00		94.0	85-115			
PCB 126	80				ng/mL	80.00		100	85-115			
PCB 128	45				ng/mL	40.00		112	85-115			
PCB 138	120				ng/mL	120.0		99.2	85-115			
PCB 153	78				ng/mL	80.00		97.4	85-115			
PCB 169	38				ng/mL	40.00		94.0	85-115			
PCB 170	78				ng/mL	80.00		97.8	85-115			
PCB 18	45				ng/mL	40.00		113	85-115			
PCB 180	37				ng/mL	40.00		92.0	85-115			
PCB 187	38				ng/mL	40.00		95.2	85-115			
PCB 28	88				ng/mL	80.00		110	85-115			
PCB 44	38				ng/mL	40.00		93.8	85-115			
PCB 52	85				ng/mL	80.00		106	85-115			
PCB 66	76				ng/mL	80.00		95.4	85-115			
PCB 77	39				ng/mL	40.00		97.0	85-115			
PCB 8	94				ng/mL	80.00		118	85-115			Qa
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*57*				*ng/mL*	*40.00*		*142*	*85-115*			*Qa*
Surrogate: PCB 198	*38*				*ng/mL*	*40.00*		*93.8*	*85-115*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Initial Cal Blank (18K0025-ICB1)						Prepared & Analyzed: 13-Nov-2018						
PCB 101	0.0				ng/mL							U
PCB 105	0.0				ng/mL							U
PCB 118	0.0				ng/mL							U
PCB 126	0.0				ng/mL							U
PCB 128	0.0				ng/mL							U
PCB 138	0.0				ng/mL							U
PCB 153	0.0				ng/mL							U
PCB 169	0.0				ng/mL							U
PCB 170	0.0				ng/mL							U
PCB 18	0.0				ng/mL							U
PCB 180	0.0				ng/mL							U
PCB 187	0.0				ng/mL							U
PCB 28	0.0				ng/mL							U
PCB 44	0.0				ng/mL							U
PCB 52	0.0				ng/mL							U
PCB 66	0.0				ng/mL							U
PCB 77	0.0				ng/mL							U
PCB 8	0.0				ng/mL							U
Initial Cal Check (18K0025-ICV3)						Prepared & Analyzed: 13-Nov-2018						
PCB 101	59				ng/mL	60.00		98.6	80-120			
PCB 105	21				ng/mL	20.00		103	80-120			
PCB 118	21				ng/mL	20.00		105	80-120			
PCB 126	41				ng/mL	40.00		103	80-120			
PCB 128	22				ng/mL	20.00		112	80-120			
PCB 138	59				ng/mL	60.00		98.1	80-120			
PCB 153	38				ng/mL	40.00		95.5	80-120			
PCB 169	19				ng/mL	20.00		96.9	80-120			
PCB 170	39				ng/mL	40.00		96.7	80-120			

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0025 - B18J145												
Initial Cal Check (18K0025-ICV3)						Prepared & Analyzed: 13-Nov-2018						
PCB 18	22				ng/mL	20.00		109	80-120			
PCB 180	22				ng/mL	20.00		109	80-120			
PCB 187	22				ng/mL	20.00		111	80-120			
PCB 28	39				ng/mL	40.00		97.9	80-120			
PCB 44	21				ng/mL	20.00		106	80-120			
PCB 52	41				ng/mL	40.00		103	80-120			
PCB 66	33				ng/mL	40.00		82.6	80-120			
PCB 77	24				ng/mL	20.00		120	80-120			
PCB 8	42				ng/mL	40.00		106	80-120			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*19*				*ng/mL*	*20.00*		*95.8*	*80-120*			
Surrogate: PCB 198	*22*				*ng/mL*	*20.00*		*111*	*80-120*			
Batch B18J145 - EPA 3545												
Blank (B18J145-BLK1)						Prepared: 12-Oct-2018 Analyzed: 17-May-2019						
2,4,5,6 Tetrachloro-m-xylene [2C]	ND	0.047		0.133	ug/kg wet	4.000						U
PCB 101	ND	0.044	0.110	0.339	ug/kg wet							U
PCB 105	ND	0.021	0.110	0.339	ug/kg wet							U
PCB 118	ND	0.030	0.110	0.339	ug/kg wet							U
PCB 126	ND	0.041	0.110	0.339	ug/kg wet							U
PCB 128	ND	0.030	0.110	0.339	ug/kg wet							U
PCB 138	ND	0.019	0.110	0.339	ug/kg wet							U
PCB 153	ND	0.051	0.110	0.339	ug/kg wet							U
PCB 169	ND	0.024	0.110	0.339	ug/kg wet							U
PCB 170	ND	0.020	0.110	0.339	ug/kg wet							U
PCB 18	ND	0.042	0.110	0.339	ug/kg wet							U
PCB 180	ND	0.037	0.110	0.339	ug/kg wet							U
PCB 187	ND	0.019	0.110	0.339	ug/kg wet							U
PCB 28	ND	0.041	0.110	0.339	ug/kg wet							U
PCB 44	ND	0.049	0.110	0.339	ug/kg wet							U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Blank (B18J145-BLK1)						Prepared: 12-Oct-2018 Analyzed: 19-Nov-2018						
PCB 52	ND	0.045	0.110	0.339	ug/kg wet							U
PCB 66	ND	0.051	0.110	0.339	ug/kg wet							U
PCB 77	ND	0.047	0.110	0.339	ug/kg wet							U
PCB 8	ND	0.040	0.110	0.339	ug/kg wet							U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*2.1*				*ug/kg wet*	*4.000*		*52.5*	*30-150*			
Surrogate: PCB 198	*2.2*				*ug/kg wet*	*4.000*		*55.0*	*30-135*			
LCS (B18J145-BS3)						Prepared: 12-Oct-2018 Analyzed: 19-Nov-2018						
PCB 101	4.9	0.044	0.110	0.339	ug/kg wet	5.333		91.4	50-150			
PCB 105	1.7	0.021	0.110	0.339	ug/kg wet	2.667		65.0	50-150			
PCB 118	1.7	0.030	0.110	0.339	ug/kg wet	2.667		64.1	50-150			
PCB 126	3.4	0.041	0.110	0.339	ug/kg wet	5.333		64.5	50-150			
PCB 128	1.8	0.030	0.110	0.339	ug/kg wet	2.667		67.2	50-150			
PCB 138	5.1	0.019	0.110	0.339	ug/kg wet	8.000		63.6	50-150			
PCB 153	2.0	0.051	0.110	0.339	ug/kg wet	2.667		76.2	50-150			
PCB 169	1.9	0.024	0.110	0.339	ug/kg wet	2.667		71.8	50-150			
PCB 170	1.9	0.020	0.110	0.339	ug/kg wet	2.667		69.8	50-150			
PCB 18	1.9	0.042	0.110	0.339	ug/kg wet	2.667		70.2	50-150			
PCB 180	1.8	0.037	0.110	0.339	ug/kg wet	2.667		68.1	50-150			
PCB 187	1.7	0.019	0.110	0.339	ug/kg wet	2.667		65.2	50-150			
PCB 28	3.1	0.041	0.110	0.339	ug/kg wet	5.333		57.4	50-150			
PCB 44	1.8	0.049	0.110	0.339	ug/kg wet	2.667		67.5	50-150			
PCB 52	3.0	0.045	0.110	0.339	ug/kg wet	2.667		114	50-150			
PCB 66	1.6	0.051	0.110	0.339	ug/kg wet	2.667		58.4	50-150			
PCB 77	2.0	0.047	0.110	0.339	ug/kg wet	2.667		73.8	50-150			
PCB 8	2.5	0.040	0.110	0.339	ug/kg wet	5.333		47.6	50-150			Qa
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.56*				*ug/kg wet*	*4.000*		*14.0*	*30-150*			*S-GC*
Surrogate: PCB 198	*2.7*				*ug/kg wet*	*4.000*		*67.9*	*30-150*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
LCS Dup (B18J145-BSD3)						Prepared: 12-Oct-2018 Analyzed: 19-Nov-2018						
PCB 101	4.6	0.044	0.110	0.339	ug/kg wet	5.333		85.7	50-150	6.44	30	
PCB 105	1.7	0.021	0.110	0.339	ug/kg wet	2.667		63.8	50-150	1.97	30	
PCB 118	1.8	0.030	0.110	0.339	ug/kg wet	2.667		65.9	50-150	2.79	30	
PCB 126	3.5	0.041	0.110	0.339	ug/kg wet	5.333		66.0	50-150	2.43	30	
PCB 128	1.8	0.030	0.110	0.339	ug/kg wet	2.667		68.1	50-150	1.41	30	
PCB 138	4.8	0.019	0.110	0.339	ug/kg wet	8.000		60.6	50-150	4.75	30	
PCB 153	1.9	0.051	0.110	0.339	ug/kg wet	2.667		71.8	50-150	6.01	30	
PCB 169	1.8	0.024	0.110	0.339	ug/kg wet	2.667		68.5	50-150	4.68	30	
PCB 170	1.7	0.020	0.110	0.339	ug/kg wet	2.667		64.8	50-150	7.55	30	
PCB 18	1.9	0.042	0.110	0.339	ug/kg wet	2.667		71.3	50-150	1.60	30	
PCB 180	1.6	0.037	0.110	0.339	ug/kg wet	2.667		58.7	50-150	14.8	30	
PCB 187	1.7	0.019	0.110	0.339	ug/kg wet	2.667		64.8	50-150	0.596	30	
PCB 28	2.9	0.041	0.110	0.339	ug/kg wet	5.333		54.1	50-150	5.84	30	
PCB 44	1.7	0.049	0.110	0.339	ug/kg wet	2.667		62.2	50-150	8.12	30	
PCB 52	2.8	0.045	0.110	0.339	ug/kg wet	2.667		103	50-150	9.82	30	
PCB 66	1.5	0.051	0.110	0.339	ug/kg wet	2.667		57.9	50-150	0.765	30	
PCB 77	1.9	0.047	0.110	0.339	ug/kg wet	2.667		70.6	50-150	4.43	30	
PCB 8	3.0	0.040	0.110	0.339	ug/kg wet	5.333		56.5	50-150	17.1	30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.40*				*ug/kg wet*	*4.000*		*9.99*	*30-150*			*S-GC*
Surrogate: PCB 198	*2.3*				*ug/kg wet*	*4.000*		*58.1*	*30-150*			
Duplicate (B18J145-DUP1)						**Source: 18J0402-02** Prepared: 12-Oct-2018 Analyzed: 17-May-2019						
2,4,5,6 Tetrachloro-m-xylene [2C]	ND	0.041		0.118	ug/kg dry	3.540	ND				200	U
PCB 101	6.7	0.039	0.097	0.300	ug/kg dry		5.1			27.4	30	
PCB 105	2.0	0.019	0.097	0.300	ug/kg dry		1.7			16.8	30	
PCB 118	3.4	0.027	0.097	0.300	ug/kg dry		2.8			18.9	30	
PCB 126	ND	0.037	0.097	0.300	ug/kg dry		ND				30	U
PCB 128	ND	0.027	0.097	0.300	ug/kg dry		ND				30	U
PCB 138	3.4	0.017	0.097	0.300	ug/kg dry		4.5			28.3	30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Duplicate (B18J145-DUP1)		**Source: 18J0402-02**			Prepared: 12-Oct-2018 Analyzed: 19-Nov-2018							
PCB 153	4.4	0.045	0.097	0.300	ug/kg dry		4.8			9.51	30	
PCB 169	ND	0.021	0.097	0.300	ug/kg dry		ND				30	U
PCB 170	1.7	0.018	0.097	0.300	ug/kg dry		1.4			23.2	30	
PCB 18	5.8	0.037	0.097	0.300	ug/kg dry		5.5			5.65	30	
PCB 180	1.3	0.033	0.097	0.300	ug/kg dry		1.5			15.8	30	
PCB 187	1.1	0.016	0.097	0.300	ug/kg dry		0.99			14.3	30	
PCB 28	4.6	0.036	0.097	0.300	ug/kg dry		2.7			52.2	30	RPD-06
PCB 44	6.3	0.043	0.097	0.300	ug/kg dry		5.1			21.2	30	
PCB 52	8.0	0.040	0.097	0.300	ug/kg dry		6.5			21.3	30	
PCB 66	6.2	0.045	0.097	0.300	ug/kg dry		4.8			25.3	30	
PCB 77	1.0	0.042	0.097	0.300	ug/kg dry		0.99			4.01	30	
PCB 8	6.5	0.035	0.097	0.300	ug/kg dry		ND				30	
PCB 8 [2C]	ND	0.041		0.118	ug/kg dry		ND				200	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*2.5*				*ug/kg dry*	*3.540*		*70.5*	*30-150*			
Surrogate: PCB 198	*2.8*				*ug/kg dry*	*3.540*		*78.4*	*30-135*			
Matrix Spike (B18J145-MS3)		**Source: 18J0402-02**			Prepared: 12-Oct-2018 Analyzed: 19-Nov-2018							
PCB 101	9.3	0.050	0.125	0.386	ug/kg dry	6.080	5.1	69.6	50-150			
PCB 105	3.4	0.024	0.125	0.386	ug/kg dry	3.040	1.7	56.7	50-150			
PCB 118	4.5	0.035	0.125	0.386	ug/kg dry	3.040	2.8	53.7	50-150			
PCB 126	7.2	0.047	0.125	0.386	ug/kg dry	6.080	ND	119	50-150			
PCB 128	3.6	0.035	0.125	0.386	ug/kg dry	3.040	ND	118	50-150			
PCB 138	9.5	0.022	0.125	0.386	ug/kg dry	9.120	4.5	54.4	50-150			
PCB 153	6.9	0.058	0.125	0.386	ug/kg dry	3.040	4.8	70.3	50-150			
PCB 169	4.0	0.027	0.125	0.386	ug/kg dry	3.040	ND	131	50-150			
PCB 170	3.7	0.023	0.125	0.386	ug/kg dry	3.040	1.4	76.1	50-150			
PCB 18	2.8	0.048	0.125	0.386	ug/kg dry	3.040	5.5	NR	50-150			Z-03
PCB 180	3.2	0.042	0.125	0.386	ug/kg dry	3.040	1.5	58.3	50-150			
PCB 187	3.3	0.021	0.125	0.386	ug/kg dry	3.040	0.99	76.4	50-150			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Matrix Spike (B18J145-MS3)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 19-Nov-2018						
PCB 28	5.6	0.046	0.125	0.386	ug/kg dry	6.080	2.7	47.7	50-150			QM-07
PCB 44	3.4	0.056	0.125	0.386	ug/kg dry	3.040	5.1	NR	50-150			Z-03
PCB 52	5.6	0.051	0.125	0.386	ug/kg dry	3.040	6.5	NR	50-150			Z-03
PCB 66	7.0	0.058	0.125	0.386	ug/kg dry	3.040	4.8	71.8	50-150			
PCB 77	3.6	0.054	0.125	0.386	ug/kg dry	3.040	0.99	87.4	50-150			
PCB 8	4.6	0.045	0.125	0.386	ug/kg dry	6.080	ND	76.4	50-150			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*3.0*				*ug/kg dry*	*4.560*		*66.2*	*30-150*			
Surrogate: PCB 198	*4.5*				*ug/kg dry*	*4.560*		*98.1*	*30-150*			
Matrix Spike Dup (B18J145-MSD3)		**Source: 18J0402-02**				Prepared: 12-Oct-2018 Analyzed: 19-Nov-2018						
PCB 101	11	0.050	0.125	0.384	ug/kg dry	6.044	5.1	100	50-150	18.0	30	
PCB 105	3.8	0.024	0.125	0.384	ug/kg dry	3.022	1.7	67.8	50-150	9.00	30	
PCB 118	4.6	0.035	0.125	0.384	ug/kg dry	3.022	2.8	58.9	50-150	3.23	30	
PCB 126	7.6	0.047	0.125	0.384	ug/kg dry	6.044	ND	125	50-150	4.76	30	
PCB 128	4.0	0.035	0.125	0.384	ug/kg dry	3.022	ND	131	50-150	10.1	30	
PCB 138	12	0.022	0.125	0.384	ug/kg dry	9.067	4.5	83.0	50-150	23.8	30	
PCB 153	7.1	0.058	0.125	0.384	ug/kg dry	3.022	4.8	77.0	50-150	2.72	30	
PCB 169	4.4	0.027	0.125	0.384	ug/kg dry	3.022	ND	146	50-150	10.2	30	
PCB 170	4.1	0.023	0.125	0.384	ug/kg dry	3.022	1.4	90.5	50-150	10.8	30	
PCB 18	2.9	0.048	0.125	0.384	ug/kg dry	3.022	5.5	NR	50-150	5.36	30	Z-03
PCB 180	3.9	0.042	0.125	0.384	ug/kg dry	3.022	1.5	80.5	50-150	18.5	30	
PCB 187	3.9	0.021	0.125	0.384	ug/kg dry	3.022	0.99	95.6	50-150	15.8	30	
PCB 28	7.0	0.046	0.125	0.384	ug/kg dry	6.044	2.7	71.3	50-150	22.2	30	
PCB 44	3.3	0.056	0.125	0.384	ug/kg dry	3.022	5.1	NR	50-150	2.88	30	Z-03
PCB 52	6.3	0.051	0.125	0.384	ug/kg dry	3.022	6.5	NR	50-150	12.4	30	Z-03
PCB 66	7.8	0.058	0.125	0.384	ug/kg dry	3.022	4.8	99.4	50-150	11.1	30	
PCB 77	3.9	0.054	0.125	0.384	ug/kg dry	3.022	0.99	96.8	50-150	7.04	30	
PCB 8	5.1	0.045	0.125	0.384	ug/kg dry	6.044	ND	84.6	50-150	9.58	30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*1.8*				*ug/kg dry*	*4.533*		*40.2*	*30-150*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J145 - EPA 3545												
Matrix Spike Dup (B18J145-MSD3)		**Source: 18J0402-02**			Prepared: 12-Oct-2018 Analyzed: 19-Nov-2018							
Surrogate: PCB 198	*4.0*				*ug/kg dry*	*4.533*		*88.9*	*30-150*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

AVS and SEM Metals by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J125 - Default Prep Metals												
Blank (B18J125-BLK1)						Prepared: 15-Oct-2018 Analyzed: 14-Nov-2018						
Acid Volatile Sulfide	ND	0.0500	0.0500	0.100	mg/kg							U
LCS (B18J125-BS1)						Prepared: 15-Oct-2018 Analyzed: 14-Nov-2018						
Acid Volatile Sulfide	0.484	0.0500	0.0500	0.100	mg/kg	0.5000		96.8	80-120			
Calibration Check (B18J125-CCV1)						Prepared: 15-Oct-2018 Analyzed: 14-Nov-2018						
Acid Volatile Sulfide	0.547	0.0500	0.0500	0.100	mg/kg	0.5000		109	90-110			
Calibration Check (B18J125-CCV2)						Prepared: 15-Oct-2018 Analyzed: 14-Nov-2018						
Acid Volatile Sulfide	0.495	0.0500	0.0500	0.100	mg/kg	0.5000		99.0	90-110			
Calibration Check (B18J125-CCV3)						Prepared: 15-Oct-2018 Analyzed: 14-Nov-2018						
Acid Volatile Sulfide	0.529	0.0500	0.0500	0.100	mg/kg	0.5000		106	90-110			
Calibration Check (B18J125-CCV4)						Prepared: 15-Oct-2018 Analyzed: 14-Nov-2018						
Acid Volatile Sulfide	0.535	0.0500	0.0500	0.100	mg/kg	0.5000		107	90-110			
Duplicate (B18J125-DUP1)			**Source: 18J0402-02**			Prepared: 15-Oct-2018 Analyzed: 14-Nov-2018						
Acid Volatile Sulfide	600	5.00	5.00	10.0	mg/kg		567			5.66	30	
Matrix Spike (B18J125-MS1)			**Source: 18J0402-02**			Prepared: 15-Oct-2018 Analyzed: 14-Nov-2018						
Acid Volatile Sulfide	704	5.00	5.00	10.0	mg/kg	119.7	567	114	70-130			
Matrix Spike Dup (B18J125-MSD1)			**Source: 18J0402-02**			Prepared: 15-Oct-2018 Analyzed: 14-Nov-2018						
Acid Volatile Sulfide	730	5.00	5.00	10.0	mg/kg	120.1	567	136	70-130	3.72	30	QM-11

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5825722 - NA												
Blank (5825722-BLK)					Prepared: 22-Oct-2018 Analyzed: 07-Nov-2018							
1,2,3,4,6,7,8-Hepta CDD	ND	0.16		4.99	pg/g				-			Uc
1,2,3,4,6,7,8-Hepta CDF	ND	0.186		4.99	pg/g				-			Uc
1,2,3,4,7,8,9-Hepta CDF	ND	0.185		4.99	pg/g				-			Uc
1,2,3,4,7,8-Hexa CDD	ND	0.182		4.99	pg/g				-			Uc
1,2,3,4,7,8-Hexa CDF	ND	0.165		4.99	pg/g				-			Uc
1,2,3,6,7,8-Hexa CDD	ND	0.186		4.99	pg/g				-			Uc
1,2,3,6,7,8-Hexa CDF	ND	0.177		4.99	pg/g				-			Uc
1,2,3,7,8,9-Hexa CDD	ND	0.187		4.99	pg/g				-			Uc
1,2,3,7,8,9-Hexa CDF	ND	0.171		4.99	pg/g				-			Uc
1,2,3,7,8-Penta CDD	ND	0.12		4.99	pg/g				-			Uc
1,2,3,7,8-Penta CDF	ND	0.146		4.99	pg/g				-			Uc
2,3,4,6,7,8-Hexa CDF	ND	0.159		4.99	pg/g				-			Uc
2,3,4,7,8-Penta CDF	ND	0.133		4.99	pg/g				-			Uc
2,3,7,8-Tetra CDD	ND	0.108		0.999	pg/g				-			Uc
2,3,7,8-Tetra CDF	ND	0.098		0.999	pg/g				-			Uc
Octa CDD	ND	0.222		9.99	pg/g				-			Uc
Octa CDF	ND	0.18		9.99	pg/g				-			Uc
Total Hepta CDD	ND	0.16		4.99	pg/g				-			Uc
Total Hepta CDF	ND	0.185		4.99	pg/g				-			Uc
Total Hexa CDD	ND	0.187		4.99	pg/g				-			Uc
Total Hexa CDF	ND	0.168		4.99	pg/g				-			Uc
Total Penta CDD	ND	0.12		4.99	pg/g				-			Uc
Total Penta CDF	ND	0.139		4.99	pg/g				-			Uc
Total Tetra CDD	ND	0.108		0.999	pg/g				-			Uc
Total Tetra CDF	ND	0.098		0.999	pg/g				-			
Surrogate: 37CL4 2378 Tetra CDD	*12.4*				*pg/g*	*20*		*62*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*51*				*pg/g*	*100*		*51*	*23-140*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5825722 - NA												
Blank (5825722-BLK)						Prepared: 22-Oct-2018 Analyzed: 07-Nov-2018						
Surrogate: C13-1234678 HeptaCDF	*55*				*pg/g*	*100*		*55*	*28-143*			
Surrogate: C13-123478 HexaCDD	*53*				*pg/g*	*100*		*53*	*32-141*			
Surrogate: C13-123478 HexaCDF	*58*				*pg/g*	*100*		*58*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*51*				*pg/g*	*100*		*51*	*26-138*			
Surrogate: C13-123678 HexaCDD	*71*				*pg/g*	*100*		*71*	*28-130*			
Surrogate: C13-123678 HexaCDF	*62*				*pg/g*	*100*		*62*	*26-123*			
Surrogate: C13-12378 PentaCDD	*66*				*pg/g*	*100*		*66*	*25-181*			
Surrogate: C13-12378 PentaCDF	*61*				*pg/g*	*100*		*61*	*24-185*			
Surrogate: C13-123789 HexaCDF	*56*				*pg/g*	*100*		*56*	*29-147*			
Surrogate: C13-234678 HexaCDF	*57*				*pg/g*	*100*		*57*	*28-136*			
Surrogate: C13-23478 PentaCDF	*67*				*pg/g*	*100*		*67*	*21-178*			
Surrogate: C13-2378 TetraCDD	*12.4*				*pg/g*	*20*		*62*	*25-164*			
Surrogate: C13-2378 TetraCDF	*11*				*pg/g*	*20*		*55*	*24-169*			
Surrogate: C13-OCDD	*110*				*pg/g*	*200*		*55*	*17-157*			
LCS (5825722-LCS)						Prepared: 22-Oct-2018 Analyzed: 09-Nov-2018						
1,2,3,4,6,7,8-Hepta CDD	95	0.148		4.99	pg/g	100		95	70-140			
1,2,3,4,6,7,8-Hepta CDF	89	0.129		4.99	pg/g	100		89	82-122			
1,2,3,4,7,8,9-Hepta CDF	93	0.128		4.99	pg/g	100		93	78-138			
1,2,3,4,7,8-Hexa CDD	87	0.145		4.99	pg/g	100		87	70-164			
1,2,3,4,7,8-Hexa CDF	93	0.142		4.99	pg/g	100		93	72-134			
1,2,3,6,7,8-Hexa CDD	93	0.148		4.99	pg/g	100		93	76-134			
1,2,3,6,7,8-Hexa CDF	94	0.153		4.99	pg/g	100		94	84-130			
1,2,3,7,8,9-Hexa CDD	94	0.149		4.99	pg/g	100		94	64-162			
1,2,3,7,8,9-Hexa CDF	96	0.148		4.99	pg/g	100		96	78-130			
1,2,3,7,8-Penta CDD	93	0.109		4.99	pg/g	100		93	25-181			

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5825722 - NA												
LCS (5825722-LCS)						Prepared: 22-Oct-2018 Analyzed: 09-Nov-2018						
1,2,3,7,8-Penta CDF	95	0.113		4.99	pg/g	100		95	80-134			
2,3,4,6,7,8-Hexa CDF	94	0.138		4.99	pg/g	100		94	70-156			
2,3,4,7,8-Penta CDF	92	0.103		4.99	pg/g	100		92	68-160			
2,3,7,8-Tetra CDD	84	0.134		0.998	pg/g	100		84	67-158			
2,3,7,8-Tetra CDF	95	0.101		0.998	pg/g	100		95	75-158			
Octa CDD	143	0.138		9.98	pg/g	100		143	78-144			
Octa CDF	82	0.112		9.98	pg/g	100		82	63-170			
Surrogate: 37CL4 2378 Tetra CDD	*17.8*				*pg/g*	*20*		*89*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*77*				*pg/g*	*100*		*77*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*75*				*pg/g*	*100*		*75*	*28-143*			
Surrogate: C13-123478 HexaCDD	*88*				*pg/g*	*100*		*88*	*32-141*			
Surrogate: C13-123478 HexaCDF	*82*				*pg/g*	*100*		*82*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*75*				*pg/g*	*100*		*75*	*26-138*			
Surrogate: C13-123678 HexaCDD	*110*				*pg/g*	*100*		*110*	*28-130*			
Surrogate: C13-123678 HexaCDF	*85*				*pg/g*	*100*		*85*	*26-123*			
Surrogate: C13-12378 PentaCDD	*114*				*pg/g*	*100*		*114*	*25-181*			
Surrogate: C13-12378 PentaCDF	*97*				*pg/g*	*100*		*97*	*24-185*			
Surrogate: C13-123789 HexaCDF	*86*				*pg/g*	*100*		*86*	*29-147*			
Surrogate: C13-234678 HexaCDF	*87*				*pg/g*	*100*		*87*	*28-136*			
Surrogate: C13-23478 PentaCDF	*109*				*pg/g*	*100*		*109*	*21-178*			
Surrogate: C13-2378 TetraCDD	*20.6*				*pg/g*	*20*		*103*	*25-164*			
Surrogate: C13-2378 TetraCDF	*17.6*				*pg/g*	*20*		*88*	*24-169*			
Surrogate: C13-OCDD	*146*				*pg/g*	*200*		*73*	*17-157*			
Matrix Spike (5825722-MS)			**Source: 18J0402-02**			Prepared: 22-Oct-2018 Analyzed: 08-Nov-2018						
1,2,3,4,6,7,8-Hepta CDD	157	0.129		4.99	pg/g	100	61.1	96	70-140			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5825722 - NA												
Matrix Spike (5825722-MS)		**Source: 18J0402-02**				Prepared: 22-Oct-2018 Analyzed: 08-Nov-2018						
1,2,3,4,6,7,8-Hepta CDF	107	0.122		4.99	pg/g	100	18.4	89	82-122			
1,2,3,4,7,8,9-Hepta CDF	95.3	0.122		4.99	pg/g	100	2.27	93	78-138			
1,2,3,4,7,8-Hexa CDD	89.5	0.11		4.99	pg/g	100	0.497	89	70-164			
1,2,3,4,7,8-Hexa CDF	96.2	0.125		4.99	pg/g	100	6.21	90	72-134			
1,2,3,6,7,8-Hexa CDD	88.4	0.112		4.99	pg/g	100	2.42	86	76-134			
1,2,3,6,7,8-Hexa CDF	92.7	0.134		4.99	pg/g	100	1.66	91	84-130			
1,2,3,7,8,9-Hexa CDD	94.9	0.113		4.99	pg/g	100	1.94	93	64-162			
1,2,3,7,8,9-Hexa CDF	94.1	0.13		4.99	pg/g	100	0.113	94	78-130			
1,2,3,7,8-Penta CDD	91.6	0.127		4.99	pg/g	100	1.6	90	25-181			
1,2,3,7,8-Penta CDF	95.4	0.146		4.99	pg/g	100	4.37	91	80-134			
2,3,4,6,7,8-Hexa CDF	91.6	0.121		4.99	pg/g	100	0.624	91	70-156			
2,3,4,7,8-Penta CDF	93.8	0.133		4.99	pg/g	100	3.82	90	68-160			
2,3,7,8-Tetra CDD	187	0.142		0.999	pg/g	100	130	57	67-158			A0145, A1
2,3,7,8-Tetra CDF	313	0.104		0.999	pg/g	100	306	7.0	75-158			A0145, A1
Octa CDD	1080	0.129		9.99	pg/g	100	1020	59	78-144			A0145, A1
Octa CDF	836	0.105		9.99	pg/g	100	769	67	63-170			
Surrogate: 37CL4 2378 Tetra CDD	*19.8*				*pg/g*	*20*		*99*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*72*				*pg/g*	*100*		*72*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*71*				*pg/g*	*100*		*71*	*28-143*			
Surrogate: C13-123478 HexaCDD	*82*				*pg/g*	*100*		*82*	*32-141*			
Surrogate: C13-123478 HexaCDF	*79*				*pg/g*	*100*		*79*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*67*				*pg/g*	*100*		*67*	*26-138*			
Surrogate: C13-123678 HexaCDD	*95*				*pg/g*	*100*		*95*	*28-130*			
Surrogate: C13-123678 HexaCDF	*77*				*pg/g*	*100*		*77*	*26-123*			
Surrogate: C13-12378 PentaCDD	*89*				*pg/g*	*100*		*89*	*25-181*			
Surrogate: C13-12378 PentaCDF	*72*				*pg/g*	*100*		*72*	*24-185*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5825722 - NA												
Matrix Spike (5825722-MS)		**Source: 18J0402-02**				Prepared: 22-Oct-2018 Analyzed: 08-Nov-2018						
Surrogate: C13-123789 HexaCDF	*77*				*pg/g*	*100*		*77*	*29-147*			
Surrogate: C13-234678 HexaCDF	*76*				*pg/g*	*100*		*76*	*28-136*			
Surrogate: C13-23478 PentaCDF	*78*				*pg/g*	*100*		*78*	*21-178*			
Surrogate: C13-2378 TetraCDD	*19.2*				*pg/g*	*20*		*96*	*25-164*			
Surrogate: C13-2378 TetraCDF	*15.4*				*pg/g*	*20*		*77*	*24-169*			
Surrogate: C13-OCDD	*168*				*pg/g*	*200*		*84*	*17-157*			
Matrix Spike Dup (5825722-MS Dup)		**Source: 18J0402-02**				Prepared: 22-Oct-2018 Analyzed: 09-Nov-2018						
1,2,3,4,6,7,8-Hepta CDD	161	0.102		5	pg/g	100	61.1	100	70-140	4.1	25	
1,2,3,4,6,7,8-Hepta CDF	112	0.13		5	pg/g	100	18.4	94	82-122	5.5	25	
1,2,3,4,7,8,9-Hepta CDF	99.3	0.13		5	pg/g	100	2.27	97	78-138	4.2	25	
1,2,3,4,7,8-Hexa CDD	88.5	0.136		5	pg/g	100	0.497	88	70-164	1.1	25	
1,2,3,4,7,8-Hexa CDF	100	0.132		5	pg/g	100	6.21	94	72-134	4.3	25	
1,2,3,6,7,8-Hexa CDD	96.4	0.138		5	pg/g	100	2.42	94	76-134	8.9	25	
1,2,3,6,7,8-Hexa CDF	98.7	0.142		5	pg/g	100	1.66	97	84-130	6.4	25	
1,2,3,7,8,9-Hexa CDD	94.9	0.139		5	pg/g	100	1.94	93	64-162	0	25	
1,2,3,7,8,9-Hexa CDF	98.1	0.137		5	pg/g	100	0.113	98	78-130	4.2	25	
1,2,3,7,8-Penta CDD	95.6	0.101		5	pg/g	100	1.6	94	25-181	4.3	25	
1,2,3,7,8-Penta CDF	96.4	0.116		5	pg/g	100	4.37	92	80-134	1.1	25	
2,3,4,6,7,8-Hexa CDF	96.6	0.128		5	pg/g	100	0.624	96	70-156	5.3	25	
2,3,4,7,8-Penta CDF	94.8	0.106		5	pg/g	100	3.82	91	68-160	1.1	25	
2,3,7,8-Tetra CDD	225	0.126		1	pg/g	100	130	95	67-158	50	25	
2,3,7,8-Tetra CDF	493	0.109		1	pg/g	100	306	187	75-158	186	25	A0145, A1
Octa CDD	1170	0.149		10	pg/g	100	1020	153	78-144	89	25	A0145, A1
Octa CDF	884	0.121		10	pg/g	100	769	115	63-170	53	25	
Surrogate: 37CL4 2378 Tetra CDD	*20.4*				*pg/g*	*20*		*102*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*74*				*pg/g*	*100*		*74*	*23-140*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5825722 - NA												
Matrix Spike Dup (5825722-MS Dup)			**Source: 18J0402-02**			Prepared: 22-Oct-2018 Analyzed: 09-Nov-2018						
Surrogate: C13-1234678 HeptaCDF	*70*				*pg/g*	*100*		*70*	*28-143*			
Surrogate: C13-123478 HexaCDD	*88*				*pg/g*	*100*		*88*	*32-141*			
Surrogate: C13-123478 HexaCDF	*85*				*pg/g*	*100*		*85*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*73*				*pg/g*	*100*		*73*	*26-138*			
Surrogate: C13-123678 HexaCDD	*98*				*pg/g*	*100*		*98*	*28-130*			
Surrogate: C13-123678 HexaCDF	*83*				*pg/g*	*100*		*83*	*26-123*			
Surrogate: C13-12378 PentaCDD	*94*				*pg/g*	*100*		*94*	*25-181*			
Surrogate: C13-12378 PentaCDF	*75*				*pg/g*	*100*		*75*	*24-185*			
Surrogate: C13-123789 HexaCDF	*81*				*pg/g*	*100*		*81*	*29-147*			
Surrogate: C13-234678 HexaCDF	*80*				*pg/g*	*100*		*80*	*28-136*			
Surrogate: C13-23478 PentaCDF	*85*				*pg/g*	*100*		*85*	*21-178*			
Surrogate: C13-2378 TetraCDD	*19*				*pg/g*	*20*		*95*	*25-164*			
Surrogate: C13-2378 TetraCDF	*16.8*				*pg/g*	*20*		*84*	*24-169*			
Surrogate: C13-OCDD	*154*				*pg/g*	*200*		*77*	*17-157*			

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

EPA M8290A / M1613 - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5827904 - NA												
Blank (5827904-BLK)	Prepared: 22-Oct-2018 Analyzed: 08-Nov-2018											
2,3,7,8-Tetra CDF	ND	0.1		1	pg/g				-			Uc
Surrogate: C13-2378 TetraCDF	*50*				*pg/g*	*100*		*50*	*40-135*			
Batch 5833197 - NA												
Blank (5833197-BLK)	Prepared: 22-Oct-2018 Analyzed: 09-Nov-2018											
2,3,7,8-Tetra CDF	ND	0.095		1	pg/g				-			Uc
Surrogate: C13-2378 TetraCDF	*72*				*pg/g*	*100*		*72*	*40-135*			
Batch 5837532 - NA												
Blank (5837532-BLK)	Prepared: 23-Oct-2018 Analyzed: 13-Nov-2018											
2,3,7,8-Tetra CDF	ND	0.12		1	pg/g				-			Uc
Surrogate: C13-2378 TetraCDF	*94*				*pg/g*	*100*		*94*	*40-135*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
Blank (BBJ0449-BLK1)					Prepared & Analyzed: 12-Oct-2018							
1,1,1-Trichloroethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
1,1,2,2-Tetrachloroethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
1,1,2-Trichloroethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
1,1-Dichloroethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
1,1-Dichloroethylene	ND	0.00500		0.00500	mg/kg dry				-			Ua
1,2,3-Trichlorobenzene	ND	0.00500		0.00500	mg/kg dry				-			Ua
1,2,4-Trichlorobenzene	ND	0.00040		0.00040	mg/kg dry				-			Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.00500		0.00500	mg/kg dry				-			Ua
1,2-Dibromoethane (EDB)	ND	0.00500		0.00500	mg/kg dry				-			Ua
1,2-Dichlorobenzene	ND	0.00040		0.00040	mg/kg dry				-			Ua
1,2-Dichloroethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
1,2-Dichloropropane	ND	0.00500		0.00500	mg/kg dry				-			Ua
1,3-Dichlorobenzene	ND	0.00040		0.00040	mg/kg dry				-			Ua
1,4-Dichlorobenzene	ND	0.00040		0.00040	mg/kg dry				-			Ua
1,4-Dioxane	ND	0.0400		0.0800	mg/kg dry				-			Ua
2-Butanone (MEK)	ND	0.00500		0.00500	mg/kg dry				-			Ua
2-Hexanone (MBK)	ND	0.00500		0.00500	mg/kg dry				-			Ua

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
Blank (BBJ0449-BLK1)					Prepared & Analyzed: 12-Oct-2018							
4-Methyl-2-pentanone (MIBK)	ND	0.00500		0.00500	mg/kg dry				-			Ua
Acetone	ND	0.0100		0.0100	mg/kg dry				-			Ua
Benzene	ND	0.00040		0.00040	mg/kg dry				-			Ua
Bromodichloromethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
Bromoform	ND	0.00500		0.00500	mg/kg dry				-			Ua
Bromomethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
Carbon disulfide	ND	0.00500		0.00500	mg/kg dry				-			Ua
Carbon tetrachloride	ND	0.00500		0.00500	mg/kg dry				-			Ua
Chlorobenzene	ND	0.00500		0.00500	mg/kg dry				-			Ua
Chloroethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
Chloroform	ND	0.00040		0.00040	mg/kg dry				-			Ua
Chloromethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
cis-1,2-Dichloroethylene	ND	0.00500		0.00500	mg/kg dry				-			Ua
cis-1,3-Dichloropropene	ND	0.00500		0.00500	mg/kg dry				-			Ua
Cyclohexane	ND	0.00500		0.00500	mg/kg dry				-			Ua
Dibromochloromethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
Dichlorodifluoromethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
Ethylbenzene	ND	0.00040		0.00040	mg/kg dry				-			Ua

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
Blank (BBJ0449-BLK1)					Prepared & Analyzed: 12-Oct-2018							
Isopropylbenzene	ND	0.00500		0.00500	mg/kg dry				-			Ua
m+p-Xylenes	ND	0.00500		0.00500	mg/kg dry				-			Ua
Methyl acetate	ND	0.00500		0.00500	mg/kg dry				-			Ua
Methyl cyclohexane	ND	0.00500		0.00500	mg/kg dry				-			Ua
Methylene chloride	ND	0.00500		0.00500	mg/kg dry				-			Ua
Methyl-t-butyl ether (MTBE)	ND	0.00500		0.00500	mg/kg dry				-			Ua
o-Xylene	ND	0.00500		0.00500	mg/kg dry				-			Ua
Styrene	ND	0.00500		0.00500	mg/kg dry				-			Ua
Tetrachloroethylene (PCE)	ND	0.00040		0.00040	mg/kg dry				-			Ua
Toluene	ND	0.00040		0.00040	mg/kg dry				-			Ua
trans-1,2-Dichloroethylene	ND	0.00500		0.00500	mg/kg dry				-			Ua
trans-1,3-Dichloropropene	ND	0.00500		0.00500	mg/kg dry				-			Ua
Trichloroethylene	ND	0.00500		0.00500	mg/kg dry				-			Ua
Trichlorofluoromethane	ND	0.00500		0.00500	mg/kg dry				-			Ua
Vinyl chloride	ND	0.00500		0.00500	mg/kg dry				-			Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*0.0532*				*mg/kg dry*	*0.0500*		*106*	*80-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*0.0462*				*mg/kg dry*	*0.0500*		*92.5*	*85-120*			
Surrogate: Dibromofluoromethane (Surr)	*0.0534*				*mg/kg dry*	*0.0500*		*107*	*80-119*			
Surrogate: Toluene-d8 (Surr)	*0.0504*				*mg/kg dry*	*0.0500*		*101*	*85-115*			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
LCS (BBJ0449-BS1)						Prepared & Analyzed: 12-Oct-2018						
1,1,1-Trichloroethane	51.1				mg/kg dry	50.0		102	70-135			
1,1,2,2-Tetrachloroethane	49.1				mg/kg dry	50.0		98.1	55-130			
1,1,2-Trichloroethane	49.6				mg/kg dry	50.0		99.2	60-125			
1,1-Dichloroethane	52.1				mg/kg dry	50.0		104	75-125			
1,1-Dichloroethylene	49.5				mg/kg dry	50.0		98.9	65-135			
1,2,3-Trichlorobenzene	48.2				mg/kg dry	50.0		96.3	60-135			
1,2,4-Trichlorobenzene	47.4				mg/kg dry	50.0		94.8	65-130			
1,2-Dibromo-3-chloropropane (DBCP)	45.8				mg/kg dry	50.0		91.6	40-135			
1,2-Dibromoethane (EDB)	51.5				mg/kg dry	50.0		103	70-125			
1,2-Dichlorobenzene	47.2				mg/kg dry	50.0		94.3	75-120			
1,2-Dichloroethane	51.3				mg/kg dry	50.0		103	70-135			
1,2-Dichloropropane	48.9				mg/kg dry	50.0		97.8	70-120			
1,3-Dichlorobenzene	50.4				mg/kg dry	50.0		101	70-125			
1,4-Dichlorobenzene	48.1				mg/kg dry	50.0		96.2	70-125			
2-Butanone (MEK)	26.0				mg/kg dry	50.0		52.0	30-160			
2-Hexanone (MBK)	48.3				mg/kg dry	50.0		96.7	45-145			
4-Methyl-2-pentanone (MIBK)	45.8				mg/kg dry	50.0		91.7	45-145			
Acetone	52.9				mg/kg dry	50.0		106	20-160			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
LCS (BBJ0449-BS1)						Prepared & Analyzed: 12-Oct-2018						
Benzene	49.2				mg/kg dry	50.0		98.4	75-125			
Bromodichloromethane	51.2				mg/kg dry	50.0		102	70-130			
Bromoform	53.3				mg/kg dry	50.0		107	55-135			
Bromomethane	41.6				mg/kg dry	50.0		83.1	30-160			
Carbon disulfide	51.5				mg/kg dry	50.0		103	45-160			
Carbon tetrachloride	50.8				mg/kg dry	50.0		102	65-135			
Chlorobenzene	50.5				mg/kg dry	50.0		101	75-125			
Chloroethane	49.3				mg/kg dry	50.0		98.6	40-155			
Chloroform	49.8				mg/kg dry	50.0		99.6	70-125			
Chloromethane	43.7				mg/kg dry	50.0		87.4	50-130			
cis-1,2-Dichloroethylene	51.5				mg/kg dry	50.0		103	65-125			
cis-1,3-Dichloropropene	47.9				mg/kg dry	50.0		95.7	70-125			
Dibromochloromethane	52.1				mg/kg dry	50.0		104	65-130			
Dichlorodifluoromethane	39.6				mg/kg dry	50.0		79.2	35-135			
Ethylbenzene	52.0				mg/kg dry	50.0		104	75-125			
Isopropylbenzene	55.1				mg/kg dry	50.0		110	75-130			
m+p-Xylenes	107				mg/kg dry	100		107	80-125			
Methylene chloride	44.0				mg/kg dry	50.0		87.9	55-140			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
LCS (BBJ0449-BS1)						Prepared & Analyzed: 12-Oct-2018						
Methyl-t-butyl ether (MTBE)	50.8				mg/kg dry	50.0		102	65-125			
o-Xylene	52.7				mg/kg dry	50.0		105	75-125			
Styrene	47.3				mg/kg dry	50.0		94.5	75-125			
Tetrachloroethylene (PCE)	69.0				mg/kg dry	50.0		138	65-140			
Toluene	48.3				mg/kg dry	50.0		96.6	70-125			
trans-1,2-Dichloroethylene	47.8				mg/kg dry	50.0		95.6	65-135			
trans-1,3-Dichloropropene	47.9				mg/kg dry	50.0		95.7	65-125			
Trichloroethylene	46.6				mg/kg dry	50.0		93.2	75-125			
Trichlorofluoromethane	43.4				mg/kg dry	50.0		86.8	25-185			
Vinyl chloride	43.9				mg/kg dry	50.0		87.8	60-130			
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*0.0526*				*mg/kg dry*	*0.0500*		*105*	*80-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*0.0540*				*mg/kg dry*	*0.0500*		*108*	*85-120*			
Surrogate: Dibromofluoromethane (Surr)	*0.0508*				*mg/kg dry*	*0.0500*		*102*	*80-119*			
Surrogate: Toluene-d8 (Surr)	*0.0498*				*mg/kg dry*	*0.0500*		*99.6*	*85-115*			
Matrix Spike (BBJ0449-MS1)						**Source: 18J0532-02RE1** Prepared & Analyzed: 12-Oct-2018						
1,1,1-Trichloroethane	47.3				mg/kg dry	50.0	0.00	94.6	70-135			
1,1,2,2-Tetrachloroethane	50.3				mg/kg dry	50.0	0.00	101	55-130			
1,1,2-Trichloroethane	51.8				mg/kg dry	50.0	0.00	104	60-125			
1,1-Dichloroethane	51.4				mg/kg dry	50.0	0.00	103	75-125			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
Matrix Spike (BBJ0449-MS1)		**Source: 18J0532-02RE1**			Prepared & Analyzed: 12-Oct-2018							
1,1-Dichloroethylene	48.8				mg/kg dry	50.0	0.00	97.5	65-135			
1,2,3-Trichlorobenzene	33.0				mg/kg dry	50.0	0.00	66.1	60-135			
1,2,4-Trichlorobenzene	30.6				mg/kg dry	50.0	0.00	61.3	65-130			M
1,2-Dibromo-3-chloropropane (DBCP)	50.9				mg/kg dry	50.0	0.00	102	40-135			
1,2-Dibromoethane (EDB)	50.9				mg/kg dry	50.0	0.00	102	70-125			
1,2-Dichlorobenzene	36.3				mg/kg dry	50.0	0.00	72.6	75-120			M
1,2-Dichloroethane	48.5				mg/kg dry	50.0	0.00	97.0	70-135			
1,2-Dichloropropane	49.3				mg/kg dry	50.0	0.00	98.5	70-120			
1,3-Dichlorobenzene	39.8				mg/kg dry	50.0	1.11	77.4	70-125			
1,4-Dichlorobenzene	36.9				mg/kg dry	50.0	0.00	73.9	70-125			
2-Butanone (MEK)	74.6				mg/kg dry	50.0	0.00	149	30-160			
2-Hexanone (MBK)	69.5				mg/kg dry	50.0	0.00	139	45-145			
4-Methyl-2-pentanone (MIBK)	62.9				mg/kg dry	50.0	0.00	126	45-145			
Acetone	103				mg/kg dry	50.0	11.1	183	20-160			M
Benzene	50.7				mg/kg dry	50.0	1.56	98.3	75-125			
Bromodichloromethane	46.6				mg/kg dry	50.0	0.00	93.2	70-130			
Bromoform	46.7				mg/kg dry	50.0	0.00	93.5	55-135			
Bromomethane	39.6				mg/kg dry	50.0	0.00	79.1	30-160			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
Matrix Spike (BBJ0449-MS1)		**Source: 18J0532-02RE1**			Prepared & Analyzed: 12-Oct-2018							
Carbon disulfide	47.3				mg/kg dry	50.0	0.00	94.6	45-160			
Carbon tetrachloride	42.7				mg/kg dry	50.0	0.00	85.3	65-135			
Chlorobenzene	46.9				mg/kg dry	50.0	1.36	91.0	75-125			
Chloroethane	51.4				mg/kg dry	50.0	0.00	103	40-155			
Chloroform	48.2				mg/kg dry	50.0	0.00	96.5	70-125			
Chloromethane	46.8				mg/kg dry	50.0	0.00	93.6	50-130			
cis-1,2-Dichloroethylene	49.8				mg/kg dry	50.0	0.00	99.5	65-125			
cis-1,3-Dichloropropene	43.3				mg/kg dry	50.0	0.00	86.5	70-125			
Dibromochloromethane	46.3				mg/kg dry	50.0	0.00	92.6	65-130			
Dichlorodifluoromethane	38.8				mg/kg dry	50.0	0.00	77.7	35-135			
Ethylbenzene	49.0				mg/kg dry	50.0	2.05	93.9	75-125			
Isopropylbenzene	44.9				mg/kg dry	50.0	0.21	89.4	75-130			
m+p-Xylenes	102				mg/kg dry	100	4.67	97.5	80-125			
Methylene chloride	43.8				mg/kg dry	50.0	0.00	87.6	55-140			
Methyl-t-butyl ether (MTBE)	54.6				mg/kg dry	50.0	0.00	109	65-125			
o-Xylene	50.5				mg/kg dry	50.0	2.41	96.2	75-125			
Styrene	39.7				mg/kg dry	50.0	0.00	79.3	75-125			
Tetrachloroethylene (PCE)	62.7				mg/kg dry	50.0	0.00	125	65-140			

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
Matrix Spike (BBJ0449-MS1)		**Source: 18J0532-02RE1**				Prepared & Analyzed: 12-Oct-2018						
Toluene	48.5				mg/kg dry	50.0	0.90	95.3	70-125			
trans-1,2-Dichloroethylene	46.9				mg/kg dry	50.0	0.00	93.8	65-135			
trans-1,3-Dichloropropene	43.3				mg/kg dry	50.0	0.00	86.5	65-125			
Trichloroethylene	45.8				mg/kg dry	50.0	0.00	91.7	75-125			
Trichlorofluoromethane	41.6				mg/kg dry	50.0	0.00	83.2	25-185			
Vinyl chloride	44.6				mg/kg dry	50.0	0.00	89.2	60-130			
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*0.363*				*mg/kg dry*	*0.357*		*102*	*80-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*0.365*				*mg/kg dry*	*0.357*		*102*	*85-120*			
Surrogate: Dibromofluoromethane (Surr)	*0.362*				*mg/kg dry*	*0.357*		*101*	*80-119*			
Surrogate: Toluene-d8 (Surr)	*0.356*				*mg/kg dry*	*0.357*		*99.8*	*85-115*			
Matrix Spike Dup (BBJ0449-MSD1)		**Source: 18J0532-02RE1**				Prepared & Analyzed: 12-Oct-2018						
1,1,1-Trichloroethane	46.5				mg/kg dry	50.0	0.00	93.1	70-135	1.62	30	
1,1,2,2-Tetrachloroethane	40.8				mg/kg dry	50.0	0.00	81.7	55-130	20.7	30	
1,1,2-Trichloroethane	47.2				mg/kg dry	50.0	0.00	94.4	60-125	9.39	30	
1,1-Dichloroethane	49.7				mg/kg dry	50.0	0.00	99.3	75-125	3.48	30	
1,1-Dichloroethylene	47.2				mg/kg dry	50.0	0.00	94.4	65-135	3.23	30	
1,2,3-Trichlorobenzene	28.5				mg/kg dry	50.0	0.00	57.0	60-135	14.8	30	M
1,2,4-Trichlorobenzene	27.5				mg/kg dry	50.0	0.00	55.0	65-130	10.8	30	M
1,2-Dibromo-3-chloropropane (DBCP)	37.1				mg/kg dry	50.0	0.00	74.1	40-135	31.5	30	P

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
Matrix Spike Dup (BBJ0449-MSD1)		**Source: 18J0532-02RE1**			Prepared & Analyzed: 12-Oct-2018							
1,2-Dibromoethane (EDB)	47.4				mg/kg dry	50.0	0.00	94.8	70-125	7.14	30	
1,2-Dichlorobenzene	35.2				mg/kg dry	50.0	0.00	70.4	75-120	3.08	30	M
1,2-Dichloroethane	45.9				mg/kg dry	50.0	0.00	91.7	70-135	5.62	30	
1,2-Dichloropropane	46.7				mg/kg dry	50.0	0.00	93.5	70-120	5.27	30	
1,3-Dichlorobenzene	39.5				mg/kg dry	50.0	1.14	76.7	70-125	0.857	30	
1,4-Dichlorobenzene	35.7				mg/kg dry	50.0	0.00	71.5	70-125	3.30	30	
2-Butanone (MEK)	46.9				mg/kg dry	50.0	0.00	93.8	30-160	45.6	30	P
2-Hexanone (MBK)	44.6				mg/kg dry	50.0	0.00	89.1	45-145	43.8	30	P
4-Methyl-2-pentanone (MIBK)	42.0				mg/kg dry	50.0	0.00	83.9	45-145	40.0	30	P
Acetone	67.5				mg/kg dry	50.0	11.5	112	20-160	41.3	30	P
Benzene	48.2				mg/kg dry	50.0	1.61	93.1	75-125	5.20	30	
Bromodichloromethane	45.4				mg/kg dry	50.0	0.00	90.7	70-130	2.70	30	
Bromoform	42.0				mg/kg dry	50.0	0.00	84.0	55-135	10.7	30	
Bromomethane	40.5				mg/kg dry	50.0	0.00	81.0	30-160	2.35	30	
Carbon disulfide	45.3				mg/kg dry	50.0	0.00	90.6	45-160	4.38	30	
Carbon tetrachloride	37.2				mg/kg dry	50.0	0.00	74.4	65-135	13.7	30	
Chlorobenzene	45.4				mg/kg dry	50.0	1.40	88.1	75-125	3.08	30	
Chloroethane	50.0				mg/kg dry	50.0	0.00	99.9	40-155	2.76	30	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
Matrix Spike Dup (BBJ0449-MSD1)		**Source: 18J0532-02RE1**			Prepared & Analyzed: 12-Oct-2018							
Chloroform	46.8				mg/kg dry	50.0	0.00	93.6	70-125	2.99	30	
Chloromethane	47.9				mg/kg dry	50.0	0.00	95.8	50-130	2.34	30	
cis-1,2-Dichloroethylene	50.0				mg/kg dry	50.0	0.00	100	65-125	0.581	30	
cis-1,3-Dichloropropene	39.4				mg/kg dry	50.0	0.00	78.9	70-125	9.29	30	
Dibromochloromethane	43.4				mg/kg dry	50.0	0.00	86.7	65-130	6.56	30	
Dichlorodifluoromethane	39.7				mg/kg dry	50.0	0.00	79.4	35-135	2.24	30	
Ethylbenzene	48.9				mg/kg dry	50.0	2.11	93.6	75-125	0.204	30	
Isopropylbenzene	40.8				mg/kg dry	50.0	0.22	81.2	75-130	9.54	30	
m+p-Xylenes	101				mg/kg dry	100	4.81	95.8	80-125	1.52	30	
Methylene chloride	42.9				mg/kg dry	50.0	0.00	85.8	55-140	2.12	30	
Methyl-t-butyl ether (MTBE)	49.2				mg/kg dry	50.0	0.00	98.3	65-125	10.4	30	
o-Xylene	50.1				mg/kg dry	50.0	2.48	95.2	75-125	0.875	30	
Styrene	37.5				mg/kg dry	50.0	0.00	75.0	75-125	5.57	30	
Tetrachloroethylene (PCE)	61.0				mg/kg dry	50.0	0.00	122	65-140	2.76	30	
Toluene	45.8				mg/kg dry	50.0	0.93	89.7	70-125	5.85	30	
trans-1,2-Dichloroethylene	45.1				mg/kg dry	50.0	0.00	90.3	65-135	3.85	30	
trans-1,3-Dichloropropene	39.4				mg/kg dry	50.0	0.00	78.9	65-125	9.29	30	
Trichloroethylene	45.5				mg/kg dry	50.0	0.00	91.1	75-125	0.657	30	

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ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0449 - SW5030B												
Matrix Spike Dup (BBJ0449-MSD1)			**Source: 18J0532-02RE1**			Prepared & Analyzed: 12-Oct-2018						
Trichlorofluoromethane	40.0				mg/kg dry	50.0	0.00	79.9	25-185	4.00	30	
Vinyl chloride	46.3				mg/kg dry	50.0	0.00	92.5	60-130	3.70	30	
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*0.337*				*mg/kg dry*	*0.346*		*97.2*	*80-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*0.362*				*mg/kg dry*	*0.346*		*105*	*85-120*			
Surrogate: Dibromofluoromethane (Surr)	*0.350*				*mg/kg dry*	*0.346*		*101*	*80-119*			
Surrogate: Toluene-d8 (Surr)	*0.343*				*mg/kg dry*	*0.346*		*98.9*	*85-115*			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Wet Chemistry Analysis - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0376 - No Prep Wet Chem												
Blank (BBJ0376-BLK1)						Prepared & Analyzed: 11-Oct-2018						
Volatile Solids	255	200		200	mg/kg				-			Ba
Duplicate (BBJ0376-DUP1)			**Source: 18J0441-09**			Prepared & Analyzed: 11-Oct-2018						
Volatile Solids	554000	200		200	mg/kg		553000		-	0.212	20	
Duplicate (BBJ0376-DUP2)			**Source: 18J0532-02**			Prepared & Analyzed: 11-Oct-2018						
Volatile Solids	29100	200		200	mg/kg		29600		-	1.51	20	
Batch BBJ0482 - No Prep Wet Chem												
Blank (BBJ0482-BLK1)						Prepared & Analyzed: 15-Oct-2018						
Cyanide	ND	0.01		0.01	mg/kg dry				-			Ua
LCS (BBJ0482-BS1)						Prepared & Analyzed: 15-Oct-2018						
Cyanide	0.26				mg/kg dry	0.250		104	80-120			
LCS Dup (BBJ0482-BSD1)						Prepared & Analyzed: 15-Oct-2018						
Cyanide	0.26				mg/kg dry	0.250		102	80-120	1.13	20	
Matrix Spike (BBJ0482-MS1)			**Source: 18J0532-02**			Prepared & Analyzed: 15-Oct-2018						
Cyanide	26.0	1.19		1.19	mg/kg dry	29.8	ND	87.4	75-125			
Matrix Spike (BBJ0482-MS2)			**Source: 18J0532-12**			Prepared & Analyzed: 15-Oct-2018						
Cyanide	25.0	1.06		1.06	mg/kg dry	26.5	ND	94.3	75-125			
Matrix Spike Dup (BBJ0482-MSD1)			**Source: 18J0532-02**			Prepared & Analyzed: 15-Oct-2018						
Cyanide	26.6	1.19		1.19	mg/kg dry	29.8	ND	89.4	75-125	2.26	20	

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL) ERDC, 3909 Halls Ferry Road Vicksburg MS, 39180	Project: Houston Ship Channel-North of Morgan's Point Project Manager: Cheryl Montgomery	**Reported:** 22-May-2019

Wet Chemistry Analysis - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0482 - No Prep Wet Chem												
Matrix Spike Dup (BBJ0482-MSD2)		**Source: 18J0532-12**				Prepared & Analyzed: 15-Oct-2018						
Cyanide	26.4	1.06		1.06	mg/kg dry	26.5	ND	99.5	75-125	5.41	20	
Batch BBJ0487 - No Prep Wet Chem												
Blank (BBJ0487-BLK1)						Prepared & Analyzed: 16-Oct-2018						
Volatile Solids	ND	200		200	mg/kg				-			Ua
Duplicate (BBJ0487-DUP1)		**Source: 18J0532-07**				Prepared & Analyzed: 16-Oct-2018						
Volatile Solids	43600	200		200	mg/kg		45200		-	3.63	20	
Duplicate (BBJ0487-DUP2)		**Source: 18J0607-06**				Prepared & Analyzed: 16-Oct-2018						
Volatile Solids	556000	200		200	mg/kg		560000		-	0.723	20	
Batch BBJ0758 - No Prep Halides												
Blank (BBJ0758-BLK1)						Prepared & Analyzed: 23-Oct-2018						
TOC (Max)	0.00725	0.00471		0.00500	% by Weight dry				-			Ba
TOC (Mean)	0.00559	0.00471		0.00500	% by Weight dry				-			Ba
TOC (Min)	ND	0.00471		0.00500	% by Weight dry				-			Ua
LCS (BBJ0758-BS1)						Prepared & Analyzed: 23-Oct-2018						
TOC (Max)	0.107	0.00798		0.0100	% by Weight dry	0.0998		107	80-120			
TOC (Mean)	0.0998	0.00798		0.0100	% by Weight dry	0.0998		100	80-120			
TOC (Min)	0.0918	0.00798		0.0100	% by Weight dry	0.0998		92.0	80-120			
LCS Dup (BBJ0758-BSD1)						Prepared & Analyzed: 23-Oct-2018						

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ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Wet Chemistry Analysis - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0758 - No Prep Halides												
LCS Dup (BBJ0758-BSD1)						Prepared & Analyzed: 23-Oct-2018						
TOC (Max)	0.0968	0.00746		0.0100	% by Weight dry	0.0933		104	80-120	10.1	20	
TOC (Mean)	0.0943	0.00746		0.0100	% by Weight dry	0.0933		101	80-120	5.74	20	
TOC (Min)	0.0925	0.00746		0.0100	% by Weight dry	0.0933		99.1	80-120	0.683	20	
Matrix Spike (BBJ0758-MS1)			**Source: 18J0532-02**			Prepared & Analyzed: 23-Oct-2018						
TOC (Max)	0.818	0.430		0.537	% by Weight dry	0.537	ND	152	80-120			M2
TOC (Mean)	0.803	0.430		0.537	% by Weight dry	0.537	ND	149	80-120			M2
TOC (Min)	0.780	0.430		0.537	% by Weight dry	0.537	ND	145	80-120			M2
Matrix Spike Dup (BBJ0758-MSD1)			**Source: 18J0532-02**			Prepared & Analyzed: 23-Oct-2018						
TOC (Max)	0.658	0.314		0.393	% by Weight dry	0.393	ND	168	80-120	21.6	20	M2, P
TOC (Mean)	0.642	0.314		0.393	% by Weight dry	0.393	ND	163	80-120	22.3	20	M2, P
TOC (Min)	0.597	0.314		0.393	% by Weight dry	0.393	ND	152	80-120	26.5	20	M2, P
Batch BBJ0803 - No Prep Halides												
Blank (BBJ0803-BLK1)						Prepared & Analyzed: 24-Oct-2018						
TOC (Max)	0.0215	0.00498		0.00500	% by Weight dry				-			Ba
TOC (Mean)	0.00969	0.00498		0.00500	% by Weight dry				-			Ba

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Wet Chemistry Analysis - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0803 - No Prep Halides												
Blank (BBJ0803-BLK1)						Prepared & Analyzed: 24-Oct-2018						
TOC (Min)	0.00513	0.00498		0.00500	% by Weight dry				-			Ba
LCS (BBJ0803-BS1)						Prepared & Analyzed: 24-Oct-2018						
TOC (Max)	0.0939	0.00860		0.0100	% by Weight dry	0.0860		109	80-120			
TOC (Mean)	0.0887	0.00860		0.0100	% by Weight dry	0.0860		103	80-120			
TOC (Min)	0.0864	0.00860		0.0100	% by Weight dry	0.0860		100	80-120			
LCS Dup (BBJ0803-BSD1)						Prepared & Analyzed: 24-Oct-2018						
TOC (Max)	0.0928	0.00917		0.0100	% by Weight dry	0.0917		101	80-120	1.21	20	
TOC (Mean)	0.0918	0.00917		0.0100	% by Weight dry	0.0917		100	80-120	3.42	20	
TOC (Min)	0.0908	0.00917		0.0100	% by Weight dry	0.0917		99.0	80-120	4.95	20	
Matrix Spike (BBJ0803-MS1)			**Source: 18J0701-02**			Prepared & Analyzed: 24-Oct-2018						
TOC (Max)	0.917	0.259		0.259	% by Weight dry	0.517	0.271	125	80-120			M2
TOC (Mean)	0.760	0.259		0.259	% by Weight dry	0.517	0.262	96.3	80-120			
TOC (Min)	0.672	0.259		0.259	% by Weight dry	0.517	ND	130	80-120			M2
Matrix Spike Dup (BBJ0803-MSD1)			**Source: 18J0701-02**			Prepared & Analyzed: 24-Oct-2018						
TOC (Max)	0.853	0.294		0.294	% by Weight dry	0.588	ND	145	80-120	7.20	20	M2

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Wet Chemistry Analysis - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBJ0803 - No Prep Halides												
Matrix Spike Dup (BBJ0803-MSD1)		**Source: 18J0701-02**				Prepared & Analyzed: 24-Oct-2018						
TOC (Mean)	0.813	0.294		0.294	% by Weight dry	0.588	ND	138	80-120	6.64	20	M2
TOC (Min)	0.765	0.294		0.294	% by Weight dry	0.588	ND	130	80-120	13.1	20	M2

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167103 - EPA 3510C												
BLK (WG1167103-1)					Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018							
1,2,4-Trichlorobenzene	ND	2.06		33.3	ug/kg				-			Ub
1,2-Dichlorobenzene	ND	7.27		33.3	ug/kg				-			Ub
1,3-Dichlorobenzene	ND	6.8		33.3	ug/kg				-			Ub
1,4-Dichlorobenzene	ND	6.93		33.3	ug/kg				-			Ub
2,4,6-Trichlorophenol	ND	2.98		33.3	ug/kg				-			Ub
2,4-Dichlorophenol	ND	3.58		33.3	ug/kg				-			Ub
2,4-Dimethylphenol	ND	5.49		33.3	ug/kg				-			Ub
2,4-Dinitrophenol	ND	56.8		200	ug/kg				-			Ub
2,4-Dinitrotoluene	ND	2.33		33.3	ug/kg				-			Ub
2,6-Dinitrotoluene	ND	8.6		33.3	ug/kg				-			Ub
2-Chloronaphthalene	ND	2.32		33.3	ug/kg				-			Ub
2-Chlorophenol	ND	2.2		33.3	ug/kg				-			Ub
2-Nitrophenol	ND	3.59		33.3	ug/kg				-			Ub
3,3'-Dichlorobenzidine	ND	5.69		66.7	ug/kg				-			Ub
4,6-Dinitro-2-methylphenol	ND	64		200	ug/kg				-			Ub
4-Bromophenyl-phenylether	ND	3.13		33.3	ug/kg				-			Ub
4-Chloro-3-methylphenol	ND	4.81		33.3	ug/kg				-			Ub
4-Chlorophenyl-phenylether	ND	3.21		33.3	ug/kg				-			Ub
4-Nitrophenol	ND	183		553	ug/kg				-			Ub
Azobenzene	ND	2.46		33.3	ug/kg				-			Ub
Benzidine	ND	216		933	ug/kg				-			Ub
bis(2-Chloroethoxy)methane	ND	3.35		33.3	ug/kg				-			Ub
bis(2-Chloroethyl)ether	ND	6.12		33.3	ug/kg				-			Ub
bis(2-chloroisopropyl)ether	ND	5.56		33.3	ug/kg				-			Ub
bis(2-Ethylhexyl)phthalate	ND	8.73		33.3	ug/kg				-			Ub
Butylbenzylphthalate	ND	6.73		33.3	ug/kg				-			Ub
Diethylphthalate	ND	3.41		33.3	ug/kg				-			Ub
Dimethylphthalate	ND	2.6		33.3	ug/kg				-			Ub

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Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167103 - EPA 3510C												
BLK (WG1167103-1)						Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018						
Di-n-butylphthalate	ND	3.17		33.3	ug/kg				-			Ub
Di-n-octylphthalate	ND	13.8		66.7	ug/kg				-			Ub
Hexachlorobenzene	ND	3.25		33.3	ug/kg				-			Ub
Hexachlorobutadiene	ND	6.47		33.3	ug/kg				-			Ub
Hexachlorocyclopentadiene	ND	36.5		200	ug/kg				-			Ub
Hexachloroethane	ND	5.57		33.3	ug/kg				-			Ub
Isophorone	ND	3.65		33.3	ug/kg				-			Ub
Nitrobenzene	ND	3.47		33.3	ug/kg				-			Ub
N-Nitrosodimethylamine	ND	8.4		33.3	ug/kg				-			Ub
N-Nitroso-di-n-propylamine	ND	5.67		33.3	ug/kg				-			Ub
n-Nitrosodiphenylamine	ND	2.34		33.3	ug/kg				-			Ub
Pentachlorophenol	ND	59.9		200	ug/kg				-			Ub
Phenol	ND	3.17		33.3	ug/kg				-			Ub
Surrogate: 2,4,6-Tribromophenol	*701*				*mg/kg*			*53*	*15-115*			
Surrogate: 2-Fluorobiphenyl	*620*				*mg/kg*			*47*	*30-130*			
Surrogate: 2-Fluorophenol	*528*				*mg/kg*			*40*	*15-115*			
Surrogate: Nitrobenzene-d5	*635*				*mg/kg*			*48*	*30-130*			
Surrogate: Phenol-d5	*654*				*mg/kg*			*49*	*15-115*			
Surrogate: Terphenyl-d14	*971*				*mg/kg*			*73*	*30-130*			
LCS (WG1167103-2)						Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018						
1,2,4-Trichlorobenzene	412	2.06		33.3	ug/kg			62	40-140			
1,2-Dichlorobenzene	393	7.27		33.3	ug/kg			59	40-140			
1,3-Dichlorobenzene	378	6.8		33.3	ug/kg			57	40-140			
1,4-Dichlorobenzene	383	6.93		33.3	ug/kg			57	40-140			
2,4,6-Trichlorophenol	483	2.98		33.3	ug/kg			72	40-140			
2,4-Dichlorophenol	474	3.58		33.3	ug/kg			71	40-140			
2,4-Dimethylphenol	405	5.49		33.3	ug/kg			61	40-140			
2,4-Dinitrophenol	348	56.8		200	ug/kg			52	40-140			
2,4-Dinitrotoluene	603	2.33		33.3	ug/kg			90	40-140			

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167103 - EPA 3510C												
LCS (WG1167103-2)						Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018						
2,6-Dinitrotoluene	561	8.6		33.3	ug/kg			84	40-140			
2-Chloronaphthalene	485	2.32		33.3	ug/kg			73	40-140			
2-Chlorophenol	416	2.2		33.3	ug/kg			62	40-140			
2-Nitrophenol	461	3.59		33.3	ug/kg			69	40-140			
3,3'-Dichlorobenzidine	557	5.69		66.7	ug/kg			84	40-140			
4,6-Dinitro-2-methylphenol	537	64		200	ug/kg			81	40-140			
4-Bromophenyl-phenylether	552	3.13		33.3	ug/kg			83	40-140			
4-Chloro-3-methylphenol	552	4.81		33.3	ug/kg			83	40-140			
4-Chlorophenyl-phenylether	542	3.21		33.3	ug/kg			81	40-140			
4-Nitrophenol	494	183		553	ug/kg			74	17-65			
Azobenzene	545	2.46		33.3	ug/kg			82	40-140			
Benzidine	482	216		933	ug/kg			29	10-82			
bis(2-Chloroethoxy)methane	496	3.35		33.3	ug/kg			74	40-140			
bis(2-Chloroethyl)ether	464	6.12		33.3	ug/kg			70	40-140			
bis(2-chloroisopropyl)ether	491	5.56		33.3	ug/kg			74	40-140			
bis(2-Ethylhexyl)phthalate	628	8.73		33.3	ug/kg			94	40-140			
Butylbenzylphthalate	614	6.73		33.3	ug/kg			92	40-140			
Diethylphthalate	594	3.41		33.3	ug/kg			89	40-140			
Dimethylphthalate	555	2.6		33.3	ug/kg			83	40-140			
Di-n-butylphthalate	621	3.17		33.3	ug/kg			93	40-140			
Di-n-octylphthalate	633	13.8		66.7	ug/kg			95	40-140			
Hexachlorobenzene	537	3.25		33.3	ug/kg			81	40-140			
Hexachlorobutadiene	416	6.47		33.3	ug/kg			62	40-140			
Hexachlorocyclopentadiene	221	36.5		200	ug/kg			33	10-109			
Hexachloroethane	402	5.57		33.3	ug/kg			60	10-97			
Isophorone	534	3.65		33.3	ug/kg			80	40-140			
Nitrobenzene	476	3.47		33.3	ug/kg			71	40-140			
N-Nitrosodimethylamine	400	8.4		33.3	ug/kg			60	27-70			

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ERDC -- Vicksburg (EL)
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Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Semivolatile Organics by GC-MS - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167103 - EPA 3510C												
LCS (WG1167103-2)						Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018						
N-Nitroso-di-n-propylamine	516	5.67		33.3	ug/kg			77	40-140			
n-Nitrosodiphenylamine	559	2.34		33.3	ug/kg			84	40-140			
Pentachlorophenol	421	59.9		200	ug/kg			63	40-140			
Phenol	468	3.17		33.3	ug/kg			70	18-54			
Surrogate: 2,4,6-Tribromophenol	*1000*				*mg/kg*			*75*	*15-115*			
Surrogate: 2-Fluorobiphenyl	*876*				*mg/kg*			*66*	*30-130*			
Surrogate: 2-Fluorophenol	*715*				*mg/kg*			*54*	*15-115*			
Surrogate: Nitrobenzene-d5	*877*				*mg/kg*			*66*	*30-130*			
Surrogate: Phenol-d5	*852*				*mg/kg*			*64*	*15-115*			*a
Surrogate: Terphenyl-d14	*1060*				*mg/kg*			*79*	*30-130*			*a
LCD (WG1167103-3)						Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018						
1,2,4-Trichlorobenzene	395	2.06		33.3	ug/kg			59	40-140	5	30	*a
1,2-Dichlorobenzene	377	7.27		33.3	ug/kg			56	40-140	5	30	*a
1,3-Dichlorobenzene	361	6.8		33.3	ug/kg			54	40-140	5	30	
1,4-Dichlorobenzene	363	6.93		33.3	ug/kg			54	40-140	5	30	*a
2,4,6-Trichlorophenol	466	2.98		33.3	ug/kg			70	40-140	3	30	
2,4-Dichlorophenol	454	3.58		33.3	ug/kg			68	40-140	4	30	
2,4-Dimethylphenol	400	5.49		33.3	ug/kg			60	40-140	2	30	
2,4-Dinitrophenol	356	56.8		200	ug/kg			53	40-140	2	30	*a
2,4-Dinitrotoluene	581	2.33		33.3	ug/kg			87	40-140	3	30	*a
2,6-Dinitrotoluene	538	8.6		33.3	ug/kg			81	40-140	4	30	
2-Chloronaphthalene	462	2.32		33.3	ug/kg			69	40-140	6	30	
2-Chlorophenol	389	2.2		33.3	ug/kg			58	40-140	7	30	*a
2-Nitrophenol	441	3.59		33.3	ug/kg			66	40-140	4	30	
3,3'-Dichlorobenzidine	554	5.69		66.7	ug/kg			83	40-140	1	30	*a
4,6-Dinitro-2-methylphenol	511	64		200	ug/kg			77	40-140	5	30	
4-Bromophenyl-phenylether	508	3.13		33.3	ug/kg			76	40-140	9	30	
4-Chloro-3-methylphenol	525	4.81		33.3	ug/kg			79	40-140	5	30	
4-Chlorophenyl-phenylether	513	3.21		33.3	ug/kg			77	40-140	5	30	*a

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ERDC -- Vicksburg (EL)
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Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167103 - EPA 3510C												
LCD (WG1167103-3)					Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018							
4-Nitrophenol	454	183		553	ug/kg			68	17-65	8	30	*a
Azobenzene	515	2.46		33.3	ug/kg			77	40-140	6	30	*a
Benzidine	590	216		933	ug/kg			35	10-82	19	30	*a
bis(2-Chloroethoxy)methane	480	3.35		33.3	ug/kg			72	40-140	3	30	
bis(2-Chloroethyl)ether	436	6.12		33.3	ug/kg			65	40-140	7	30	
bis(2-chloroisopropyl)ether	469	5.56		33.3	ug/kg			70	40-140	6	30	
bis(2-Ethylhexyl)phthalate	593	8.73		33.3	ug/kg			89	40-140	5	30	
Butylbenzylphthalate	579	6.73		33.3	ug/kg			87	40-140	6	30	
Diethylphthalate	562	3.41		33.3	ug/kg			84	40-140	6	30	
Dimethylphthalate	532	2.6		33.3	ug/kg			80	40-140	4	30	
Di-n-butylphthalate	583	3.17		33.3	ug/kg			87	40-140	7	30	*a
Di-n-octylphthalate	600	13.8		66.7	ug/kg			90	40-140	5	30	*a
Hexachlorobenzene	503	3.25		33.3	ug/kg			75	40-140	8	30	*a
Hexachlorobutadiene	394	6.47		33.3	ug/kg			59	40-140	5	30	*a
Hexachlorocyclopentadiene	231	36.5		200	ug/kg			35	10-109	6	30	*a
Hexachloroethane	382	5.57		33.3	ug/kg			57	10-97	5	30	
Isophorone	516	3.65		33.3	ug/kg			77	40-140	4	30	*a
Nitrobenzene	450	3.47		33.3	ug/kg			68	40-140	4	30	*a
N-Nitrosodimethylamine	388	8.4		33.3	ug/kg			58	27-70	3	30	
N-Nitroso-di-n-propylamine	501	5.67		33.3	ug/kg			75	40-140	3	30	*a
n-Nitrosodiphenylamine	529	2.34		33.3	ug/kg			79	40-140	6	30	
Pentachlorophenol	417	59.9		200	ug/kg			63	40-140	0	30	
Phenol	435	3.17		33.3	ug/kg			65	18-54	7	30	
Surrogate: 2,4,6-Tribromophenol	*983*				*mg/kg*			*74*	*15-115*			*a
Surrogate: 2-Fluorobiphenyl	*842*				*mg/kg*			*63*	*30-130*			
Surrogate: 2-Fluorophenol	*672*				*mg/kg*			*50*	*15-115*			
Surrogate: Nitrobenzene-d5	*836*				*mg/kg*			*63*	*30-130*			
Surrogate: Phenol-d5	*808*				*mg/kg*			*61*	*15-115*			
Surrogate: Terphenyl-d14	*1000*				*mg/kg*			*75*	*30-130*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167103 - EPA 3510C												
MS (WG1167103-4)		**Source: ND**				Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018						
1,2,4-Trichlorobenzene	569	2.99		48.4	ug/kg	969	18J0402-02	58.7	40-140		30	
1,2-Dichlorobenzene	448	10.6		48.4	ug/kg	969	18J0402-02	46.2	40-140		30	
1,3-Dichlorobenzene	433	9.88		48.4	ug/kg	969	18J0402-02	44.7	40-140		30	
1,4-Dichlorobenzene	421	10.1		48.4	ug/kg	969	18J0402-02	43.5	40-140		30	
2,4,6-Trichlorophenol	763	4.33		48.4	ug/kg	969	18J0402-02	78.8	40-140		30	
2,4-Dichlorophenol	638	5.2		48.4	ug/kg	969	18J0402-02	65.9	40-140		30	
2,4-Dimethylphenol	345	7.98		48.4	ug/kg	969	18J0402-02	35.6	30-130		30	
2,4-Dinitrophenol	155	82.5		291	ug/kg	969	18J0402-02	16	10-96		30	
2,4-Dinitrotoluene	867	3.39		48.4	ug/kg	969	18J0402-02	89.5	40-140		30	
2,6-Dinitrotoluene	842	12.5		48.4	ug/kg	969	18J0402-02	86.9	40-140		30	
2-Chloronaphthalene	736	3.37		48.4	ug/kg	969	18J0402-02	76	40-140		30	
2-Chlorophenol	459	3.2		48.4	ug/kg	969	18J0402-02	47.4	40-140		30	
2-Nitrophenol	597	5.22		48.4	ug/kg	969	18J0402-02	61.6	40-140		30	
3,3'-Dichlorobenzidine	229	8.26		96.9	ug/kg	969	18J0402-02	23.6	40-140		30	Q
4,6-Dinitro-2-methylphenol	387	93		291	ug/kg	969	18J0402-02	39.9	30-130		30	
4-Bromophenyl-phenylether	815	4.55		48.4	ug/kg	969	18J0402-02	84.1	40-140		30	
4-Chloro-3-methylphenol	769	6.99		48.4	ug/kg	969	18J0402-02	79.4	40-140		30	
4-Chlorophenyl-phenylether	789	4.67		48.4	ug/kg	969	18J0402-02	81.4	40-140		30	
4-Nitrophenol	616	266		804	ug/kg	969	18J0402-02	63.6	17-65		30	
Azobenzene	1000	3.57		48.4	ug/kg	969	18J0402-02	103	40-140		30	
Benzidine	ND	314		1360	ug/kg	2420	18J0402-02	0	10-82		30	Q, U
bis(2-Chloroethoxy)methane	676	4.87		48.4	ug/kg	969	18J0402-02	69.8	40-140		30	
bis(2-Chloroethyl)ether	535	8.89		48.4	ug/kg	969	18J0402-02	55.2	40-140		30	
bis(2-chloroisopropyl)ether	605	8.08		48.4	ug/kg	969	18J0402-02	62.5	40-140		30	
bis(2-Ethylhexyl)phthalate	1160	12.7		48.4	ug/kg	969	18J0402-02	96.1	40-140		30	
Butylbenzylphthalate	888	9.78		48.4	ug/kg	969	18J0402-02	91.7	40-140		30	
Diethylphthalate	828	4.95		48.4	ug/kg	969	18J0402-02	85.5	40-140		30	
Dimethylphthalate	789	3.78		48.4	ug/kg	969	18J0402-02	81.4	40-140		30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167103 - EPA 3510C												
MS (WG1167103-4)		**Source: ND**				Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018						
Di-n-butylphthalate	815	4.61		48.4	ug/kg	969	18J0402-02	84.1	40-140		30	
Di-n-octylphthalate	868	20		96.9	ug/kg	969	18J0402-02	89.6	40-140		30	
Hexachlorobenzene	797	4.72		48.4	ug/kg	969	18J0402-02	82.3	40-140		30	
Hexachlorobutadiene	604	9.4		48.4	ug/kg	969	18J0402-02	62.3	40-140		30	
Hexachlorocyclopentadiene	75.6	53.1		291	ug/kg	969	18J0402-02	7.8	12-87		30	Q
Hexachloroethane	415	8.1		48.4	ug/kg	969	18J0402-02	42.8	10-97		30	
Isophorone	742	5.31		48.4	ug/kg	969	18J0402-02	76.6	40-140		30	
Nitrobenzene	600	5.05		48.4	ug/kg	969	18J0402-02	61.9	40-140		30	
N-Nitrosodimethylamine	414	12.2		48.4	ug/kg	969	18J0402-02	42.7	27-70		30	
N-Nitroso-di-n-propylamine	725	8.24		48.4	ug/kg	969	18J0402-02	74.8	40-140		30	
n-Nitrosodiphenylamine	829	3.4		48.4	ug/kg	969	18J0402-02	85.6	40-140		30	
Pentachlorophenol	506	87.1		291	ug/kg	969	18J0402-02	52.2	40-140		30	
Phenol	534	4.6		48.4	ug/kg	969	18J0402-02	55.1	18-54		30	
Surrogate: 2,4,6-Tribromophenol	*1500*				*mg/kg*			*78*	*15-115*			
Surrogate: 2-Fluorobiphenyl	*1360*				*mg/kg*			*70*	*30-130*			
Surrogate: 2-Fluorophenol	*740*				*mg/kg*			*38*	*15-115*			
Surrogate: Nitrobenzene-d5	*1120*				*mg/kg*			*58*	*30-130*			
Surrogate: Phenol-d5	*961*				*mg/kg*			*50*	*15-115*			
Surrogate: Terphenyl-d14	*1530*				*mg/kg*			*79*	*30-130*			
MSD (WG1167103-5)		**Source: ND**				Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018						
1,2,4-Trichlorobenzene	661	3.02		48.8	ug/kg	969	18J0402-02	67.6	40-140	15	30	
1,2-Dichlorobenzene	604	10.6		48.8	ug/kg	969	18J0402-02	61.8	40-140	30	30	
1,3-Dichlorobenzene	609	9.97		48.8	ug/kg	969	18J0402-02	62.3	40-140	34	30	Q
1,4-Dichlorobenzene	586	10.2		48.8	ug/kg	969	18J0402-02	60	40-140	33	30	Q
2,4,6-Trichlorophenol	796	4.37		48.8	ug/kg	969	18J0402-02	81.5	40-140	4	30	
2,4-Dichlorophenol	727	5.25		48.8	ug/kg	969	18J0402-02	74.4	40-140	13	30	
2,4-Dimethylphenol	741	8.05		48.8	ug/kg	969	18J0402-02	75.8	40-140	73	30	Q
2,4-Dinitrophenol	139	83.2		293	ug/kg	969	18J0402-02	14.2	10-96	11	30	
2,4-Dinitrotoluene	900	3.42		48.8	ug/kg	969	18J0402-02	92.1	40-140	4	30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167103 - EPA 3510C												
MSD (WG1167103-5)		**Source: ND**				Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018						
2,6-Dinitrotoluene	876	12.6		48.8	ug/kg	969	18J0402-02	89.7	40-140	4	30	
2-Chloronaphthalene	776	3.4		48.8	ug/kg	969	18J0402-02	79.4	40-140	5	30	
2-Chlorophenol	626	3.22		48.8	ug/kg	969	18J0402-02	64.1	40-140	31	30	Q
2-Nitrophenol	697	5.27		48.8	ug/kg	969	18J0402-02	71.3	40-140	15	30	
3,3'-Dichlorobenzidine	316	8.33		97.7	ug/kg	969	18J0402-02	32.3	40-140	32	30	Q
4,6-Dinitro-2-methylphenol	392	93.8		293	ug/kg	969	18J0402-02	40.1	40-140	1	30	
4-Bromophenyl-phenylether	835	4.59		48.8	ug/kg	969	18J0402-02	85.5	40-140	2	30	
4-Chloro-3-methylphenol	843	7.05		48.8	ug/kg	969	18J0402-02	86.3	40-140	9	30	
4-Chlorophenyl-phenylether	838	4.71		48.8	ug/kg	969	18J0402-02	85.8	40-140	6	30	
4-Nitrophenol	699	269		811	ug/kg	969	18J0402-02	71.5	17-65	13	30	
Azobenzene	1040	3.6		48.8	ug/kg	969	18J0402-02	106	40-140	4	30	
Benzidine	ND	316		1370	ug/kg	969	18J0402-02	0	10-82	NR	30	Q, U
bis(2-Chloroethoxy)methane	750	4.91		48.8	ug/kg	969	18J0402-02	76.8	40-140	10	30	
bis(2-Chloroethyl)ether	706	8.97		48.8	ug/kg	969	18J0402-02	72.3	40-140	28	30	
bis(2-chloroisopropyl)ether	752	8.15		48.8	ug/kg	969	18J0402-02	77	40-140	22	30	
bis(2-Ethylhexyl)phthalate	1200	12.8		48.8	ug/kg	969	18J0402-02	99.4	40-140	3	30	
Butylbenzylphthalate	917	9.87		48.8	ug/kg	969	18J0402-02	93.8	40-140	3	30	
Diethylphthalate	856	4.99		48.8	ug/kg	969	18J0402-02	87.6	40-140	3	30	
Dimethylphthalate	782	3.81		48.8	ug/kg	969	18J0402-02	80	40-140	1	30	
Di-n-butylphthalate	862	4.65		48.8	ug/kg	969	18J0402-02	88.2	40-140	6	30	
Di-n-octylphthalate	901	20.2		97.7	ug/kg	969	18J0402-02	92.2	40-140	4	30	
Hexachlorobenzene	853	4.76		48.8	ug/kg	969	18J0402-02	87.3	40-140	7	30	
Hexachlorobutadiene	699	9.48		48.8	ug/kg	969	18J0402-02	71.5	40-140	15	30	
Hexachlorocyclopentadiene	81.7	53.5		293	ug/kg	969	18J0402-02	8.36	12-87	8	30	Q
Hexachloroethane	548	8.17		48.8	ug/kg	969	18J0402-02	56.1	10-97	28	30	
Isophorone	808	5.35		48.8	ug/kg	969	18J0402-02	82.7	40-140	9	30	
Nitrobenzene	730	5.09		48.8	ug/kg	969	18J0402-02	74.7	40-140	20	30	
N-Nitrosodimethylamine	580	12.3		48.8	ug/kg	969	18J0402-02	59.4	27-70	33	30	Q

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167103 - EPA 3510C												
MSD (WG1167103-5)		**Source: ND**			Prepared: 11-Oct-2018 Analyzed: 19-Oct-2018							
N-Nitroso-di-n-propylamine	831	8.32		48.8	ug/kg	969	18J0402-02	85	40-140	14	30	
n-Nitrosodiphenylamine	824	3.43		48.8	ug/kg	969	18J0402-02	84.3	40-140	1	30	
Pentachlorophenol	535	87.8		293	ug/kg	969	18J0402-02	54.8	40-140	6	30	
Phenol	690	4.64		48.8	ug/kg	969	18J0402-02	70.6	18-54	25	30	
Surrogate: 2,4,6-Tribromophenol	*1660*				*mg/kg*			*85*	*15-115*			
Surrogate: 2-Fluorobiphenyl	*1440*				*mg/kg*			*74*	*30-130*			
Surrogate: 2-Fluorophenol	*1060*				*mg/kg*			*54*	*15-115*			
Surrogate: Nitrobenzene-d5	*1340*				*mg/kg*			*69*	*30-130*			
Surrogate: Phenol-d5	*1240*				*mg/kg*			*64*	*15-115*			
Surrogate: Terphenyl-d14	*1560*				*mg/kg*			*80*	*30-130*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
22-May-2019

TNRCC 1005 - Quality Control

Katahdin

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG238699 - TNRCC 1005												
BLK (WG238699-1)						Prepared: 15-Oct-2018 Analyzed: 18-Oct-2018						
>C12-C28	11	9.6		50.	mg/Kgdr ywt				-			Ja
>C28-C35	10	9.6		50.	mg/Kgdr ywt				-			Ja
C6-C12	15	9.9		50.	mg/Kgdr ywt				-			Ja
C6-C35	31	19.		100	mg/Kgdr ywt				-			Ja
Surrogate: 1-Chlorooctane	*86.0*				*%*			*86.0*	*70-130*			
Surrogate: O-TERPHENYL	*105.*				*%*			*105.*	*70-130*			
LCS (WG238699-2)						Prepared: 15-Oct-2018 Analyzed: 18-Oct-2018						
>C12-C28	12.1	9.6		50.	mg/Kgdr ywt	250		4.84	75-125			*
C6-C12	40.7	9.9		50.	mg/Kgdr ywt	250		16.3	75-125			*
C6-C35	58.6	19.		100	mg/Kgdr ywt	500		11.7	75-125			*
Surrogate: 1-Chlorooctane	*3730*				*%*			*NR*	*70-130*			*
Surrogate: O-TERPHENYL	*102.*				*%*			*102.*	*70-130*			
Batch WG238787 - TNRCC 1005												
DUP (SL9921-14RE)						**Source: 18J0402-02RE** Prepared: 11-Oct-2018 Analyzed: 18-Oct-2018						
>C12-C28	23	9.5		50.	mg/Kgdr ywt		250		-	166	30	Ja, *
>C28-C35	20	9.5		50.	mg/Kgdr ywt		46		-	78.8	30	Ja, *
C6-C12	12	9.8		50.	mg/Kgdr ywt		41		-	109	30	Ja, *
C6-C35	50	19.		99.	mg/Kgdr ywt		340		-	149	30	Ja, *
Surrogate: 1-Chlorooctane	*62.6*				*%*			*62.6*	*70-130*			*
Surrogate: O-TERPHENYL	*108.*				*%*			*108.*	*70-130*			
BLK (WG238787-1)						Prepared: 17-Oct-2018 Analyzed: 18-Oct-2018						
>C12-C28	6.8	4.8		25.	mg/Kgdr ywt				-			Ja

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

TNRCC 1005 - Quality Control

Katahdin

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG238787 - TNRCC 1005												
BLK (WG238787-1)					Prepared: 17-Oct-2018 Analyzed: 18-Oct-2018							
>C28-C35	8.4	4.8		25.	mg/Kgdr ywt				-			Ja
C6-C12	5.5	5.0		25.	mg/Kgdr ywt				-			Ja
C6-C35	18	9.5		50.	mg/Kgdr ywt				-			Ja
Surrogate: 1-Chlorooctane	*45.1*				*%*			*45.1*	*70-130*			*
Surrogate: O-TERPHENYL	*96.0*				*%*			*96.0*	*70-130*			
LCS (WG238787-2)					Prepared: 17-Oct-2018 Analyzed: 18-Oct-2018							
>C12-C28	217.	4.8		25.	mg/Kgdr ywt	250		86.8	75-125			
C6-C12	208.	5.0		25.	mg/Kgdr ywt	250		83.2	75-125			
C6-C35	426.	9.5		50.	mg/Kgdr ywt	500		85.2	75-125			
Surrogate: 1-Chlorooctane	*87.5*				*%*			*87.5*	*70-130*			
Surrogate: O-TERPHENYL	*98.4*				*%*			*98.4*	*70-130*			
MS (WG238787-3)			**Source: 18J0402-03**		Prepared: 11-Oct-2018 Analyzed: 18-Oct-2018							
>C12-C28	250	5.1		27.	mg/Kgdr ywt	268	8.3	94.5	75-125			
C6-C12	240	5.3		27.	mg/Kgdr ywt	268	7.8	89	75-125			
C6-C35	500	10.		54.	mg/Kgdr ywt	536	24	88.5	75-125			
Surrogate: 1-Chlorooctane	*89.0*				*%*			*89.0*	*70-130*			
Surrogate: O-TERPHENYL	*106.*				*%*			*106.*	*70-130*			
MSD (WG238787-4)			**Source: 18J0402-03**		Prepared: 11-Oct-2018 Analyzed: 18-Oct-2018							
>C12-C28	280	6.0		31.	mg/Kgdr ywt	310	8.3	91	75-125	11	20	
C6-C12	270	6.1		31.	mg/Kgdr ywt	310	7.8	87.5	75-125	13	20	
C6-C35	560	12.		62.	mg/Kgdr ywt	620	24	86.5	75-125	12	20	
Surrogate: 1-Chlorooctane	*86.0*				*%*			*86.0*	*70-130*			
Surrogate: O-TERPHENYL	*101.*				*%*			*101.*	*70-130*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

PAHs by GC/MS SIM - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167101 - EPA 3510C												
BLK (WG1167101-1)						Prepared: 11-Oct-2018 Analyzed: 01-Nov-2018						
Acenaphthene	ND	1.56		4	ug/kg				-			Ub
Acenaphthylene	ND	1.57		4	ug/kg				-			Ub
Anthracene	ND	2.74		4	ug/kg				-			Ub
Benz(a)anthracene	ND	1.97		4	ug/kg				-			Ub
Benzo(a)pyrene	2.52	1.16		4	ug/kg				-			Jc
Benzo(b)fluoranthene	ND	1.92		4	ug/kg				-			Ub
Benzo(e)pyrene	ND	2.2		4	ug/kg				-			Ub
Benzo(g,h,i)perylene	ND	2.58		4	ug/kg				-			Ub
Benzo(k)fluoranthene	ND	1.15		4	ug/kg				-			Ub
Chrysene	ND	1.45		4	ug/kg				-			Ub
Dibenz(a,h)anthracene	ND	2.37		4	ug/kg				-			Ub
Fluoranthene	ND	1.84		4	ug/kg				-			Ub
Fluorene	ND	2.36		4	ug/kg				-			Ub
Indeno(1,2,3-cd)pyrene	ND	1.14		4	ug/kg				-			Ub
Naphthalene	ND	1.57		4	ug/kg				-			Ub
Phenanthrene	ND	2.58		4	ug/kg				-			Ub
Pyrene	ND	2.21		4	ug/kg				-			Ub
Surrogate: 2-Methylnaphthalene-d10	*280*				*ug/kg*			*56*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*455*				*ug/kg*			*91*	*30-130*			
Surrogate: Pyrene-d10	*408*				*ug/kg*			*82*	*30-130*			
LCS (WG1167101-2)						Prepared: 11-Oct-2018 Analyzed: 01-Nov-2018						
Acenaphthene	276	1.56		4	ug/kg			55	40-140			
Acenaphthylene	291	1.57		4	ug/kg			58	40-140			
Anthracene	387	2.74		4	ug/kg			77	40-140			
Benz(a)anthracene	457	1.97		4	ug/kg			91	40-140			
Benzo(a)pyrene	417	1.16		4	ug/kg			83	40-140			
Benzo(b)fluoranthene	472	1.92		4	ug/kg			94	40-140			
Benzo(e)pyrene	495	2.2		4	ug/kg			99	40-140			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

PAHs by GC/MS SIM - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167101 - EPA 3510C												
LCS (WG1167101-2)						Prepared: 11-Oct-2018 Analyzed: 01-Nov-2018						
Benzo(g,h,i)perylene	495	2.58		4	ug/kg			99	40-140			
Benzo(k)fluoranthene	466	1.15		4	ug/kg			93	40-140			
Chrysene	404	1.45		4	ug/kg			81	40-140			
Dibenz(a,h)anthracene	481	2.37		4	ug/kg			96	40-140			
Fluoranthene	407	1.84		4	ug/kg			81	40-140			
Fluorene	311	2.36		4	ug/kg			62	40-140			
Indeno(1,2,3-cd)pyrene	428	1.14		4	ug/kg			86	40-140			
Naphthalene	247	1.57		4	ug/kg			49	40-140			
Phenanthrene	335	2.58		4	ug/kg			67	40-140			
Pyrene	362	2.21		4	ug/kg			72	40-140			
Surrogate: 2-Methylnaphthalene-d10	*253*				*ug/kg*			*51*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*446*				*ug/kg*			*89*	*30-130*			
Surrogate: Pyrene-d10	*386*				*ug/kg*			*77*	*30-130*			
LCD (WG1167101-3)						Prepared: 11-Oct-2018 Analyzed: 01-Nov-2018						
Acenaphthene	273	1.56		4	ug/kg			55	40-140	0	30	
Acenaphthylene	291	1.57		4	ug/kg			58	40-140	0	30	
Anthracene	383	2.74		4	ug/kg			77	40-140	0	30	
Benz(a)anthracene	466	1.97		4	ug/kg			93	40-140	2	30	
Benzo(a)pyrene	426	1.16		4	ug/kg			85	40-140	2	30	
Benzo(b)fluoranthene	481	1.92		4	ug/kg			96	40-140	2	30	
Benzo(e)pyrene	503	2.2		4	ug/kg			100	40-140	1	30	
Benzo(g,h,i)perylene	504	2.58		4	ug/kg			101	40-140	2	30	
Benzo(k)fluoranthene	472	1.15		4	ug/kg			94	40-140	1	30	
Chrysene	412	1.45		4	ug/kg			82	40-140	1	30	
Dibenz(a,h)anthracene	489	2.37		4	ug/kg			98	40-140	2	30	
Fluoranthene	400	1.84		4	ug/kg			80	40-140	1	30	
Fluorene	315	2.36		4	ug/kg			63	40-140	2	30	
Indeno(1,2,3-cd)pyrene	437	1.14		4	ug/kg			87	40-140	1	30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

PAHs by GC/MS SIM - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167101 - EPA 3510C												
LCD (WG1167101-3)						Prepared: 11-Oct-2018 Analyzed: 01-Nov-2018						
Naphthalene	231	1.57		4	ug/kg			46	40-140	6	30	
Phenanthrene	335	2.58		4	ug/kg			67	40-140	0	30	
Pyrene	360	2.21		4	ug/kg			72	40-140	0	30	
Surrogate: 2-Methylnaphthalene-d10	*232*				*ug/kg*			*46*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*433*				*ug/kg*			*87*	*30-130*			
Surrogate: Pyrene-d10	*369*				*ug/kg*			*74*	*30-130*			
MS (WG1167101-4)			**Source: 18J0402-02**			Prepared: 11-Oct-2018 Analyzed: 01-Nov-2018						
Acenaphthene	517	2.24		5.77	ug/kg	721	66	62.6	40-140			
Acenaphthylene	576	2.26		5.77	ug/kg	721	88.6	67.6	40-140			
Anthracene	529	3.94		5.77	ug/kg	721	56	65.6	40-140			
Benz(a)anthracene	909	2.84		5.77	ug/kg	721	82.3	115	40-140			
Benzo(a)pyrene	763	1.67		5.77	ug/kg	721	159	83.8	40-140			
Benzo(b)fluoranthene	801	2.76		5.77	ug/kg	721	76	101	40-140			
Benzo(e)pyrene	866	3.17		5.77	ug/kg	721	132	102	40-140			
Benzo(g,h,i)perylene	1340	3.71		5.77	ug/kg	721	526	113	40-140			
Benzo(k)fluoranthene	659	1.66		5.77	ug/kg	721	45	85.2	40-140			
Chrysene	594	2.09		5.77	ug/kg	721	76.1	71.8	40-140			
Dibenz(a,h)anthracene	661	3.42		5.77	ug/kg	721	4.62	91.7	40-140			
Fluoranthene	1360	2.66		5.77	ug/kg	721	543	113	40-140			
Fluorene	572	3.41		5.77	ug/kg	721	51.4	72.2	40-140			
Indeno(1,2,3-cd)pyrene	784	1.64		5.77	ug/kg	721	171	85	40-140			
Naphthalene	409	2.26		5.77	ug/kg	721	77.5	46	40-140			
Phenanthrene	916	3.71		5.77	ug/kg	721	239	93.9	40-140			
Pyrene	2210	3.18		5.77	ug/kg	721	1160	146	40-140			N
Surrogate: 2-Methylnaphthalene-d10	*381*				*ug/kg*			*53*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*605*				*ug/kg*			*84*	*30-130*			
Surrogate: Pyrene-d10	*637*				*ug/kg*			*88*	*30-130*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	22-May-2019

PAHs by GC/MS SIM - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1167101 - EPA 3510C												
MSD (WG1167101-5)		**Source: 18J0402-02**				Prepared: 11-Oct-2018 Analyzed: 01-Nov-2018						
Acenaphthene	508	2.18		5.6	ug/kg	721	66	63.1	40-140	2	30	
Acenaphthylene	564	2.2		5.6	ug/kg	721	88.6	67.9	40-140	2	30	
Anthracene	583	3.83		5.6	ug/kg	721	56	75.2	40-140	10	30	
Benz(a)anthracene	760	2.76		5.6	ug/kg	721	82.3	96.8	40-140	18	30	
Benzo(a)pyrene	768	1.62		5.6	ug/kg	721	159	87	40-140	1	30	
Benzo(b)fluoranthene	682	2.68		5.6	ug/kg	721	76	86.5	40-140	16	30	
Benzo(e)pyrene	811	3.08		5.6	ug/kg	721	132	97	40-140	7	30	
Benzo(g,h,i)perylene	1240	3.61		5.6	ug/kg	721	526	102	40-140	8	30	
Benzo(k)fluoranthene	683	1.61		5.6	ug/kg	721	45	91.1	40-140	4	30	
Chrysene	620	2.03		5.6	ug/kg	721	76.1	77.7	40-140	4	30	
Dibenz(a,h)anthracene	625	3.32		5.6	ug/kg	721	4.62	89.2	40-140	6	30	
Fluoranthene	1150	2.58		5.6	ug/kg	721	543	86.7	40-140	17	30	
Fluorene	554	3.31		5.6	ug/kg	721	51.4	71.8	40-140	3	30	
Indeno(1,2,3-cd)pyrene	746	1.6		5.6	ug/kg	721	171	82.1	40-140	5	30	
Naphthalene	441	2.2		5.6	ug/kg	721	77.5	51.9	40-140	8	30	
Phenanthrene	776	3.61		5.6	ug/kg	721	239	76.7	40-140	17	30	
Pyrene	1900	3.09		5.6	ug/kg	721	1160	106	40-140	15	30	
Surrogate: 2-Methylnaphthalene-d10	*403*				*ug/kg*			*58*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*562*				*ug/kg*			*80*	*30-130*			
Surrogate: Pyrene-d10	*596*				*ug/kg*			*85*	*30-130*			

SPECIFIC GRAVITY OF SOILS - ASTM D854-14 Method B

Client: Air Water & Soil Laboratories, Inc.
Client Project: 18J0402
Project No.: 40901

Lab Sample No.	Boring	Depth	Sample	Replicate No.	Material Used	Passing #4 Sieve	Pycnometer Id.	Pre-test Pycnometer Check Weight	Weight Pycnometer +Soil+Water	Test Temp.	Tare No.	Weight Tare+ Dry Soil	Tare Weight	Weight Dry Soil	Test Water Density	Weight Pycnometer +Water at Test Temp	Average Calibrated Pycnometer Dry Weight	Average Calibrated Volume of Pycnometer	Specific Gravity of Soil at Test Temp	Conversion Factor For Temp	Specific Gravity of Soil at 20*C
								gm	gm	°C		gm	gm	gm	gm/ml	gm	gm	ml	g/cc		g/cc
					Sieve	%		Mp	Mpws,t	Tt				Mds	ρw,t	Mpw,t	Mp	Vp	Gt	Tb-K	G20*C
				TEST PARAMETERS													CALIBRATION PARAMETERS		SPECIFIC GRAVITY		
40901001	18J0402-01	NA	HSCNew-NMP-01-SD	1	- #4	100	A	159.91	689.97	22.7	209	226.57	176.21	50.36	0.9976	658.42	159.90	499.72	2.677	0.9994	2.68
40901002	18J0402-02	NA	HSCNew-NMP-02-SD	1	- #4	100	C	161.1	691.23	22.6	208	230.82	179.91	50.91	0.9976	659.37	161.11	499.44	2.672	0.9994	2.67
40901003	18J0402-03	NA	HSCNew-NMP-03-SD	1	- #4	98.7	D	163.45	694.51	22.6	207	226.38	174.04	52.34	0.9976	662.00	163.44	499.74	2.640	0.9994	2.64
40901004	18J0402-04	NA	HSCNew-NMP-04-SD	2	- #4	99.7	R	164.26	693.86	20.9	205	228.99	179.19	49.8	0.9980	662.85	164.29	499.56	2.650	0.9998	2.65
40901005	18J0402-05	NA	HSCNew-NMP-05-SD	1	- #4	99.7	G	163.57	693.82	21.1	813	152.7	101.68	51.02	0.9980	661.88	163.54	499.35	2.674	0.9998	2.67
40901006	18J0402-06	NA	HSCNew-NMP-06-SD	2	- #4	98.5	T	185.16	714.48	21.2	217	229.37	179.68	49.69	0.9980	683.51	185.15	499.38	2.654	0.9997	2.65
40901007	18J0402-07	NA	HSCNew-NMP-07-SD	2	- #4	100	W	193.16	722.31	21	200	233.58	184.21	49.37	0.9980	691.49	193.13	499.36	2.661	0.9998	2.66
40901008	18J0402-08	NA	HSCNew-NMP-08-SD	2	- #4	100	F	162.2	692.24	21.1	201	232.36	181.56	50.8	0.9980	660.65	162.20	499.46	2.645	0.9998	2.64
40901009	18J0402-09	NA	HSCNew-NMP-09-SD	2	- #4	100	J	159.87	690.21	21.3	751	231.52	180.84	50.68	0.9979	658.62	159.84	499.81	2.655	0.9997	2.65
40901010	18J0402-10	NA	HSCNew-NMP-10-SD	1	- #4	100	E	164.7	695.04	20.8	208	230.75	179.71	51.04	0.9980	662.97	164.70	499.24	2.691	0.9998	2.69
40901011	18J0402-11	NA	HSCNew-NMP-11-SD	1	- #4	100	N	183.46	713.15	21.1	807	151.9	101.69	50.21	0.9980	681.78	183.43	499.36	2.665	0.9998	2.66
40901012	18J0402-12	NA	HSCNew-NMP-03-DUP	2	- #4	100	G	163.59	693.28	21	510	152.21	102.21	50	0.9980	661.89	163.54	499.35	2.687	0.9998	2.69

Performed By: AR Input Validation: AR Reviewed By: ALO Date: 10/17/2018

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-01
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-01-SD
		Lab Sample	40901001

Sample Color: **VERY DARK GREENISH GRAY**
USCS Group Name: **FAT CLAY WITH SAND**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (44)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1086
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1086
Dry Wt. Passing Split, gm	538
Total Sample Dry Wt, gm	538

Split Sample - Passing No. 4	
Tare No.	74
Tare + WS., gm	555.52
Tare + DS., gm	348.65
Tare, gm	145.92
Water Content of Split Sample	**102.0%**
Wt. of DS., gm	202.73
Wt. of +#200 Sample, gm	40.94

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.86	0.4%	99.6%	
No. 20	0.85	0.32	0.2%	99.4%	
No. 40	0.425	0.63	0.3%	99.1%	
No. 60	0.25	2.41	1.2%	97.9%	
No. 140	0.106	24.75	12.2%	85.7%	
No. 200	0.075	11.97	5.9%	79.8%	

HYDROMETER (-#200)

Tare No.	503	Wt. Dispers., gm	5	Specific Gravity	2.68
Wt. Tare + DS., gm	142.04	Wt. Dry Soil, gm (*-#200*)	34.75		Tested
Wt. Tare, gm	102.29	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9933*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	39	21.2	5.7	33.3	0.0134	95.2	0.0296	76.0%
5	37	21.2	5.7	31.3	0.0134	89.5	0.0190	71.4%
15	35.5	21.3	5.7	29.8	0.0133	85.2	0.0111	68.0%
30	34.5	21.4	5.6	28.9	0.0133	82.6	0.0079	65.9%
60	32	21.5	5.6	26.4	0.0133	75.5	0.0057	60.2%
250	29	22.5	5.3	23.7	0.0132	67.7	0.0028	54.1%
1440	26	22	5.5	20.5	0.0132	58.6	0.0012	46.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=20.7% Clay=59.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**20.2**	D30, mm	NA
Coarse=0.4; Medium=0.5; Fine=19.3		D10, mm	NA
% Fines (-#200)	**79.8**	Cc	NA
% Plus #200 (-3")	**20.2**	Cu	NA

USCS Description
FAT CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	21.4	21.5
0.05	78.1			
		Silt	27.0	27.1
0.002	51.1			
		Clay	51.1	51.3

USDA Classification
CLAY

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-01
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-01-SD
		Lab Sample	40901001

Soil Description: VERY DARK GREENISH GRAY FAT CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	74
Wt. Tare & WS, gm	555.52
Wt. Tare & DS, gm	348.65
Wt. Tare, gm	145.92
Water Content, %	102.0

SAMPLE SUMMARY

Liquid Limit (LL), %	**74**
Plastic Limit (PL), %	**21**
Plasticity Index (PI)	**53**
USCS Group Symbol (*-#40 Fraction*)	**CH**
USCS Group Name (*-#40 Fraction*)	**FAT CLAY**
Sample Color:	**VERY DARK GREENISH GRAY**

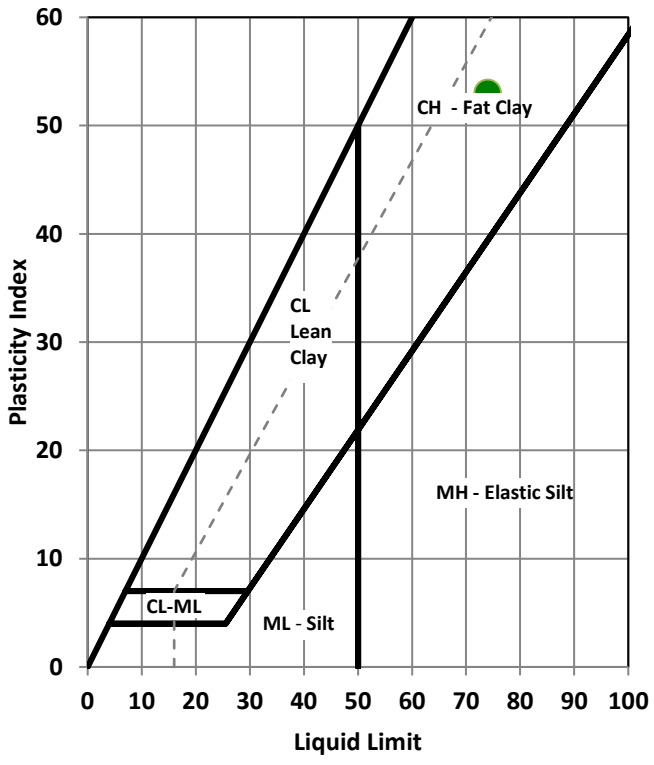
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	712	474	489
Wt. Tare & WS, gm	18.15	18.04	17.30
Wt. Tare & DS, gm	17.15	16.74	16.15
Wt. Tare, gm	12.50	10.77	10.55
Water Content, %	21.5	21.8	20.5

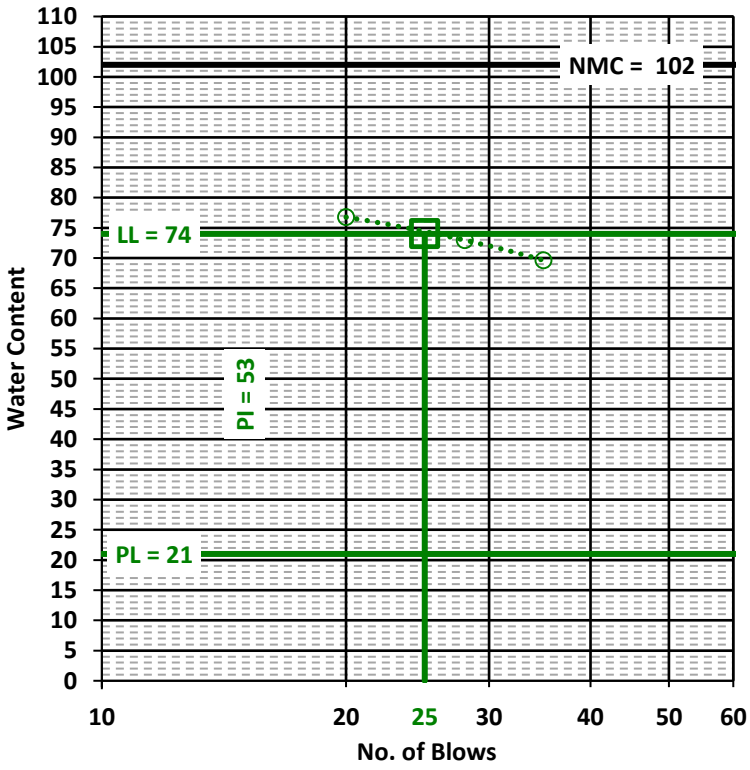
LIQUID LIMIT

	3 Points		
	472	471	409
	17.49	19.85	19.97
	14.58	16.02	16.16
	10.79	10.77	10.69
	76.8	73.0	69.7
# of Blows	20	28	35

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

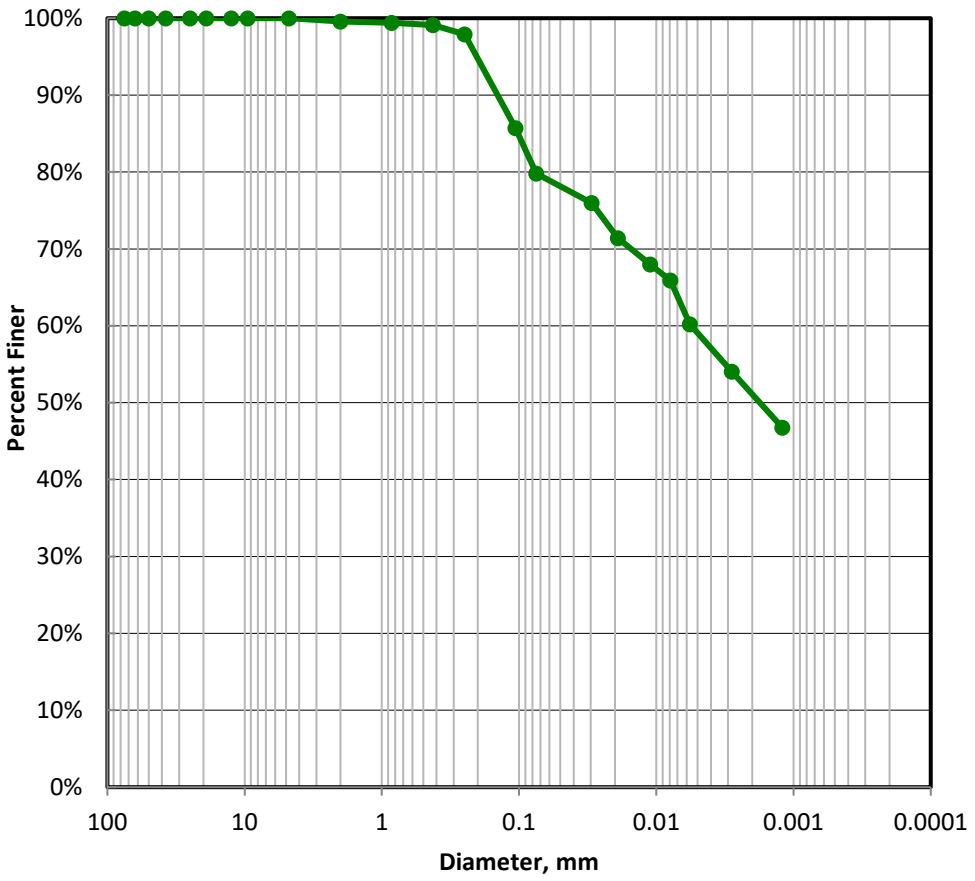
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-01
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-01-SD
		Lab Sample	40901001

Sample Color: **VERY DARK GREENISH GRAY**

USCS Group Name: **FAT CLAY WITH SAND**

USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (44)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.6%
No. 20	0.85	99.4%
No. 40	0.425	99.1%
No. 60	0.25	97.9%
No. 140	0.106	85.7%
No. 200	0.075	79.8%
NA	0.0296	76.0%
NA	0.0190	71.4%
NA	0.0111	68.0%
NA	0.0079	65.9%
NA	0.0057	60.2%
NA	0.0028	54.1%
NA	0.0012	46.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=20.7% Clay=59.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**20.2**	D30, mm	NA
Coarse=0.4; Medium=0.5; Fine=19.3		D10, mm	NA
% Fines (-#200)	**79.8**	Cc	NA
% Plus #200 (-3")	**20.2**	Cu	NA

USCS Description

FAT CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	21.4	21.5
0.05	78.1			
		Silt	27.0	27.1
0.002	51.1			
		Clay	51.1	51.3

USDA Classification

CLAY

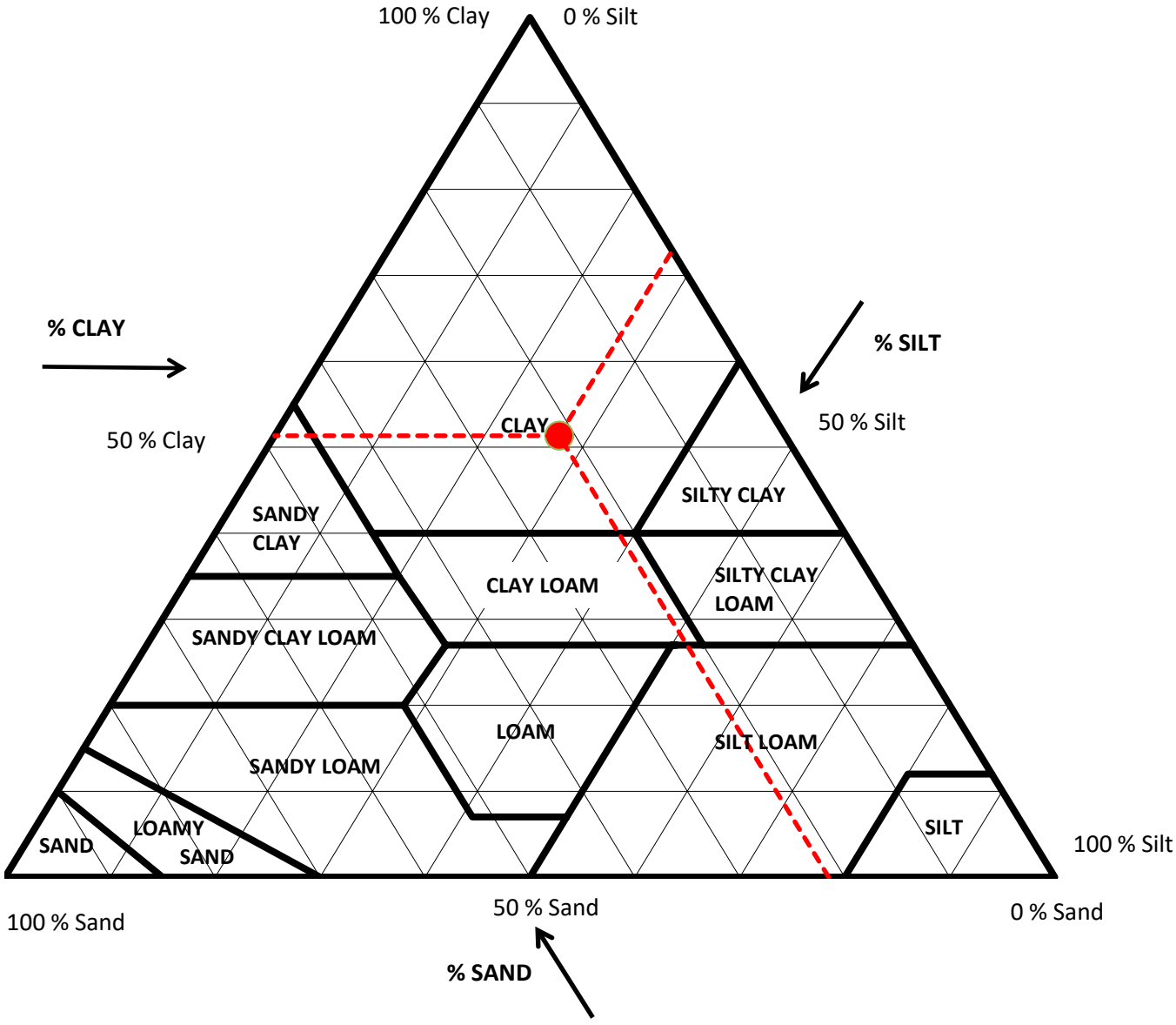
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-01
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-01-SD
		Lab Sample	40901001

Sample Color: **VERY DARK GREENISH GRAY**
USCS Group Name: **FAT CLAY WITH SAND**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (44)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	21.5
Percent Silt, %	27.1
Percent Clay, %	51.3

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.1
Coarse Sand; 1-0.5	0.3
Medium Sand; 0.5-0.25	1.3
Fine Sand; 0.25-0.1	13.3
Very Fine Sand; 0.1-0.05	6.6
Total	**21.5**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-02
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-02-SD
		Lab Sample	40901002

Sample Color: **VERY DARK GRAY**
USCS Group Name: **LEAN CLAY WITH SAND**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (20)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1012
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1012
Dry Wt. Passing Split, gm	704
Total Sample Dry Wt, gm	704

Split Sample - Passing No. 4	
Tare No.	73
Tare + WS., gm	608.39
Tare + DS., gm	467.71
Tare, gm	146.7
Water Content of Split Sample	**43.8%**
Wt. of DS., gm	321.01
Wt. of +#200 Sample, gm	68.87

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	1.25	0.4%	99.6%	
No. 20	0.85	2.36	0.7%	98.9%	
No. 40	0.425	2.17	0.7%	98.2%	
No. 60	0.25	2.16	0.7%	97.5%	
No. 140	0.106	30.01	9.3%	88.2%	
No. 200	0.075	30.92	9.6%	78.5%	

HYDROMETER (-#200)

Tare No.	513	Wt. Dispers., gm	5	Specific Gravity	2.67
Wt. Tare + DS., gm	155.56	Wt. Dry Soil, gm (*-#200*)	46.88		Tested
Wt. Tare, gm	103.68	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9955*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	41.5	21.2	5.7	35.8	0.0134	76.0	0.0291	59.7%
5	37	21.3	5.7	31.3	0.0134	66.5	0.0191	52.2%
15	34	21.4	5.6	28.4	0.0134	60.3	0.0113	47.4%
30	32.5	21.4	5.6	26.9	0.0134	57.1	0.0081	44.9%
60	30	21.6	5.6	24.4	0.0133	51.8	0.0058	40.7%
250	27	22.5	5.3	21.7	0.0132	46.1	0.0029	36.2%
1440	23	21.8	5.5	17.5	0.0133	37.2	0.0012	29.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=38.7% Clay=39.8%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**21.5**	D30, mm	NA
Coarse=0.4; Medium=1.4; Fine=19.7		D10, mm	NA
% Fines (-#200)	**78.5**	Cc	NA
% Plus #200 (-3")	**21.5**	Cu	NA

USCS Description
LEAN CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	29.1	29.2
0.05	70.5			
		Silt	37.3	37.4
0.002	33.2			
		Clay	33.2	33.3

USDA Classification
CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-02
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-02-SD
		Lab Sample	40901002

Soil Description: VERY DARK GRAY LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	73
Wt. Tare & WS, gm	608.39
Wt. Tare & DS, gm	467.71
Wt. Tare, gm	146.70
Water Content, %	43.8

SAMPLE SUMMARY

Liquid Limit (LL), %	**44**
Plastic Limit (PL), %	**17**
Plasticity Index (PI)	**27**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**VERY DARK GRAY**

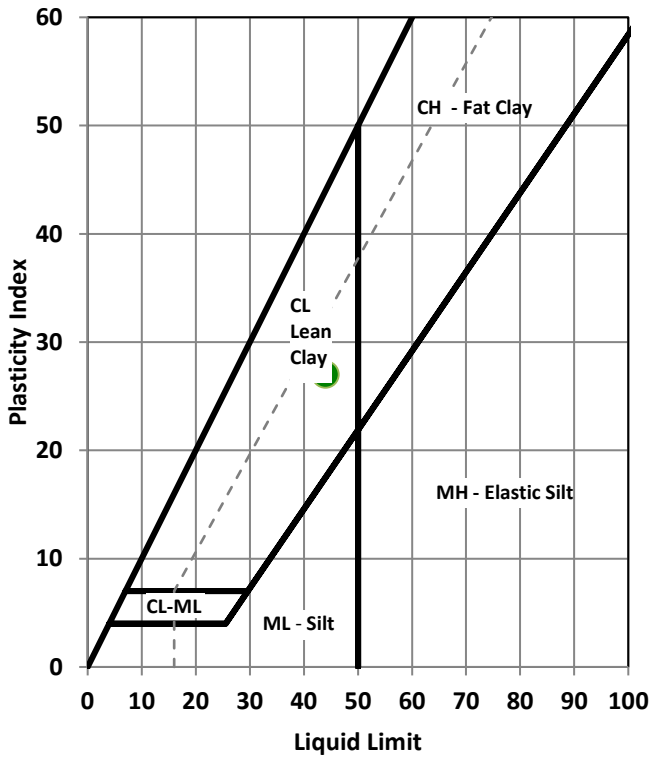
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	216	222	234
Wt. Tare & WS, gm	23.44	24.21	23.72
Wt. Tare & DS, gm	22.38	23.07	22.69
Wt. Tare, gm	16.13	16.24	16.40
Water Content, %	17.0	16.7	16.4

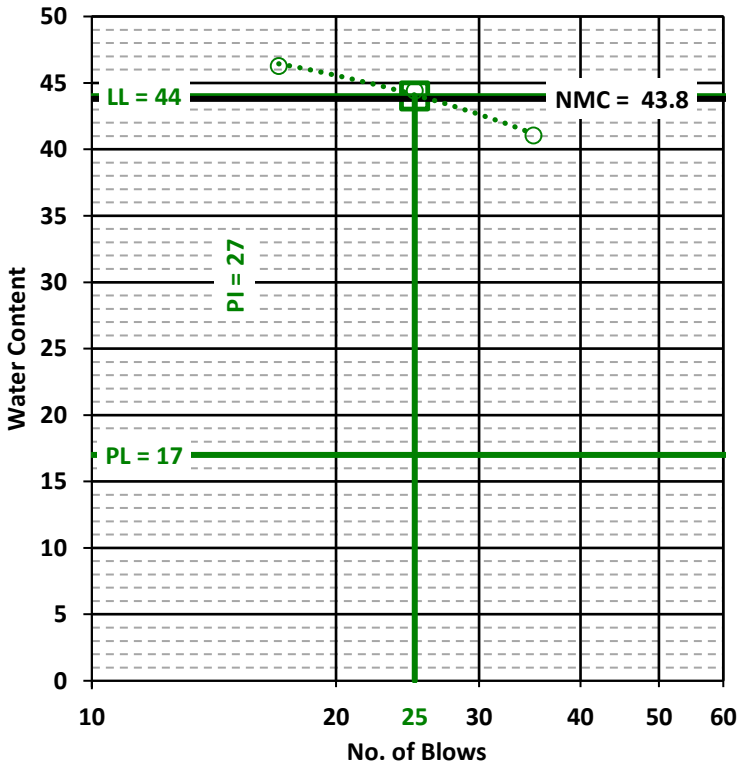
LIQUID LIMIT

	3 Points		
	215	221	202
	24.33	24.70	25.69
	21.85	22.12	22.99
	16.49	16.31	16.41
	46.3	44.4	41.0
# of Blows	17	25	35

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

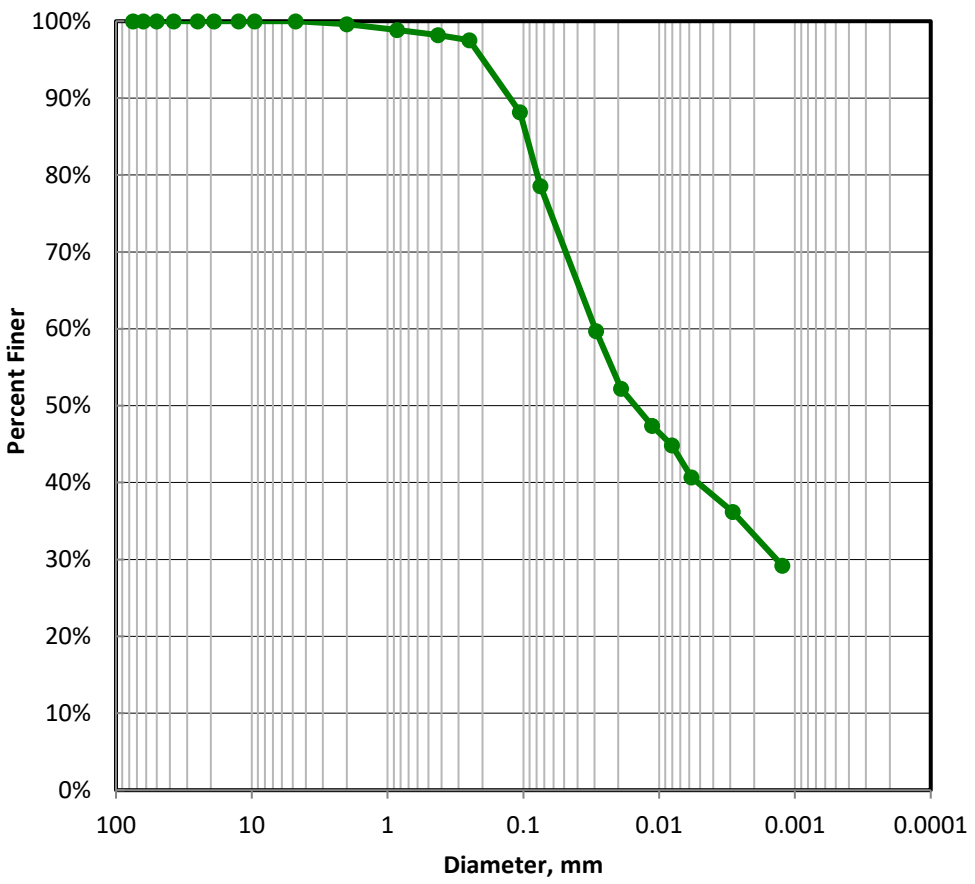
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-02
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-02-SD
		Lab Sample	40901002

Sample Color: **VERY DARK GRAY**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (20)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.6%
No. 20	0.85	98.9%
No. 40	0.425	98.2%
No. 60	0.25	97.5%
No. 140	0.106	88.2%
No. 200	0.075	78.5%
NA	0.0291	59.7%
NA	0.0191	52.2%
NA	0.0113	47.4%
NA	0.0081	44.9%
NA	0.0058	40.7%
NA	0.0029	36.2%
NA	0.0012	29.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=38.7% Clay=39.8%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**21.5**	D30, mm	NA
Coarse=0.4; Medium=1.4; Fine=19.7		D10, mm	NA
% Fines (-#200)	**78.5**	Cc	NA
% Plus #200 (-3")	**21.5**	Cu	NA

USCS Description

LEAN CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	29.1	29.2
0.05	70.5			
		Silt	37.3	37.4
0.002	33.2			
		Clay	33.2	33.3

USDA Classification

CLAY LOAM

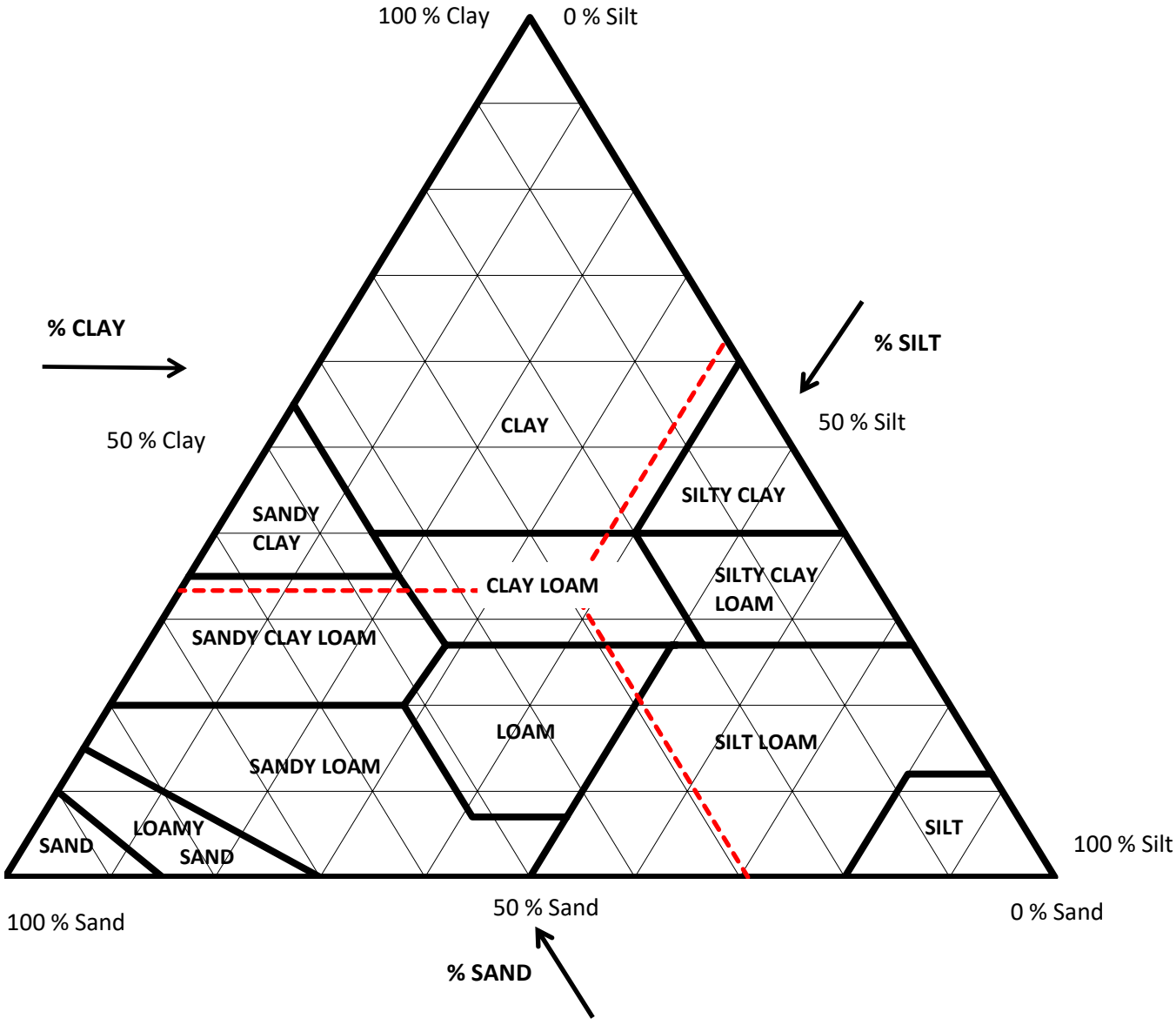
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-02
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-02-SD
		Lab Sample	40901002

Sample Color: **VERY DARK GRAY**
USCS Group Name: **LEAN CLAY WITH SAND**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (20)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	29.2
Percent Silt, %	37.4
Percent Clay, %	33.3

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.6
Coarse Sand; 1-0.5	0.7
Medium Sand; 0.5-0.25	0.8
Fine Sand; 0.25-0.1	11.0
Very Fine Sand; 0.1-0.05	16.1
Total	**29.2**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-03
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-SD
		Lab Sample	40901003

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1053
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	11
Wet Wt Passing Split, gm	1041
Dry Wt. Passing Split, gm	847
Total Sample Dry Wt, gm	859

Split Sample - Passing No. 4	
Tare No.	72
Tare + WS., gm	552.77
Tare + DS., gm	477.35
Tare, gm	147.62
Water Content of Split Sample	**22.9%**
Wt. of DS., gm	329.73
Wt. of +#200 Sample, gm	137.34

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	6.06	0.7%	99.3%	
3/8"	9.5	4.63	0.5%	98.8%	
No. 4	4.75	0.78	0.1%	98.7%	
No. 10	2	2.4	0.7%	97.9%	
No. 20	0.85	1.2	0.4%	97.6%	
No. 40	0.425	1.53	0.5%	97.1%	
No. 60	0.25	10.14	3.0%	94.1%	
No. 140	0.106	90.12	27.0%	67.1%	
No. 200	0.075	31.95	9.6%	57.6%	

HYDROMETER (-#200)

Tare No.	550	Wt. Dispers., gm	5	Specific Gravity	2.64
Wt. Tare + DS., gm	240.57	Wt. Dry Soil, gm (*-#200*)	41.12		Tested
Wt. Tare, gm	194.45	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*1.0023*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	35.5	21.5	5.6	29.9	0.0135	72.9	0.0307	42.0%
5	32	21.5	5.6	26.4	0.0135	64.4	0.0200	37.0%
15	29	21.6	5.6	23.4	0.0135	57.0	0.0118	32.8%
30	28	21.6	5.6	22.4	0.0135	54.6	0.0084	31.4%
60	26	21.7	5.6	20.4	0.0134	49.7	0.0060	28.6%
250	24	22.3	5.4	18.6	0.0133	45.3	0.0030	26.1%
1440	21	22.1	5.4	15.6	0.0134	38.0	0.0013	21.9%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**1.3**	Silt=29.6% Clay=28%	
Coarse=0; Fine=1.3		D60, mm	NA
% Sand (-#4 & +#200)	**41.1**	D30, mm	NA
Coarse=0.7; Medium=0.8; Fine=39.6		D10, mm	NA
% Fines (-#200)	**57.6**	Cc	NA
% Plus #200 (-3")	**42.4**	Cu	NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	2.1	0
2	97.9			
		Sand	47.5	48.5
0.05	50.5			
		Silt	26.3	26.9
0.002	24.2			
		Clay	24.2	24.7

USDA Classification
SANDY CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-03
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-SD
		Lab Sample	40901003

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	72
Wt. Tare & WS, gm	552.77
Wt. Tare & DS, gm	477.35
Wt. Tare, gm	147.62
Water Content, %	22.9

SAMPLE SUMMARY

Liquid Limit (LL), %	**23**
Plastic Limit (PL), %	**12**
Plasticity Index (PI)	**11**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

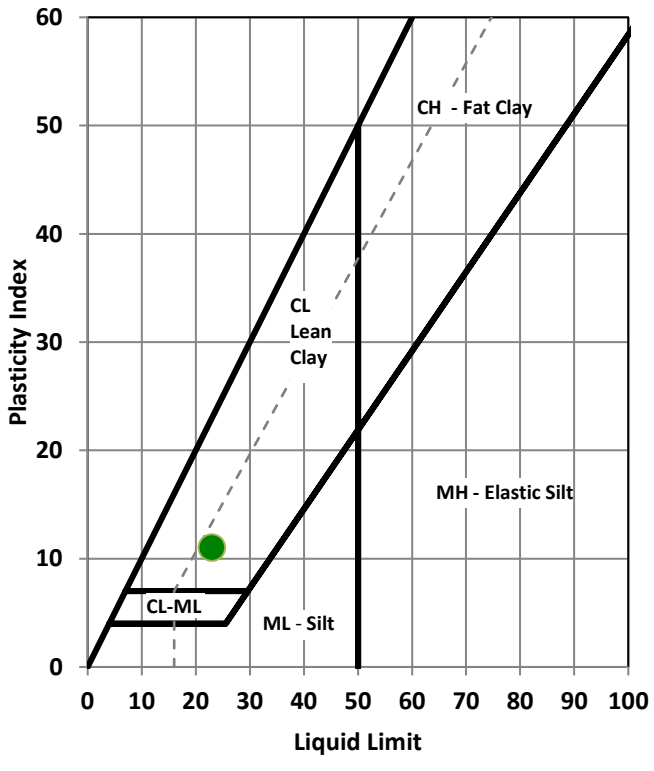
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	447	488	403
Wt. Tare & WS, gm	18.09	17.14	18.69
Wt. Tare & DS, gm	17.33	16.49	17.87
Wt. Tare, gm	10.74	10.86	10.75
Water Content, %	11.5	11.5	11.5

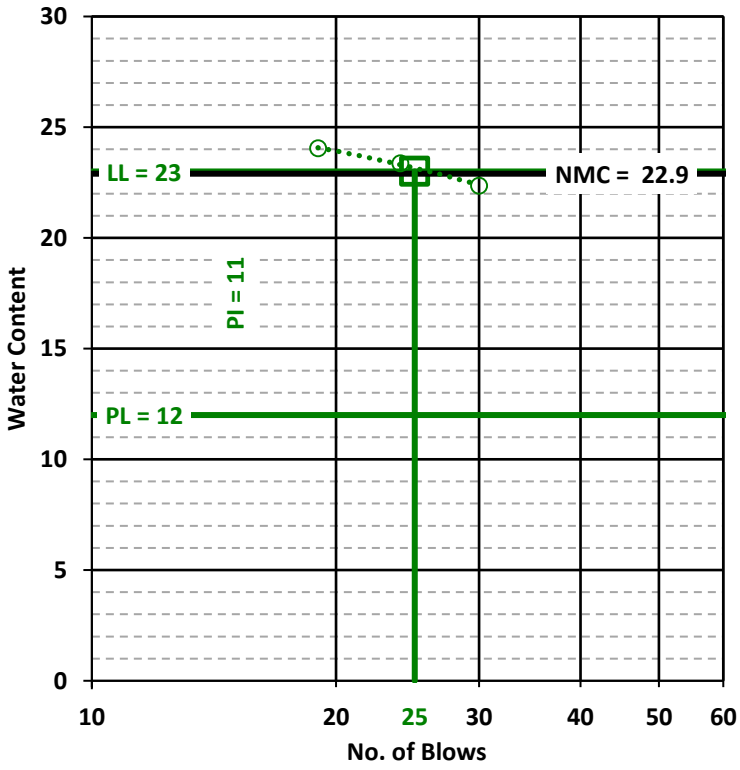
LIQUID LIMIT

	3 Points		
	470	704	410
	21.08	19.95	17.62
	19.07	18.31	16.37
	10.71	11.29	10.78
	24.0	23.4	22.4
# of Blows	19	24	30

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

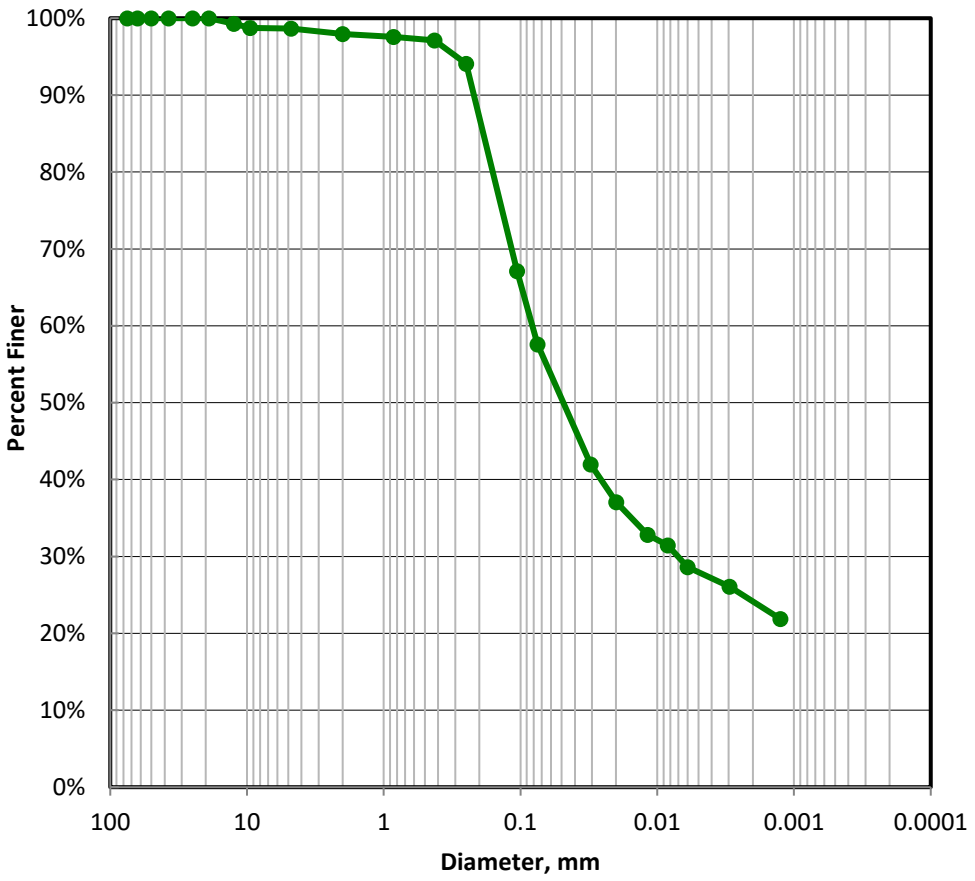
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-03
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-SD
		Lab Sample	40901003

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	99.3%
3/8"	9.5	98.8%
No. 4	4.75	98.7%
No. 10	2	97.9%
No. 20	0.85	97.6%
No. 40	0.425	97.1%
No. 60	0.25	94.1%
No. 140	0.106	67.1%
No. 200	0.075	57.6%
NA	0.0307	42.0%
NA	0.0200	37.0%
NA	0.0118	32.8%
NA	0.0084	31.4%
NA	0.0060	28.6%
NA	0.0030	26.1%
NA	0.0013	21.9%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**1.3**	Silt=29.6% Clay=28%	
Coarse=0; Fine=1.3		D60, mm	NA
% Sand (-#4 & +#200)	**41.1**	D30, mm	NA
Coarse=0.7; Medium=0.8; Fine=39.6		D10, mm	NA
% Fines (-#200)	**57.6**	Cc	NA
% Plus #200 (-3")	**42.4**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	97.9
0.05	50.5
0.002	24.2

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	2.1	0
Sand	47.5	48.5
Silt	26.3	26.9
Clay	24.2	24.7

USDA Classification

SANDY CLAY LOAM

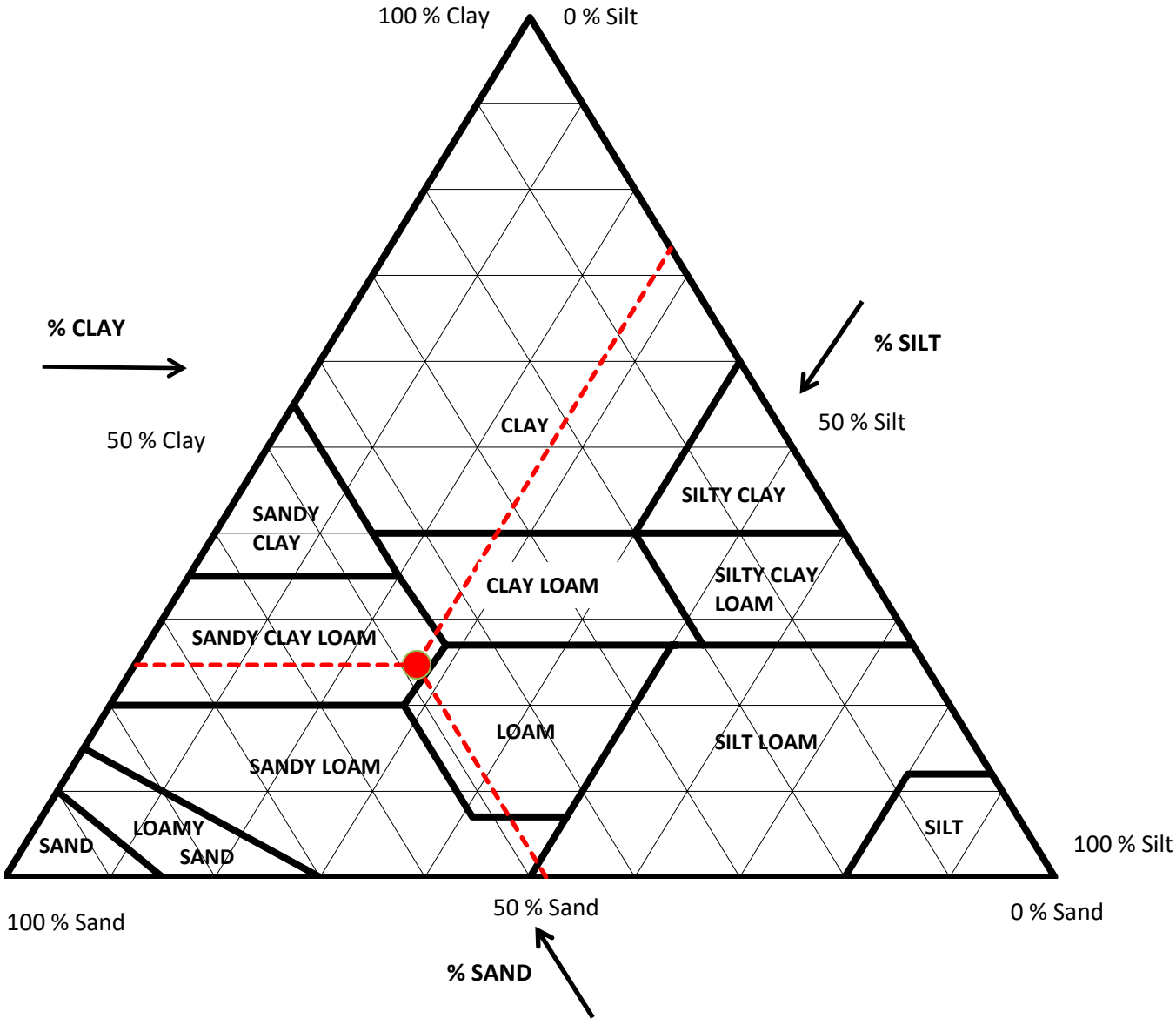
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-03
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-SD
		Lab Sample	40901003

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	48.5
Percent Silt, %	26.9
Percent Clay, %	24.7

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.3
Coarse Sand; 1-0.5	0.4
Medium Sand; 0.5-0.25	3.2
Fine Sand; 0.25-0.1	29.2
Very Fine Sand; 0.1-0.05	15.4
Total	**48.5**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-04
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-04-SD
		Lab Sample	40901004

Sample Color: **VERY DARK GRAY**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (45)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1092
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	2
Wet Wt Passing Split, gm	1091
Dry Wt. Passing Split, gm	623
Total Sample Dry Wt, gm	624

Split Sample - Passing No. 4	
Tare No.	2066
Tare + WS., gm	575.58
Tare + DS., gm	394.07
Tare, gm	152.59
Water Content of Split Sample	**75.2%**
Wt. of DS., gm	241.48
Wt. of +#200 Sample, gm	31.00

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	1.7	0.3%	99.7%	
No. 4	4.75	0	0.0%	99.7%	
No. 10	2	0.92	0.4%	99.3%	
No. 20	0.85	1.21	0.5%	98.8%	
No. 40	0.425	0.89	0.4%	98.5%	
No. 60	0.25	1.28	0.5%	98.0%	
No. 140	0.106	15.66	6.5%	91.5%	
No. 200	0.075	11.04	4.6%	86.9%	

HYDROMETER (-#200)

Tare No.	523	Wt. Dispers., gm	5	Specific Gravity	2.65
Wt. Tare + DS., gm	154.08	Wt. Dry Soil, gm (*-#200*)	46.13		Tested
Wt. Tare, gm	102.95	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*1.0000*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	48	22	5.5	42.5	0.0134	92.1	0.0273	80.1%
5	46	22	5.5	40.5	0.0134	87.8	0.0176	76.3%
15	43	22.1	5.4	37.6	0.0133	81.5	0.0104	70.9%
30	40.5	22.1	5.4	35.1	0.0133	76.1	0.0075	66.1%
60	37	22.2	5.4	31.6	0.0133	68.5	0.0055	59.5%
250	31.5	23.1	5.2	26.3	0.0132	57.0	0.0028	49.6%
1440	26.5	21.6	5.6	20.9	0.0134	45.3	0.0012	39.4%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.3**	Silt=28.7% Clay=58.2%	
Coarse=0; Fine=0.3		D60, mm	NA
% Sand (-#4 & +#200)	**12.8**	D30, mm	NA
Coarse=0.4; Medium=0.9; Fine=11.6		D10, mm	NA
% Fines (-#200)	**86.9**	Cc	NA
% Plus #200 (-3")	**13.1**	Cu	NA

USCS Description
FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.7	0
2	99.3			
		Sand	15.2	15.3
0.05	84.2			
		Silt	38.7	38.9
0.002	45.5			
		Clay	45.5	45.8

USDA Classification
CLAY

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-04
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-04-SD
		Lab Sample	40901004

Soil Description: VERY DARK GRAY FAT CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	2066
Wt. Tare & WS, gm	575.58
Wt. Tare & DS, gm	394.07
Wt. Tare, gm	152.59
Water Content, %	75.2

SAMPLE SUMMARY

Liquid Limit (LL), %	**70**
Plastic Limit (PL), %	**23**
Plasticity Index (PI)	**47**
USCS Group Symbol (*-#40 Fraction*)	**CH**
USCS Group Name (*-#40 Fraction*)	**FAT CLAY**
Sample Color:	**VERY DARK GRAY**

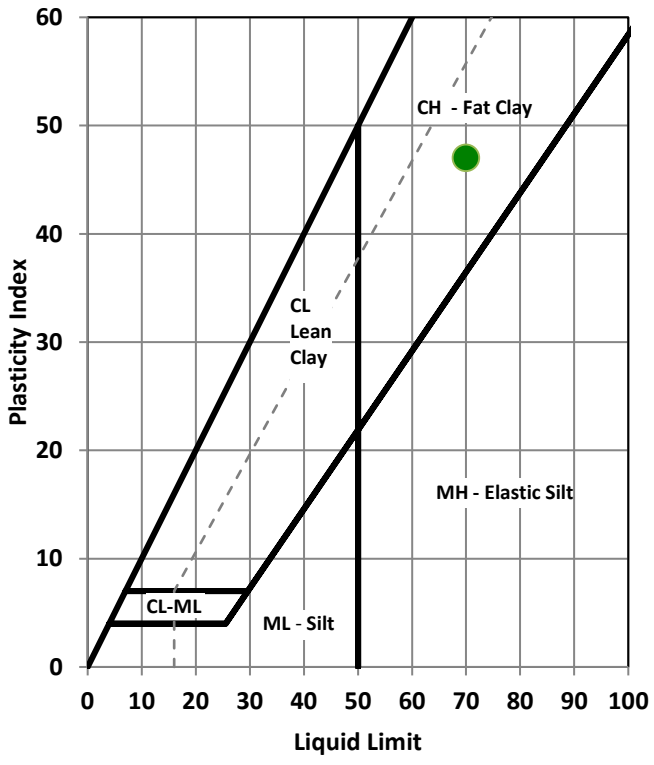
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	444	486	463
Wt. Tare & WS, gm	17.42	17.70	16.90
Wt. Tare & DS, gm	16.16	16.39	15.72
Wt. Tare, gm	10.71	10.79	10.72
Water Content, %	23.1	23.4	23.6

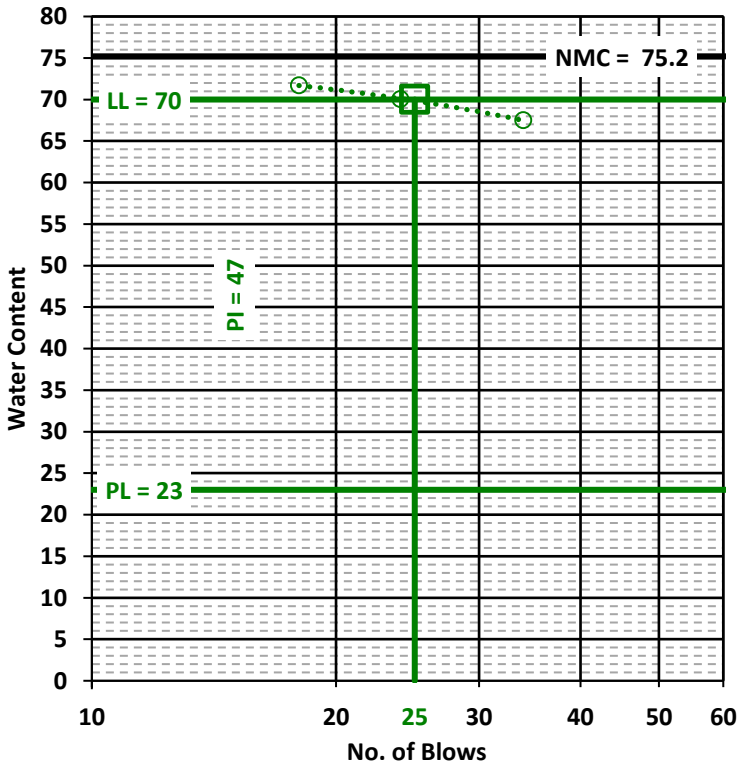
LIQUID LIMIT

	3 Points		
	405	459	424
	18.14	19.49	19.38
	14.97	15.91	15.91
	10.55	10.80	10.77
	71.7	70.1	67.5
# of Blows	18	24	34

PLASTICITY CHART



FLOW CURVE



Performed By: ZH Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

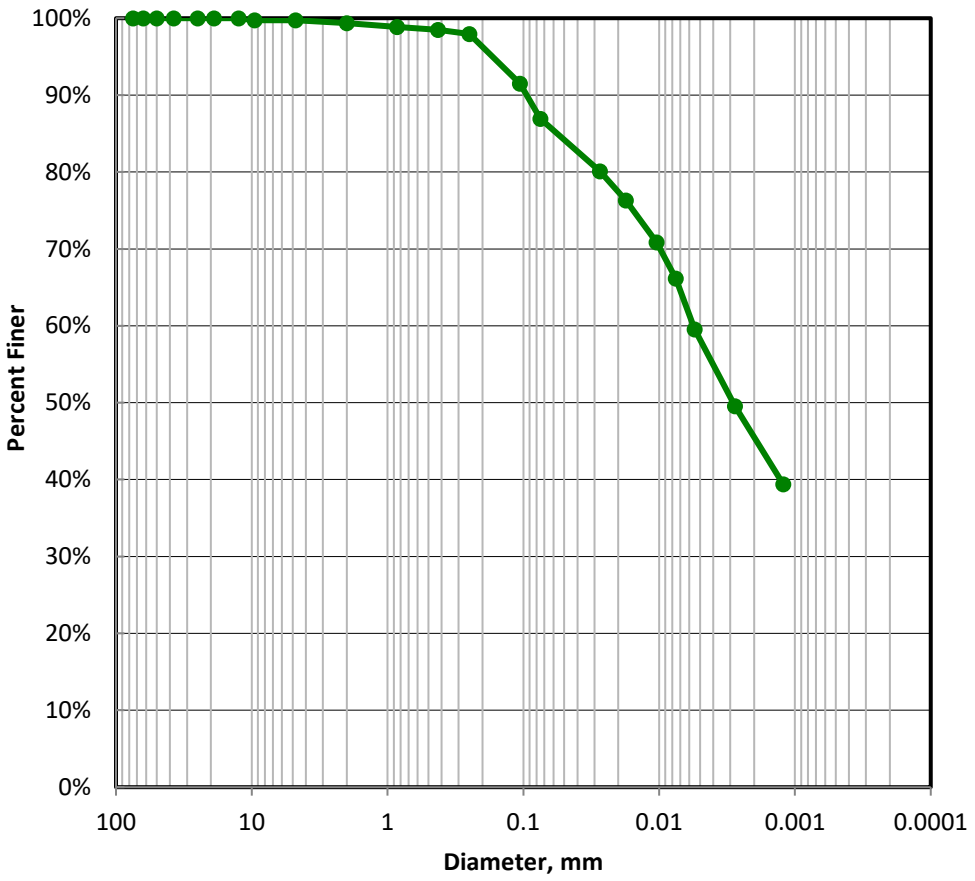
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-04
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-04-SD
		Lab Sample	40901004

Sample Color: **VERY DARK GRAY**

USCS Group Name: **FAT CLAY**

USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (45)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	99.7%
No. 4	4.75	99.7%
No. 10	2	99.3%
No. 20	0.85	98.8%
No. 40	0.425	98.5%
No. 60	0.25	98.0%
No. 140	0.106	91.5%
No. 200	0.075	86.9%
NA	0.0273	80.1%
NA	0.0176	76.3%
NA	0.0104	70.9%
NA	0.0075	66.1%
NA	0.0055	59.5%
NA	0.0028	49.6%
NA	0.0012	39.4%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.3**	Silt=28.7% Clay=58.2%	
Coarse=0; Fine=0.3		D60, mm	NA
% Sand (-#4 & +#200)	**12.8**	D30, mm	NA
Coarse=0.4; Medium=0.9; Fine=11.6		D10, mm	NA
% Fines (-#200)	**86.9**	Cc	NA
% Plus #200 (-3")	**13.1**	Cu	NA

USCS Description

FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	99.3
0.05	84.2
0.002	45.5

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.7	0
Sand	15.2	15.3
Silt	38.7	38.9
Clay	45.5	45.8

USDA Classification

CLAY

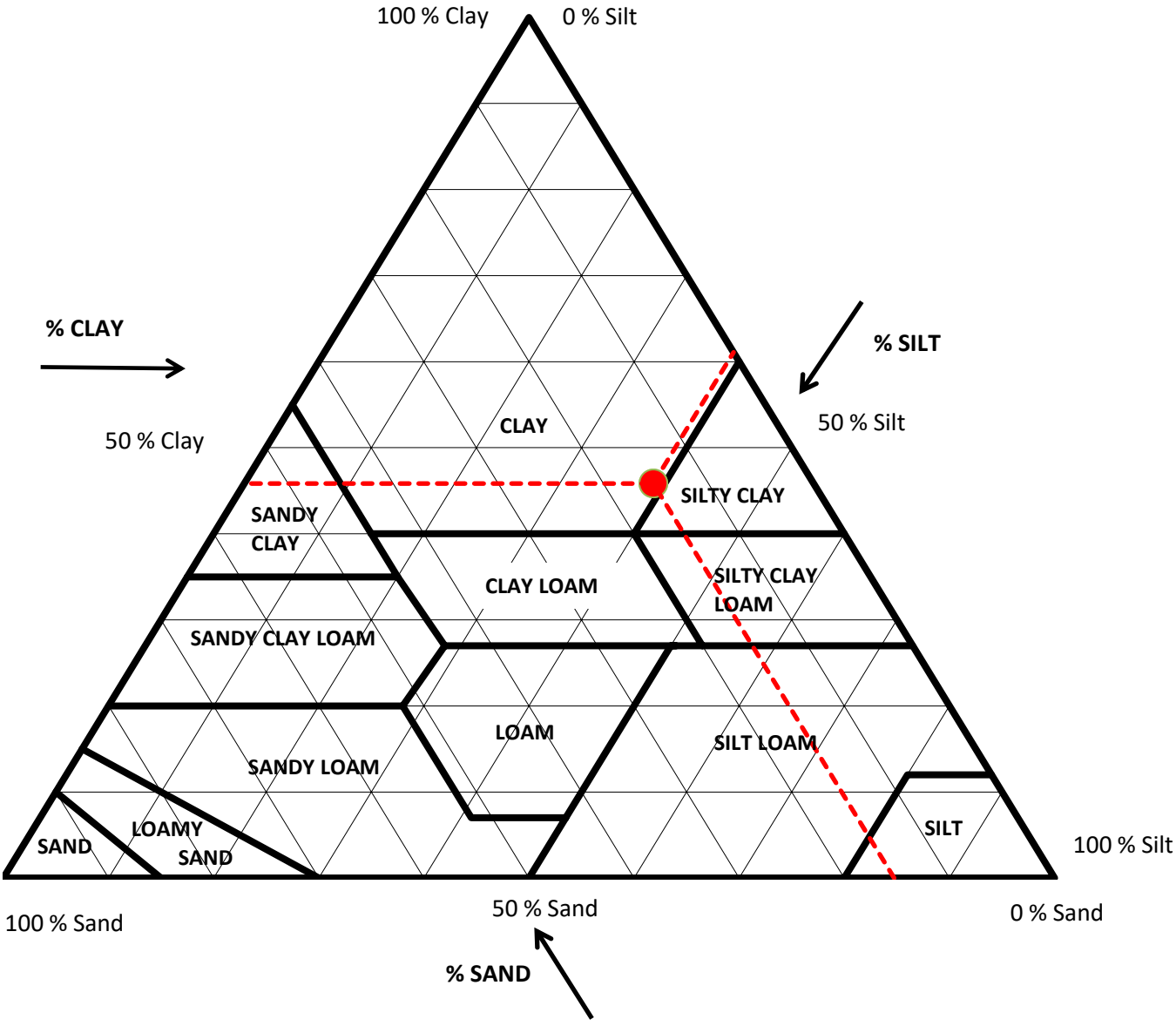
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-04
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-04-SD
		Lab Sample	40901004

Sample Color: **VERY DARK GRAY**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (45)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	15.3
Percent Silt, %	38.9
Percent Clay, %	45.8

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.4
Coarse Sand; 1-0.5	0.4
Medium Sand; 0.5-0.25	0.6
Fine Sand; 0.25-0.1	7.3
Very Fine Sand; 0.1-0.05	6.6
Total	**15.3**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-05
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-05-SD
		Lab Sample	40901005

Sample Color: **DARK GRAY**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1248
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	2
Wet Wt Passing Split, gm	1246
Dry Wt. Passing Split, gm	811
Total Sample Dry Wt, gm	813

Split Sample - Passing No. 4	
Tare No.	2009
Tare + WS., gm	674.68
Tare + DS., gm	491.61
Tare, gm	150.33
Water Content of Split Sample	**53.6%**
Wt. of DS., gm	341.28
Wt. of +#200 Sample, gm	117.76

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	1.06	0.1%	99.9%	
No. 4	4.75	1.43	0.2%	99.7%	
No. 10	2	9.72	2.8%	96.9%	
No. 20	0.85	6.84	2.0%	94.9%	
No. 40	0.425	4.41	1.3%	93.6%	
No. 60	0.25	6.52	1.9%	91.7%	
No. 140	0.106	51.98	15.2%	76.5%	
No. 200	0.075	38.29	11.2%	65.3%	

HYDROMETER (-#200)

Tare No.	543	Wt. Dispers., gm	5	Specific Gravity	2.67
Wt. Tare + DS., gm	233.81	Wt. Dry Soil, gm (*-#200*)	32.63		Tested
Wt. Tare, gm	196.18	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9955*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	32.5	21.5	5.6	26.9	0.0134	82.1	0.0311	53.6%
5	30	21.5	5.6	24.4	0.0134	74.4	0.0201	48.6%
15	28.5	21.7	5.6	22.9	0.0133	69.9	0.0117	45.6%
30	27.5	21.8	5.5	22.0	0.0133	67.1	0.0083	43.8%
60	26	21.9	5.5	20.5	0.0133	62.5	0.0059	40.8%
250	23	23	5.2	17.8	0.0131	54.3	0.0029	35.5%
1440	20.5	21.5	5.6	14.9	0.0134	45.5	0.0013	29.7%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.3**	Silt=25.8% Clay=39.5%	
Coarse=0; Fine=0.3		D60, mm	NA
% Sand (-#4 & +#200)	**34.4**	D30, mm	NA
Coarse=2.8; Medium=3.3; Fine=28.3		D10, mm	NA
% Fines (-#200)	**65.3**	Cc	NA
% Plus #200 (-3")	**34.7**	Cu	NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	3.1	0
2	96.9			
		Sand	37.0	38.2
0.05	59.9			
		Silt	27.0	27.9
0.002	32.8			
		Clay	32.8	33.9

USDA Classification
CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-05
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-05-SD
		Lab Sample	40901005

Soil Description: DARK GRAY LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	2009
Wt. Tare & WS, gm	674.68
Wt. Tare & DS, gm	491.61
Wt. Tare, gm	150.33
Water Content, %	53.6

SAMPLE SUMMARY

Liquid Limit (LL), %	**47**
Plastic Limit (PL), %	**16**
Plasticity Index (PI)	**31**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**DARK GRAY**

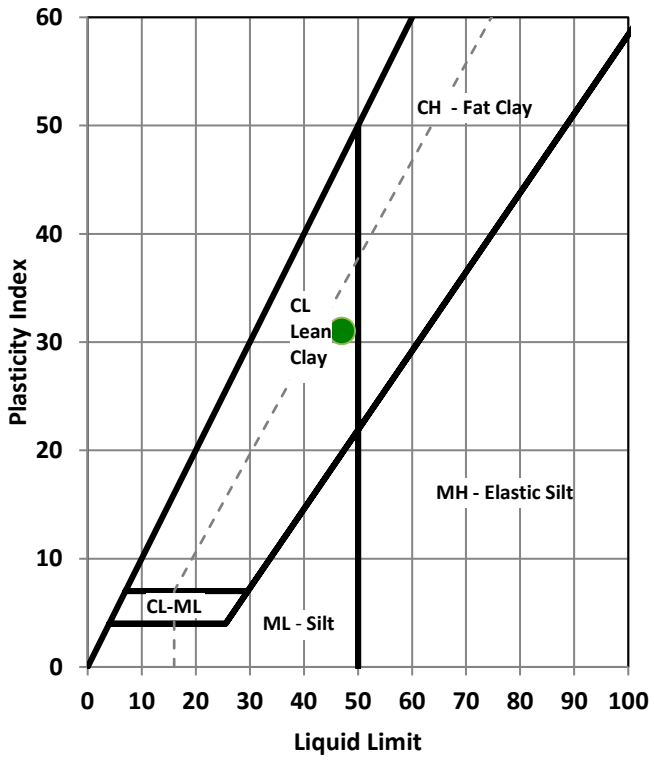
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	508	461	433
Wt. Tare & WS, gm	18.27	16.85	17.70
Wt. Tare & DS, gm	17.20	16.03	16.76
Wt. Tare, gm	10.79	10.68	10.72
Water Content, %	16.7	15.3	15.6

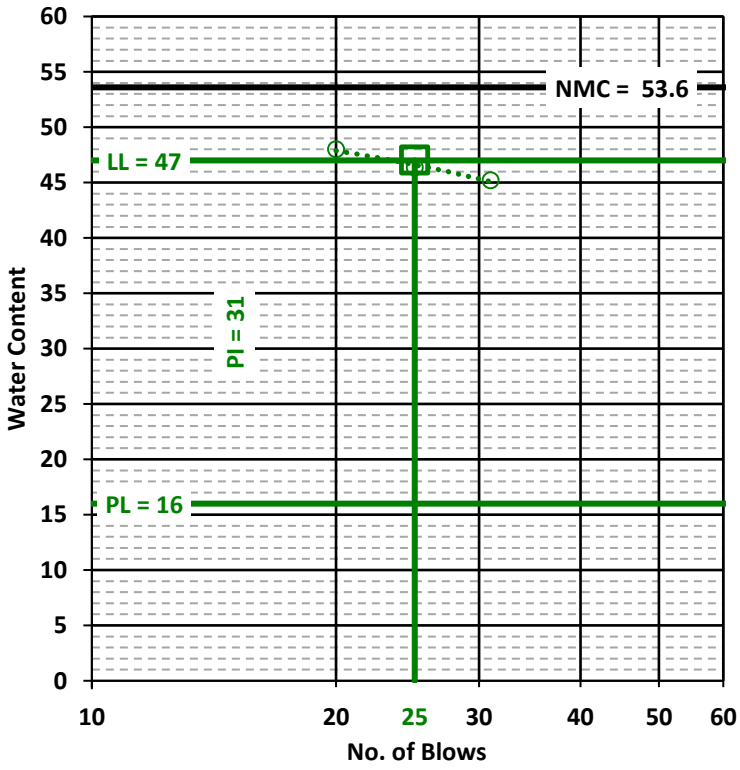
LIQUID LIMIT

	3 Points		
	469	485	500
	19.24	20.11	18.92
	16.48	17.17	16.38
	10.73	10.83	10.76
	48.0	46.4	45.2
# of Blows	20	25	31

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

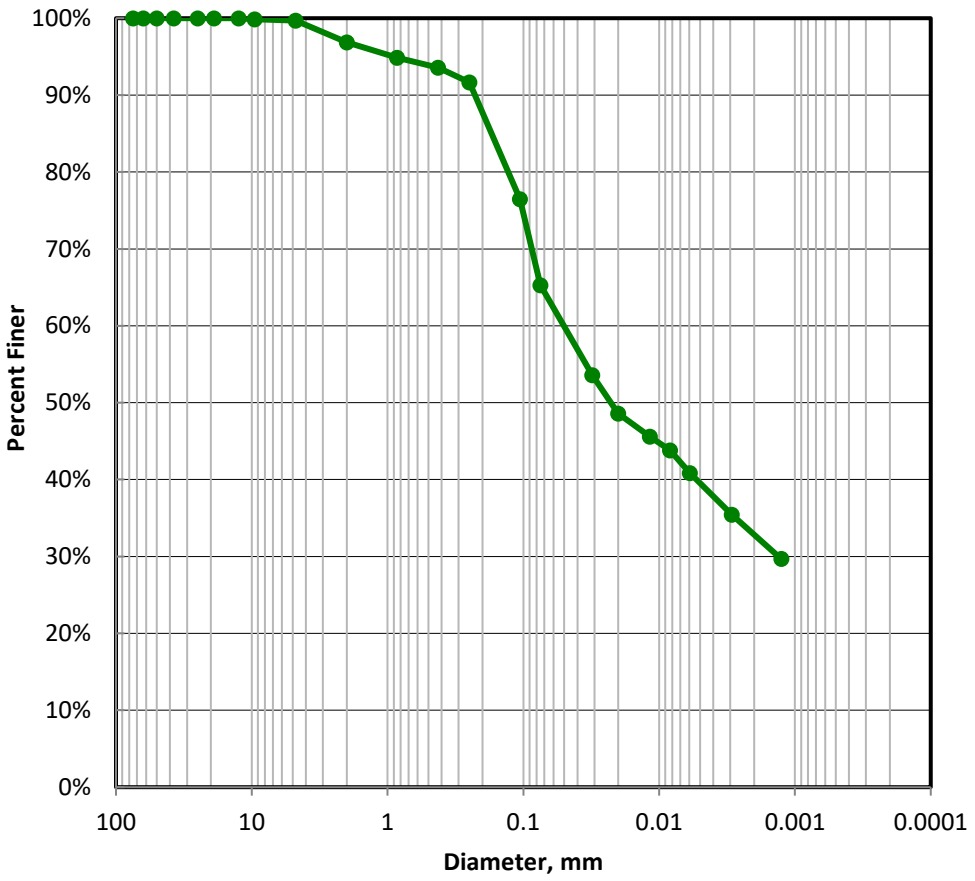
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-05
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-05-SD
		Lab Sample	40901005

Sample Color: **DARK GRAY**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	99.9%
No. 4	4.75	99.7%
No. 10	2	96.9%
No. 20	0.85	94.9%
No. 40	0.425	93.6%
No. 60	0.25	91.7%
No. 140	0.106	76.5%
No. 200	0.075	65.3%
NA	0.0311	53.6%
NA	0.0201	48.6%
NA	0.0117	45.6%
NA	0.0083	43.8%
NA	0.0059	40.8%
NA	0.0029	35.5%
NA	0.0013	29.7%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.3**	Silt=25.8% Clay=39.5%	
Coarse=0; Fine=0.3		D60, mm	NA
% Sand (-#4 & +#200)	**34.4**	D30, mm	NA
Coarse=2.8; Medium=3.3; Fine=28.3		D10, mm	NA
% Fines (-#200)	**65.3**	Cc	NA
% Plus #200 (-3")	**34.7**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	3.1	0
2	96.9			
		Sand	37.0	38.2
0.05	59.9			
		Silt	27.0	27.9
0.002	32.8			
		Clay	32.8	33.9

USDA Classification

CLAY LOAM

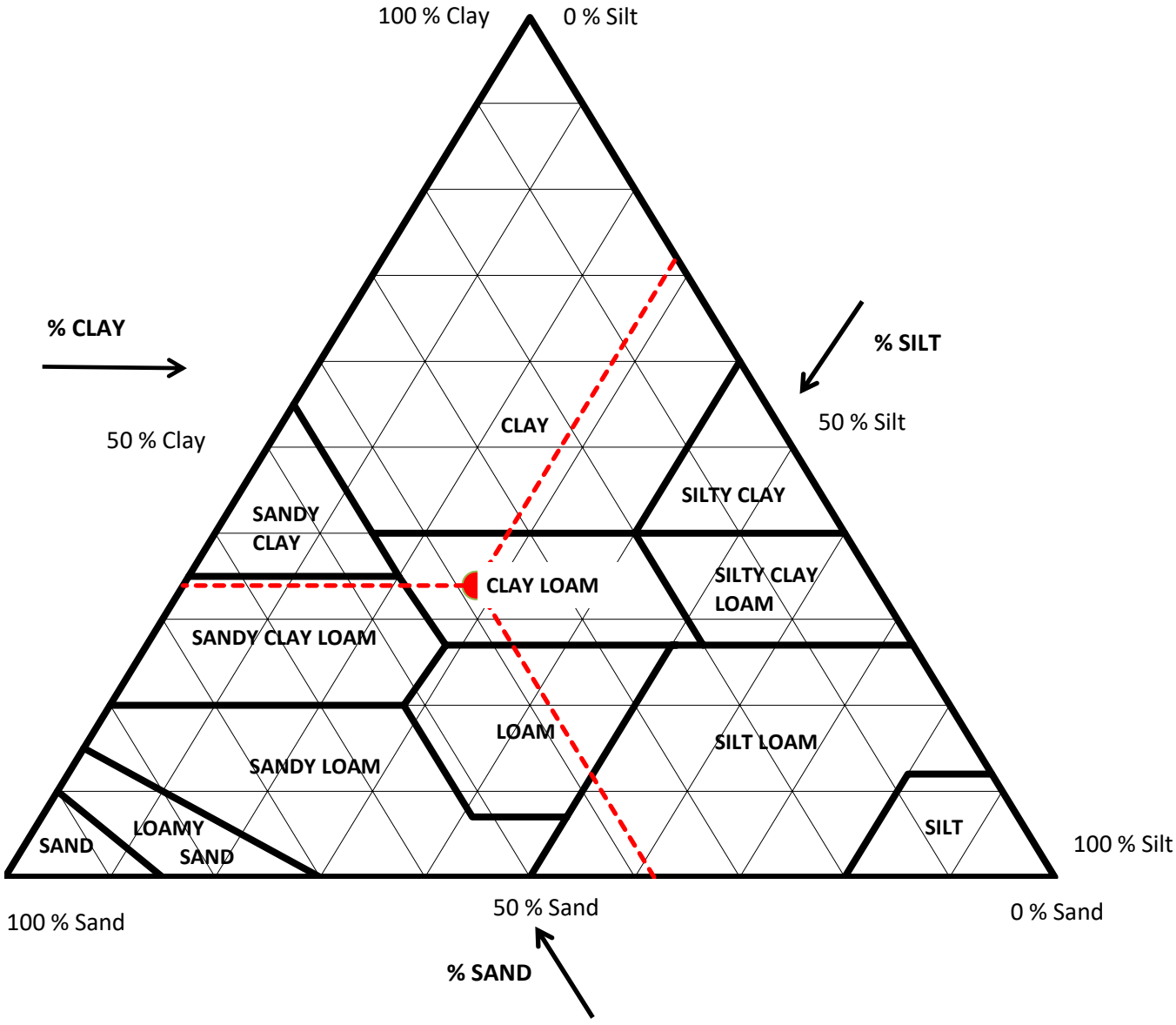
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-05
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-05-SD
		Lab Sample	40901005

Sample Color: **DARK GRAY**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	38.2
Percent Silt, %	27.9
Percent Clay, %	33.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	1.7
Coarse Sand; 1-0.5	1.4
Medium Sand; 0.5-0.25	2.3
Fine Sand; 0.25-0.1	17.6
Very Fine Sand; 0.1-0.05	15.2
Total	**38.2**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-06
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-06-SD
		Lab Sample	40901006

Sample Color: **BROWN**
USCS Group Name: **LEAN CLAY WITH SAND**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (19)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1070
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	11
Wet Wt Passing Split, gm	1059
Dry Wt. Passing Split, gm	721
Total Sample Dry Wt, gm	732

Split Sample - Passing No. 4	
Tare No.	2074
Tare + WS., gm	612.61
Tare + DS., gm	465.95
Tare, gm	153.25
Water Content of Split Sample	**46.9%**
Wt. of DS., gm	312.70
Wt. of +#200 Sample, gm	57.46

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	2.86	0.4%	99.6%	
3/8"	9.5	7.77	1.1%	98.5%	
No. 4	4.75	0.5	0.1%	98.5%	
No. 10	2	0.26	0.1%	98.4%	
No. 20	0.85	1.71	0.5%	97.9%	
No. 40	0.425	2.35	0.7%	97.1%	
No. 60	0.25	2.81	0.9%	96.2%	
No. 140	0.106	22.29	7.0%	89.2%	
No. 200	0.075	28.04	8.8%	80.4%	

HYDROMETER (-#200)

Tare No.	Q53	Wt. Dispers., gm	5	Specific Gravity	2.65
Wt. Tare + DS., gm	242.5	Wt. Dry Soil, gm (*-#200*)	45.1		Tested
Wt. Tare, gm	192.4	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*1.0000*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	42	21.4	5.6	36.4	0.0135	80.7	0.0290	64.9%
5	38	21.4	5.6	32.4	0.0135	71.8	0.0190	57.7%
15	34.5	21.5	5.6	28.9	0.0134	64.1	0.0113	51.5%
30	32	21.7	5.6	26.4	0.0134	58.5	0.0081	47.1%
60	30	21.8	5.5	24.5	0.0134	54.3	0.0058	43.7%
250	26	22.9	5.2	20.8	0.0132	46.1	0.0029	37.1%
1440	22.5	21.5	5.6	16.9	0.0134	37.5	0.0013	30.1%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**1.5**	Silt=38.1% Clay=42.3%	
Coarse=0; Fine=1.5		D60, mm	NA
% Sand (-#4 & +#200)	**18.1**	D30, mm	NA
Coarse=0.1; Medium=1.3; Fine=16.7		D10, mm	NA
% Fines (-#200)	**80.4**	Cc	NA
% Plus #200 (-3")	**19.6**	Cu	NA

USCS Description
LEAN CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	1.6	0
2	98.4			
		Sand	24.6	25.0
0.05	73.8			
		Silt	39.7	40.4
0.002	34.0			
		Clay	34.0	34.6

USDA Classification
CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-06
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-06-SD
		Lab Sample	40901006

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	2074
Wt. Tare & WS, gm	612.61
Wt. Tare & DS, gm	465.95
Wt. Tare, gm	153.25
Water Content, %	46.9

SAMPLE SUMMARY

Liquid Limit (LL), %	**42**
Plastic Limit (PL), %	**17**
Plasticity Index (PI)	**25**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

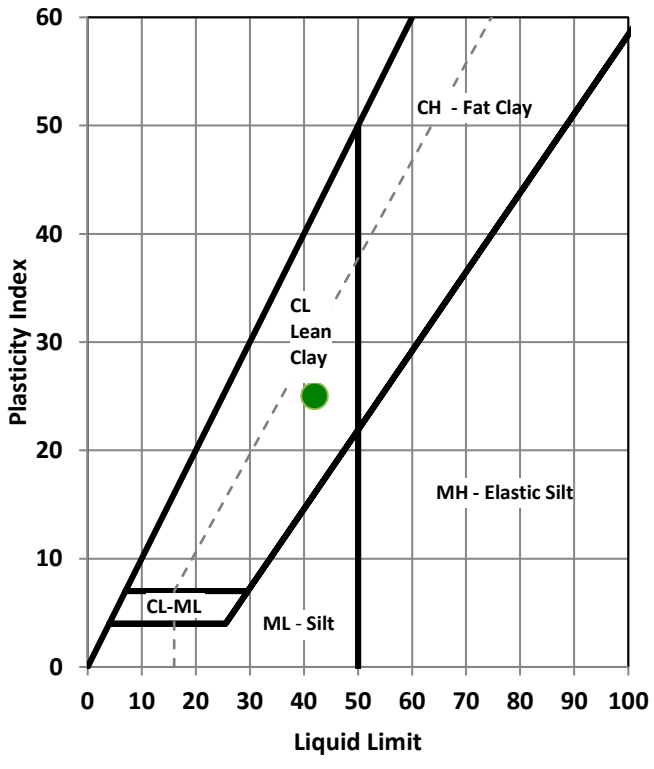
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	434	702	423
Wt. Tare & WS, gm	17.55	17.54	17.11
Wt. Tare & DS, gm	16.57	16.81	16.19
Wt. Tare, gm	10.78	12.47	10.73
Water Content, %	16.9	16.8	16.8

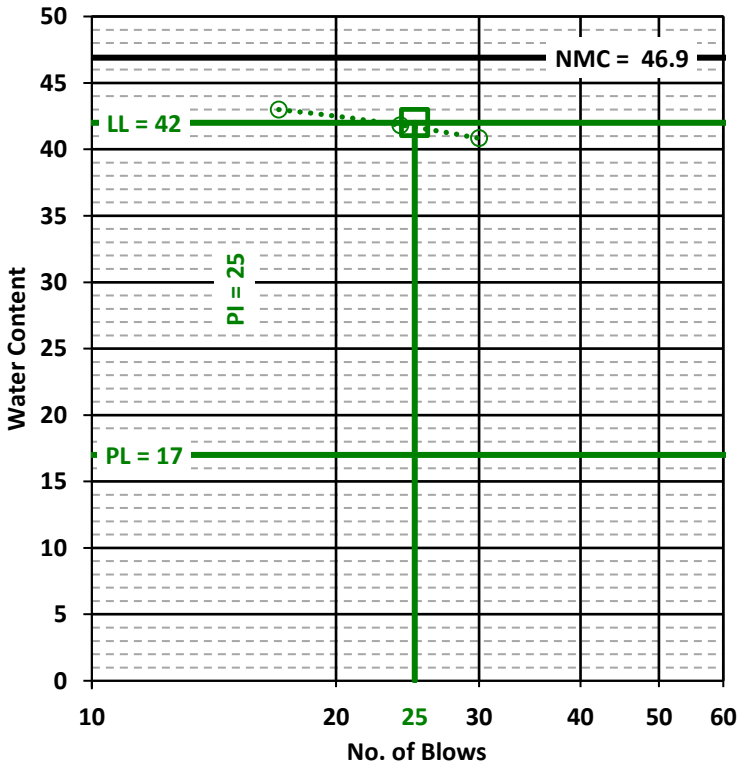
LIQUID LIMIT

	3 Points		
	422	450	404
	19.39	19.90	19.76
	16.81	17.22	17.15
	10.81	10.81	10.76
	43.0	41.8	40.8
# of Blows	17	24	30

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

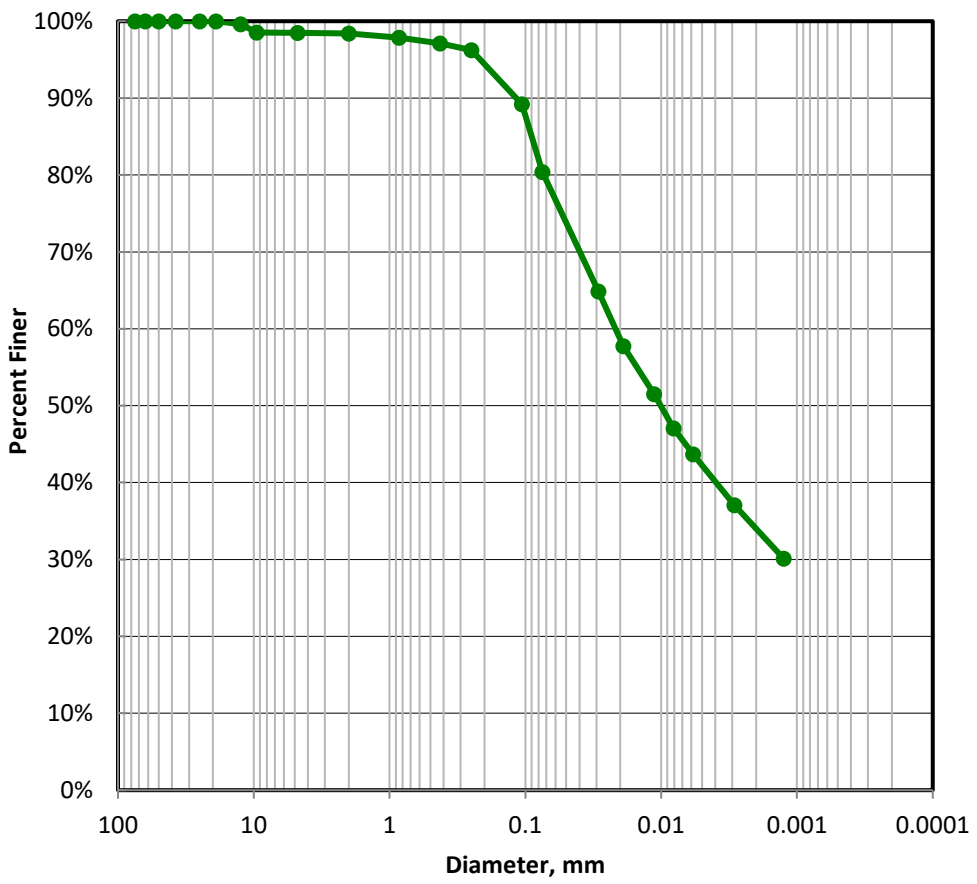
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-06
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-06-SD
		Lab Sample	40901006

Sample Color: **BROWN**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (19)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	99.6%
3/8"	9.5	98.5%
No. 4	4.75	98.5%
No. 10	2	98.4%
No. 20	0.85	97.9%
No. 40	0.425	97.1%
No. 60	0.25	96.2%
No. 140	0.106	89.2%
No. 200	0.075	80.4%
NA	0.0290	64.9%
NA	0.0190	57.7%
NA	0.0113	51.5%
NA	0.0081	47.1%
NA	0.0058	43.7%
NA	0.0029	37.1%
NA	0.0013	30.1%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**1.5**	Silt=38.1% Clay=42.3%	
Coarse=0; Fine=1.5		D60, mm	NA
% Sand (-#4 & +#200)	**18.1**	D30, mm	NA
Coarse=0.1; Medium=1.3; Fine=16.7		D10, mm	NA
% Fines (-#200)	**80.4**	Cc	NA
% Plus #200 (-3")	**19.6**	Cu	NA

USCS Description

LEAN CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	98.4
0.05	73.8
0.002	34.0

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	1.6	0
Sand	24.6	25.0
Silt	39.7	40.4
Clay	34.0	34.6

USDA Classification

CLAY LOAM

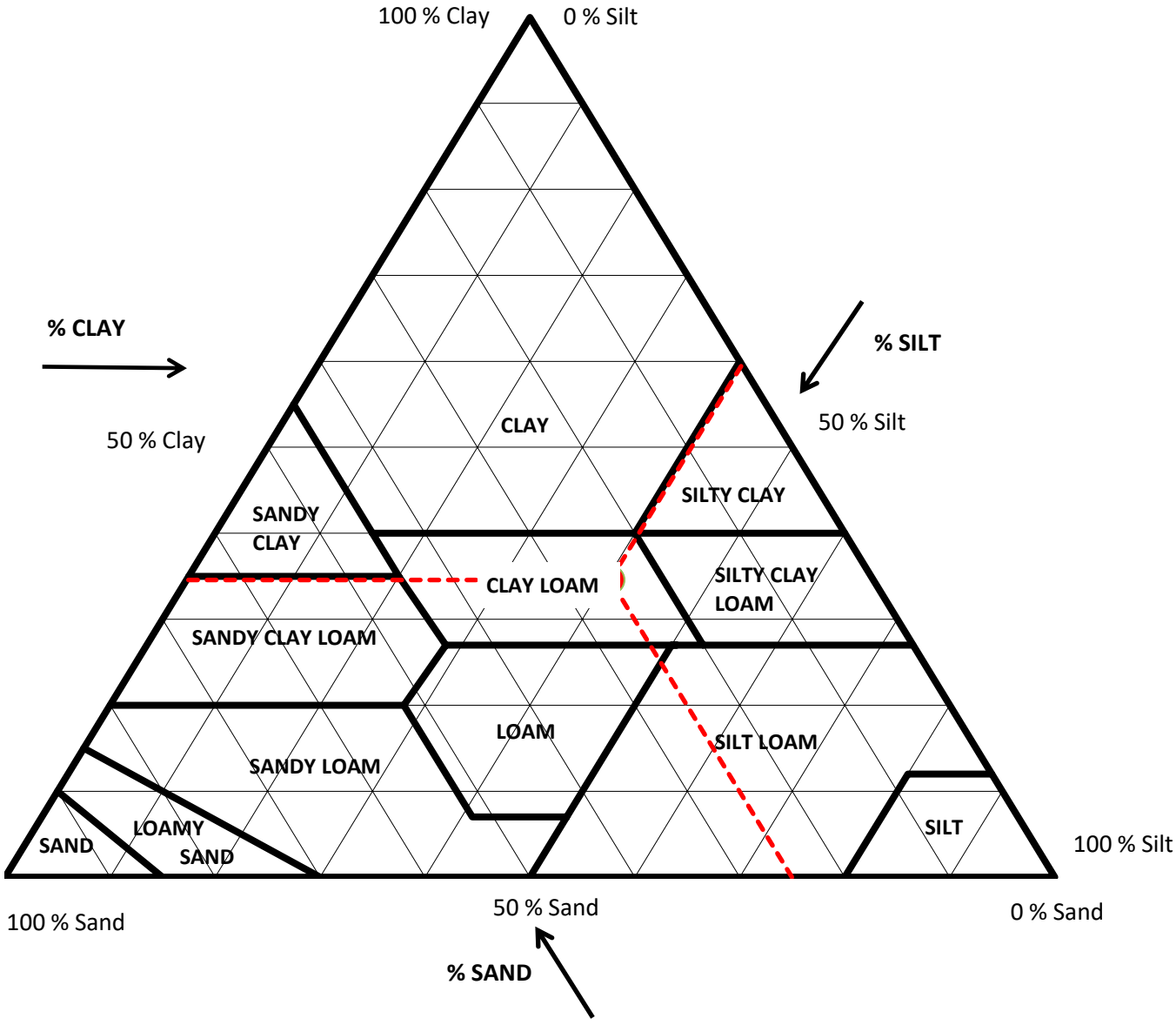
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-06
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-06-SD
		Lab Sample	40901006

Sample Color: **BROWN**
USCS Group Name: **LEAN CLAY WITH SAND**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (19)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	25.0
Percent Silt, %	40.4
Percent Clay, %	34.6

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.4
Coarse Sand; 1-0.5	0.7
Medium Sand; 0.5-0.25	1.1
Fine Sand; 0.25-0.1	8.6
Very Fine Sand; 0.1-0.05	14.2
Total	**25.0**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-07
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-07-SD
		Lab Sample	40901007

Sample Color: **BLACK**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1066
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1066
Dry Wt. Passing Split, gm	713
Total Sample Dry Wt, gm	713

Split Sample - Passing No. 4	
Tare No.	88
Tare + WS., gm	584.02
Tare + DS., gm	438.95
Tare, gm	145.87
Water Content of Split Sample	**49.5%**
Wt. of DS., gm	293.08
Wt. of +#200 Sample, gm	88.83

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.48	0.2%	99.8%	
No. 20	0.85	1.93	0.7%	99.2%	
No. 40	0.425	3.06	1.0%	98.1%	
No. 60	0.25	7.22	2.5%	95.7%	
No. 140	0.106	46.31	15.8%	79.9%	
No. 200	0.075	29.83	10.2%	69.7%	

HYDROMETER (-#200)

Tare No.	520	Wt. Dispers., gm	5	Specific Gravity	2.66
Wt. Tare + DS., gm	144.19	Wt. Dry Soil, gm (*-#200*)	37.06		Tested
Wt. Tare, gm	102.13	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9977*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	35.5	21.4	5.6	29.9	0.0134	80.5	0.0306	56.1%
5	32.5	21.4	5.6	26.9	0.0134	72.4	0.0198	50.5%
15	30	21.5	5.6	24.4	0.0134	65.7	0.0116	45.8%
30	29	21.7	5.6	23.4	0.0134	63.0	0.0083	43.9%
60	27	21.8	5.5	21.5	0.0133	57.9	0.0059	40.3%
250	24	22.9	5.2	18.8	0.0132	50.6	0.0029	35.3%
1440	22	21.4	5.6	16.4	0.0134	44.2	0.0013	30.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=30.6% Clay=39.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**30.3**	D30, mm	NA
Coarse=0.2; Medium=1.7; Fine=28.4		D10, mm	NA
% Fines (-#200)	**69.7**	Cc	NA
% Plus #200 (-3")	**30.3**	Cu	NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.2	0
2	99.8			
		Sand	36.3	36.3
0.05	63.6			
		Silt	30.3	30.3
0.002	33.3			
		Clay	33.3	33.3

USDA Classification
CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-07
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-07-SD
		Lab Sample	40901007

Soil Description: BLACK LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	88
Wt. Tare & WS, gm	584.02
Wt. Tare & DS, gm	438.95
Wt. Tare, gm	145.87
Water Content, %	49.5

SAMPLE SUMMARY

Liquid Limit (LL), %	**45**
Plastic Limit (PL), %	**16**
Plasticity Index (PI)	**29**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BLACK**

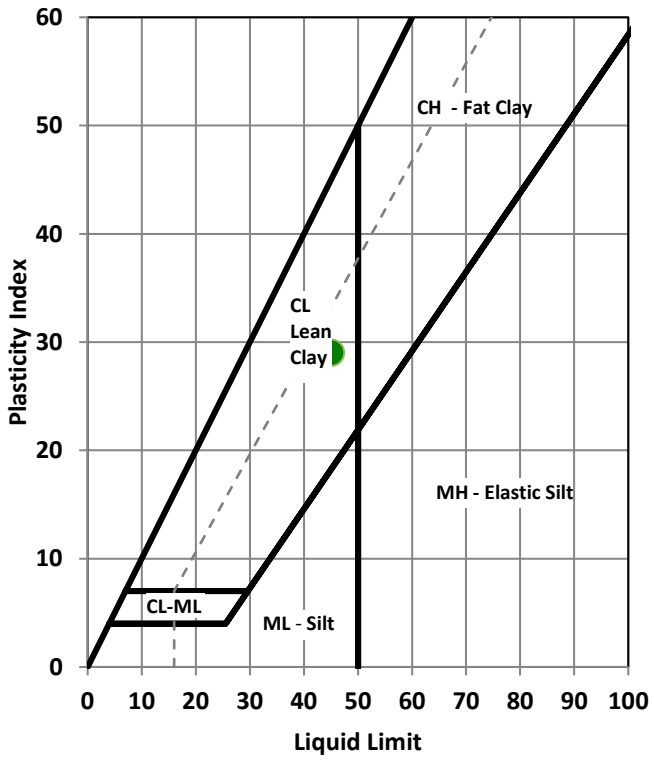
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	449	503	419
Wt. Tare & WS, gm	17.09	18.21	18.66
Wt. Tare & DS, gm	16.20	17.18	17.60
Wt. Tare, gm	10.71	10.63	10.72
Water Content, %	16.2	15.7	15.4

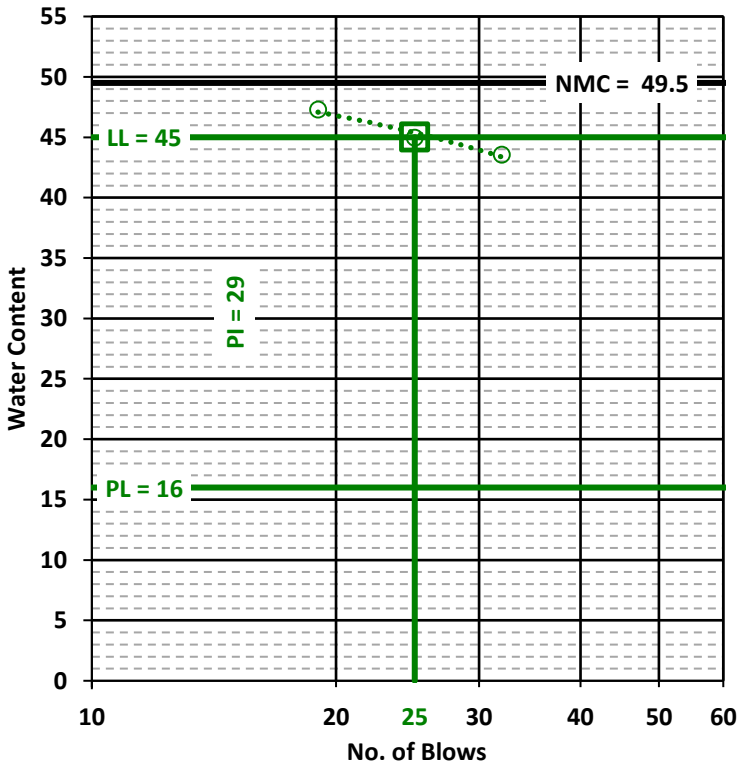
LIQUID LIMIT

	3 Points		
	467	499	460
	19.22	18.67	17.67
	16.50	16.22	15.57
	10.75	10.77	10.75
	47.3	45.0	43.6
# of Blows	19	25	32

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

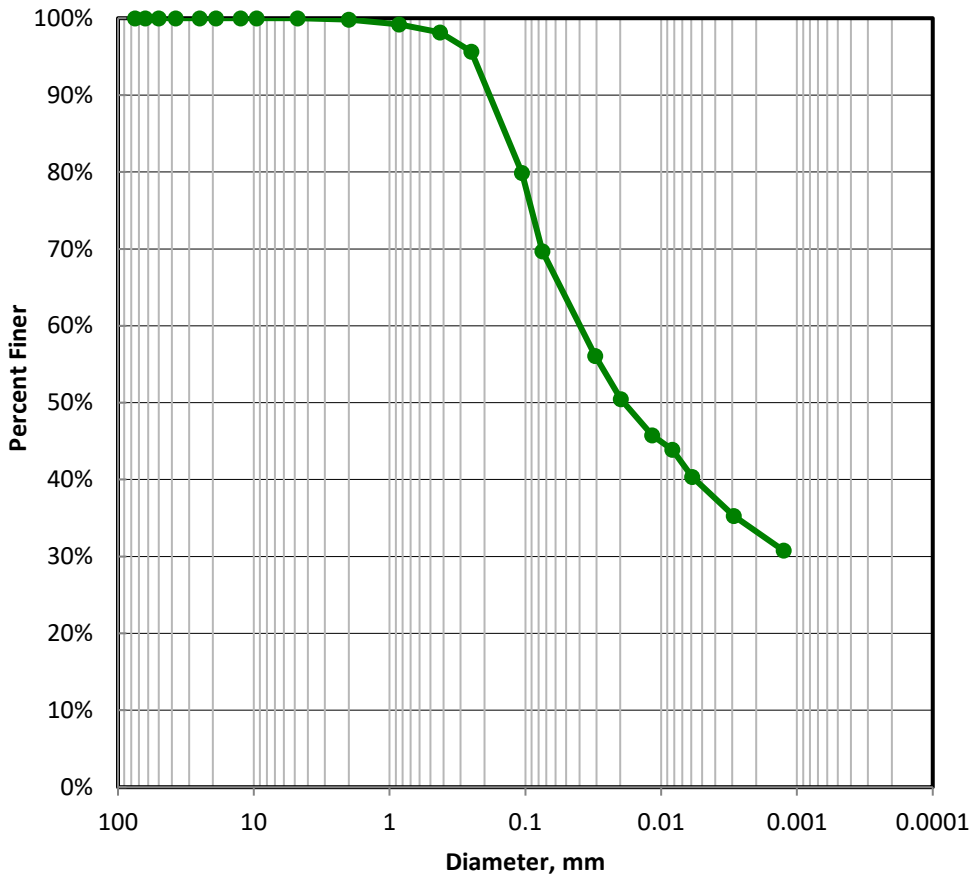
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-07
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-07-SD
		Lab Sample	40901007

Sample Color: **BLACK**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.8%
No. 20	0.85	99.2%
No. 40	0.425	98.1%
No. 60	0.25	95.7%
No. 140	0.106	79.9%
No. 200	0.075	69.7%
NA	0.0306	56.1%
NA	0.0198	50.5%
NA	0.0116	45.8%
NA	0.0083	43.9%
NA	0.0059	40.3%
NA	0.0029	35.3%
NA	0.0013	30.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=30.6% Clay=39.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**30.3**	D30, mm	NA
Coarse=0.2; Medium=1.7; Fine=28.4		D10, mm	NA
% Fines (-#200)	**69.7**	Cc	NA
% Plus #200 (-3")	**30.3**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.2	0
2	99.8			
		Sand	36.3	36.3
0.05	63.6			
		Silt	30.3	30.3
0.002	33.3			
		Clay	33.3	33.3

USDA Classification

CLAY LOAM

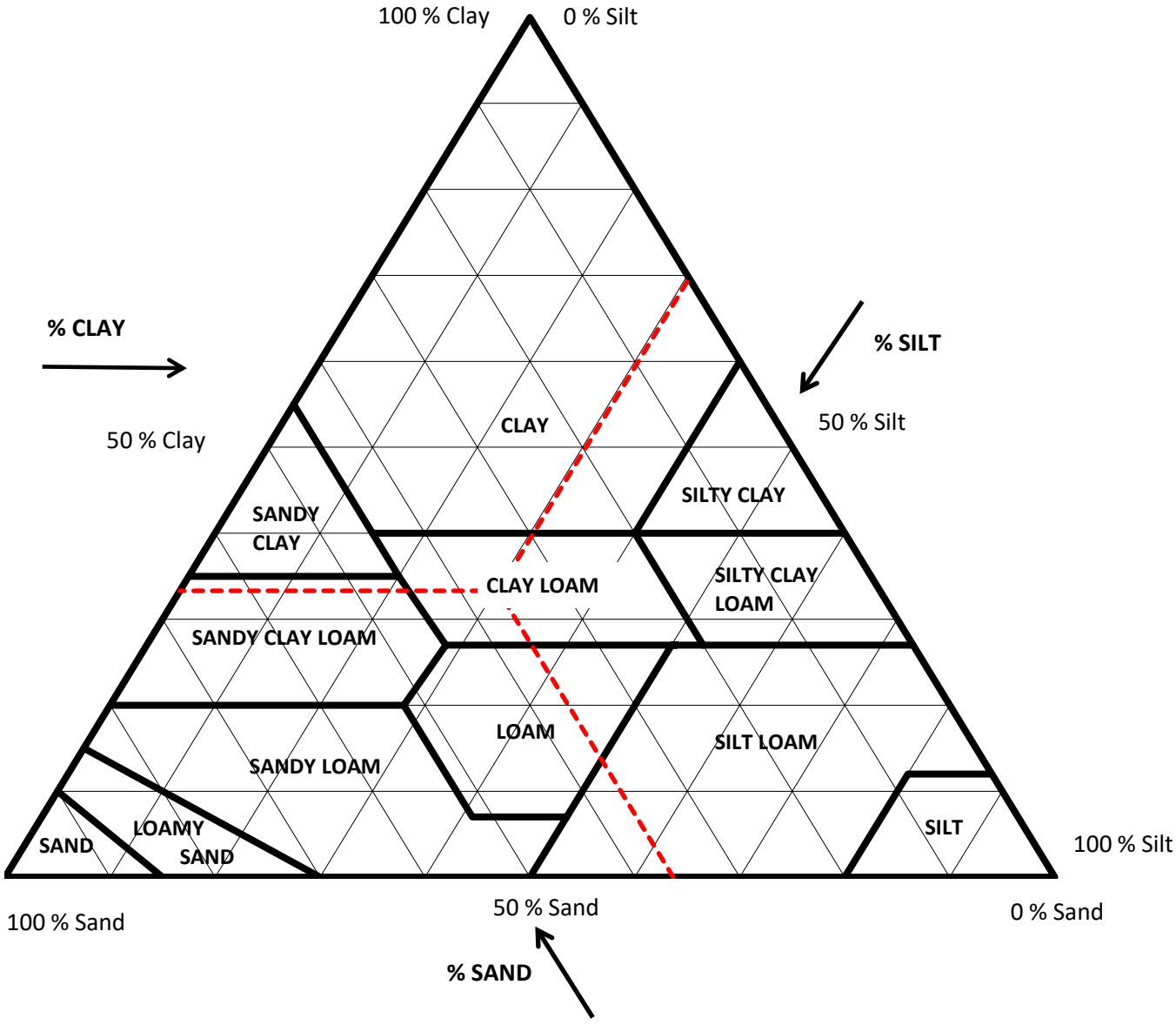
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-07
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-07-SD
		Lab Sample	40901007

Sample Color: **BLACK**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **CLAY LOAM** AASHTO: **A-7-6 (18)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	36.3
Percent Silt, %	30.3
Percent Clay, %	33.3

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.5
Coarse Sand; 1-0.5	0.9
Medium Sand; 0.5-0.25	2.7
Fine Sand; 0.25-0.1	17.5
Very Fine Sand; 0.1-0.05	14.6
Total	**36.3**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-08
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-08-SD
		Lab Sample	40901008

Sample Color: **BROWN**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1054
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1054
Dry Wt. Passing Split, gm	712
Total Sample Dry Wt, gm	712

Split Sample - Passing No. 4	
Tare No.	87
Tare + WS., gm	642.39
Tare + DS., gm	482.08
Tare, gm	148.48
Water Content of Split Sample	**48.1%**
Wt. of DS., gm	333.60
Wt. of +#200 Sample, gm	47.61

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.5	0.1%	99.9%	
No. 20	0.85	0.94	0.3%	99.6%	
No. 40	0.425	1	0.3%	99.3%	
No. 60	0.25	2.03	0.6%	98.7%	
No. 140	0.106	32.02	9.6%	89.1%	
No. 200	0.075	11.12	3.3%	85.7%	

HYDROMETER (-#200)

Tare No.	240	Wt. Dispers., gm	5	Specific Gravity	2.64
Wt. Tare + DS., gm	235.9	Wt. Dry Soil, gm (*-#200*)	53.72		Tested
Wt. Tare, gm	177.18	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*1.0023*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	58	21.5	5.6	52.4	0.0135	97.8	0.0247	83.8%
5	56.5	21.6	5.6	50.9	0.0135	95.0	0.0159	81.4%
15	53.5	21.7	5.6	47.9	0.0134	89.4	0.0095	76.6%
30	51	21.7	5.6	45.4	0.0134	84.7	0.0069	72.6%
60	48	21.9	5.5	42.5	0.0134	79.3	0.0050	68.0%
250	40.5	22.8	5.3	35.2	0.0133	65.7	0.0026	56.3%
1440	34	21.4	5.6	28.4	0.0135	53.0	0.0012	45.4%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=17.7% Clay=68%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**14.3**	D30, mm	NA
Coarse=0.1; Medium=0.6; Fine=13.5		D10, mm	NA
% Fines (-#200)	**85.7**	Cc	NA
% Plus #200 (-3")	**14.3**	Cu	NA

USCS Description
FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.1	0
2	99.9			
		Sand	14.8	14.8
0.05	85.0			
		Silt	32.2	32.3
0.002	52.8			
		Clay	52.8	52.9

USDA Classification
CLAY

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-08
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-08-SD
		Lab Sample	40901008

Soil Description: BROWN FAT CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	87
Wt. Tare & WS, gm	642.39
Wt. Tare & DS, gm	482.08
Wt. Tare, gm	148.48
Water Content, %	48.1

SAMPLE SUMMARY

Liquid Limit (LL), %	**57**
Plastic Limit (PL), %	**19**
Plasticity Index (PI)	**38**
USCS Group Symbol (*-#40 Fraction*)	**CH**
USCS Group Name (*-#40 Fraction*)	**FAT CLAY**
Sample Color:	**BROWN**

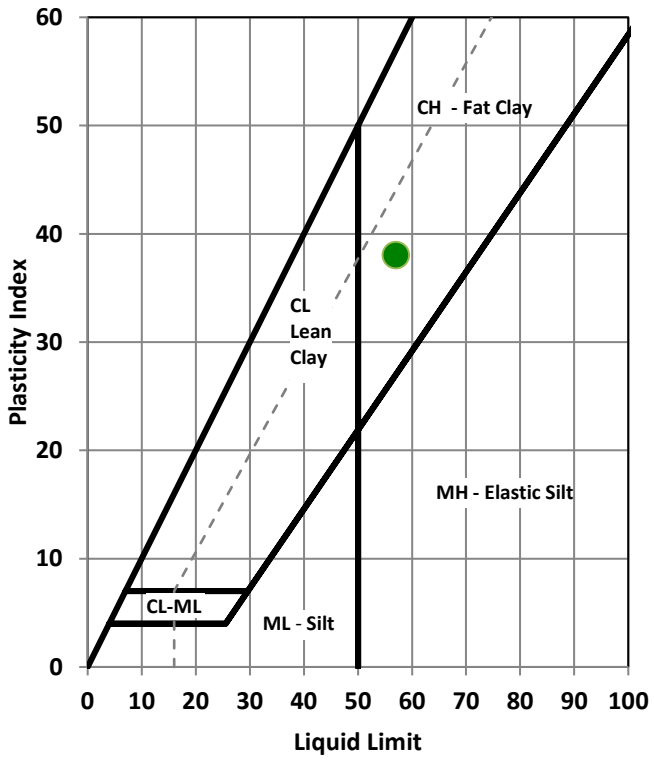
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	406	426	464
Wt. Tare & WS, gm	17.83	17.02	17.50
Wt. Tare & DS, gm	16.62	16.02	16.42
Wt. Tare, gm	10.72	10.71	10.76
Water Content, %	20.5	18.8	19.1

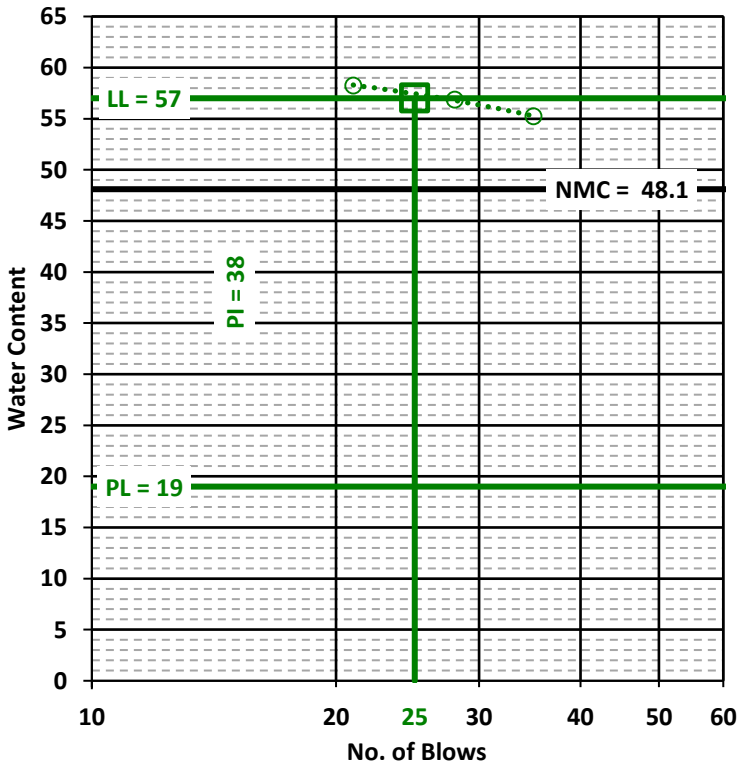
LIQUID LIMIT

	3 Points		
	510	414	480
	19.14	19.68	19.09
	16.07	16.45	16.08
	10.80	10.77	10.63
	58.3	56.9	55.2
# of Blows	21	28	35

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

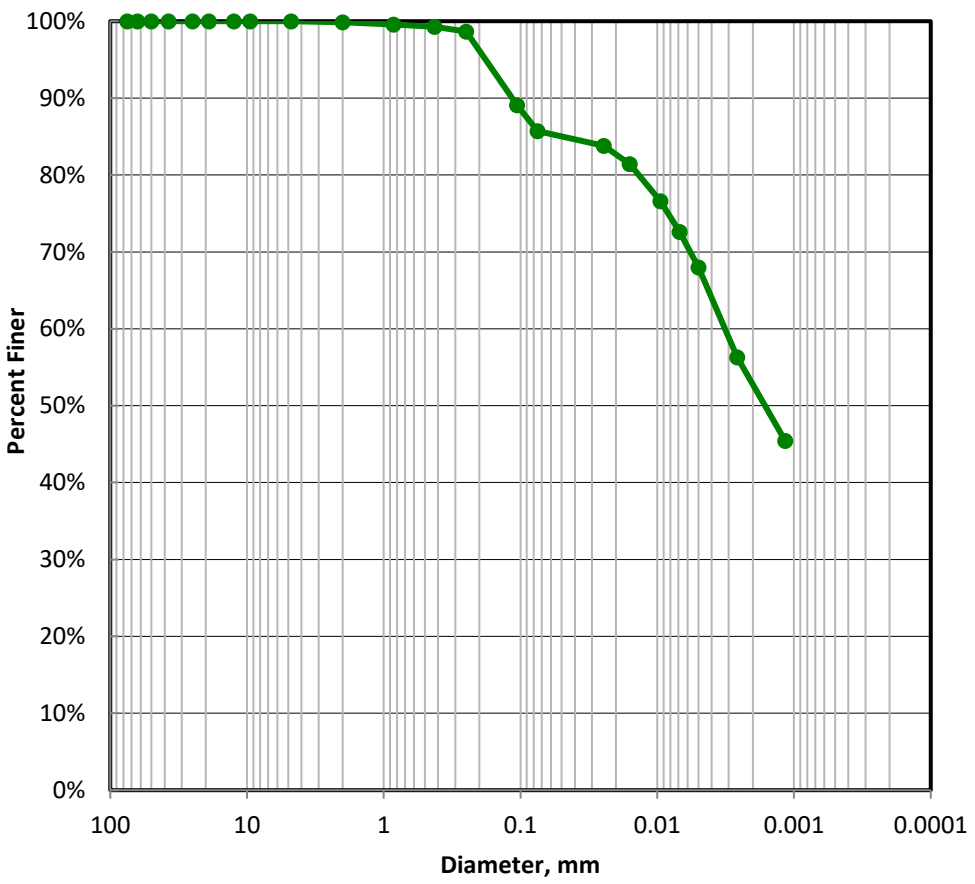
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-08
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-08-SD
		Lab Sample	40901008

Sample Color: **BROWN**

USCS Group Name: **FAT CLAY**

USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.9%
No. 20	0.85	99.6%
No. 40	0.425	99.3%
No. 60	0.25	98.7%
No. 140	0.106	89.1%
No. 200	0.075	85.7%
NA	0.0247	83.8%
NA	0.0159	81.4%
NA	0.0095	76.6%
NA	0.0069	72.6%
NA	0.0050	68.0%
NA	0.0026	56.3%
NA	0.0012	45.4%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=17.7% Clay=68%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**14.3**	D30, mm	NA
Coarse=0.1; Medium=0.6; Fine=13.5		D10, mm	NA
% Fines (-#200)	**85.7**	Cc	NA
% Plus #200 (-3")	**14.3**	Cu	NA

USCS Description

FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	99.9
0.05	85.0
0.002	52.8

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.1	0
Sand	14.8	14.8
Silt	32.2	32.3
Clay	52.8	52.9

USDA Classification

CLAY

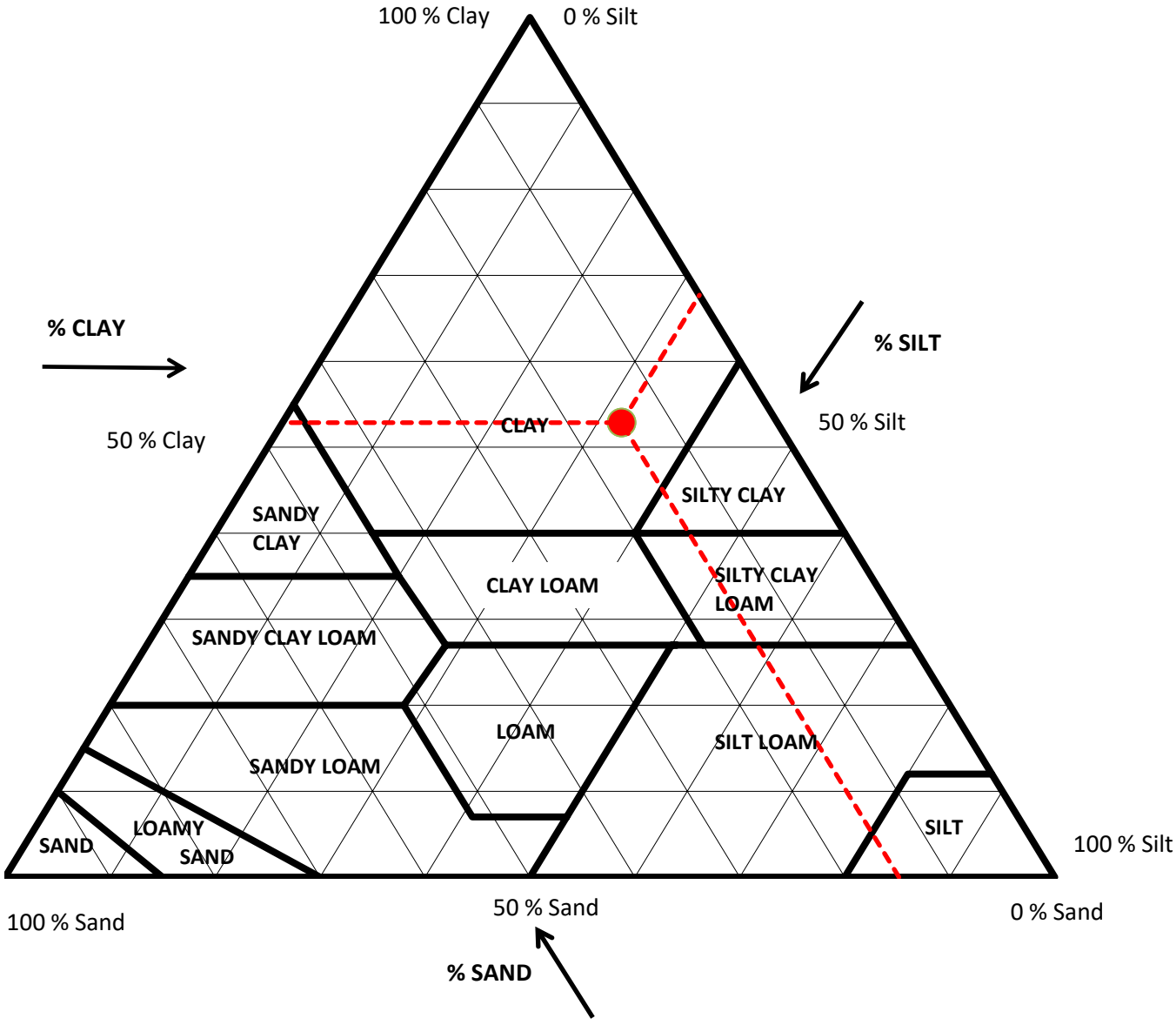
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-08
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-08-SD
		Lab Sample	40901008

Sample Color: **BROWN**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	14.8
Percent Silt, %	32.3
Percent Clay, %	52.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.2
Coarse Sand; 1-0.5	0.3
Medium Sand; 0.5-0.25	0.7
Fine Sand; 0.25-0.1	10.2
Very Fine Sand; 0.1-0.05	3.5
Total	**14.8**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-09
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-09-SD
		Lab Sample	40901009

Sample Color: **YELLOWISH RED**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1087
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1087
Dry Wt. Passing Split, gm	722
Total Sample Dry Wt, gm	722

Split Sample - Passing No. 4	
Tare No.	86
Tare + WS., gm	650.73
Tare + DS., gm	481.78
Tare, gm	147.98
Water Content of Split Sample	**50.6%**
Wt. of DS., gm	333.80
Wt. of +#200 Sample, gm	28.71

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	1.25	0.4%	99.6%	
No. 20	0.85	0.84	0.3%	99.4%	
No. 40	0.425	0.81	0.2%	99.1%	
No. 60	0.25	0.79	0.2%	98.9%	
No. 140	0.106	11.3	3.4%	95.5%	
No. 200	0.075	13.72	4.1%	91.4%	

HYDROMETER (-#200)

Tare No.	239	Wt. Dispers., gm	5	Specific Gravity	2.65
Wt. Tare + DS., gm	236.53	Wt. Dry Soil, gm (*-#200*)	51.83		Tested
Wt. Tare, gm	179.7	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*1.0000*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	54	21.5	5.6	48.4	0.0134	93.4	0.0258	85.4%
5	53	21.5	5.6	47.4	0.0134	91.5	0.0165	83.6%
15	51	21.6	5.6	45.4	0.0134	87.6	0.0097	80.1%
30	50	21.7	5.6	44.4	0.0134	85.7	0.0069	78.3%
60	47	21.9	5.5	41.5	0.0134	80.1	0.0050	73.2%
250	40	22.7	5.3	34.7	0.0132	66.9	0.0026	61.2%
1440	31	21.4	5.6	25.4	0.0135	49.0	0.0012	44.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=18.3% Clay=73.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**8.6**	D30, mm	NA
Coarse=0.4; Medium=0.5; Fine=7.7		D10, mm	NA
% Fines (-#200)	**91.4**	Cc	NA
% Plus #200 (-3")	**8.6**	Cu	NA

USCS Description
FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	10.5	10.6
0.05	89.1			
		Silt	33.4	33.5
0.002	55.7			
		Clay	55.7	55.9

USDA Classification
CLAY

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-09
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-09-SD
		Lab Sample	40901009

Soil Description: YELLOWISH RED FAT CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	86
Wt. Tare & WS, gm	650.73
Wt. Tare & DS, gm	481.78
Wt. Tare, gm	147.98
Water Content, %	50.6

SAMPLE SUMMARY

Liquid Limit (LL), %	**55**
Plastic Limit (PL), %	**21**
Plasticity Index (PI)	**34**
USCS Group Symbol (*-#40 Fraction*)	**CH**
USCS Group Name (*-#40 Fraction*)	**FAT CLAY**
Sample Color:	**YELLOWISH RED**

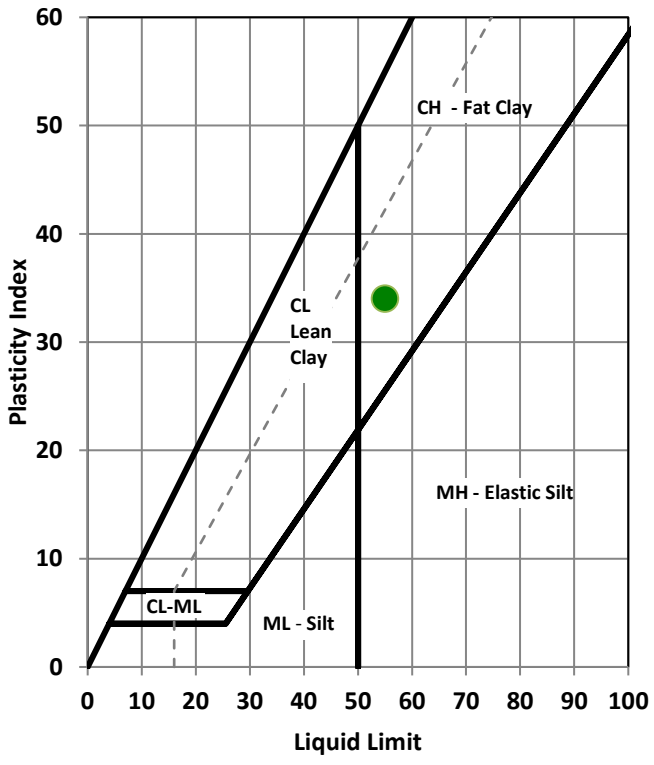
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	506	707	425
Wt. Tare & WS, gm	17.40	18.87	17.43
Wt. Tare & DS, gm	16.27	17.74	16.28
Wt. Tare, gm	10.76	12.43	10.78
Water Content, %	20.5	21.3	20.9

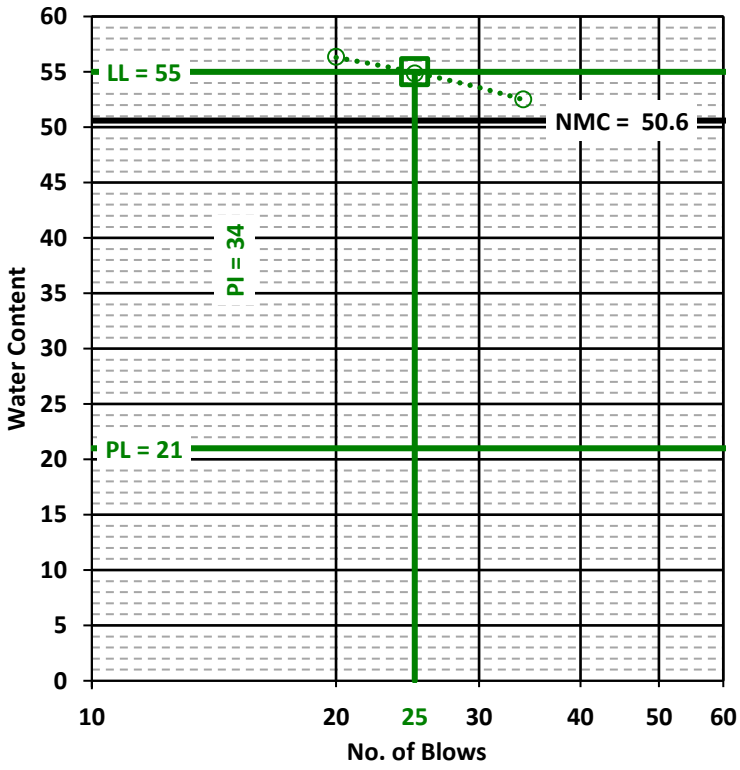
LIQUID LIMIT

	3 Points		
	411	402	496
	18.32	20.03	20.49
	15.57	16.75	17.15
	10.69	10.77	10.79
	56.4	54.8	52.5
# of Blows	20	25	34

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

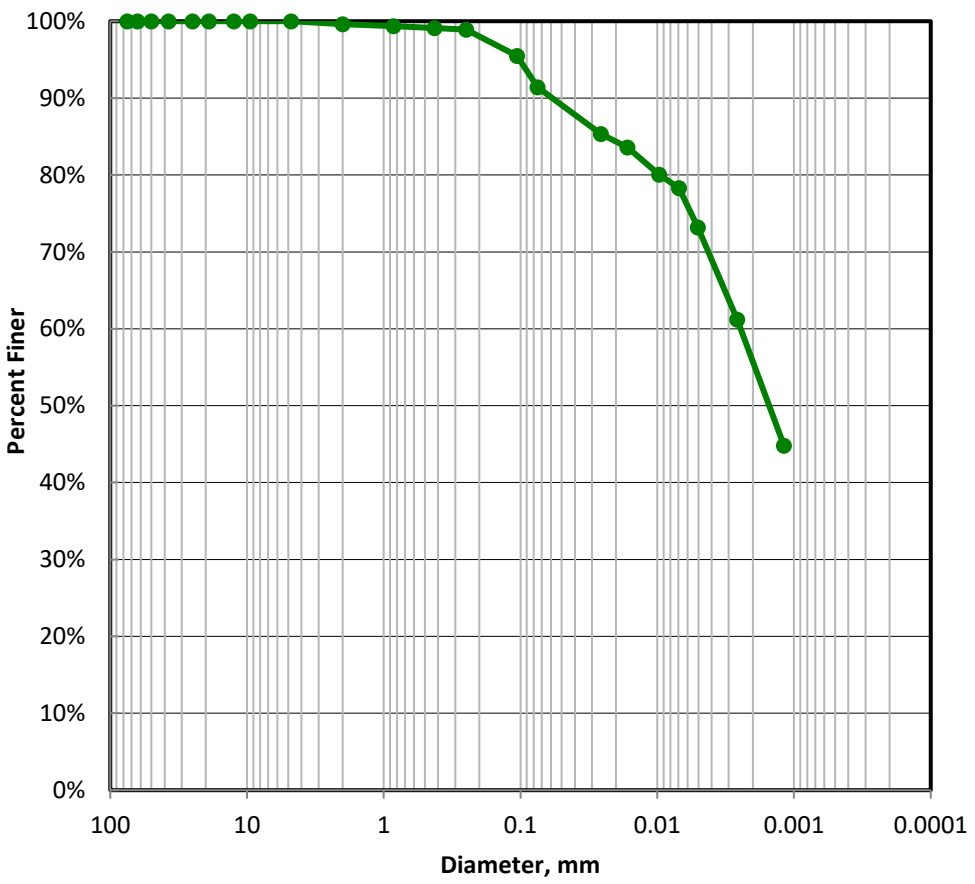
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-09
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-09-SD
		Lab Sample	40901009

Sample Color: **YELLOWISH RED**

USCS Group Name: **FAT CLAY**

USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.6%
No. 20	0.85	99.4%
No. 40	0.425	99.1%
No. 60	0.25	98.9%
No. 140	0.106	95.5%
No. 200	0.075	91.4%
NA	0.0258	85.4%
NA	0.0165	83.6%
NA	0.0097	80.1%
NA	0.0069	78.3%
NA	0.0050	73.2%
NA	0.0026	61.2%
NA	0.0012	44.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=18.3% Clay=73.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**8.6**	D30, mm	NA
Coarse=0.4; Medium=0.5; Fine=7.7		D10, mm	NA
% Fines (-#200)	**91.4**	Cc	NA
% Plus #200 (-3")	**8.6**	Cu	NA

USCS Description

FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	99.6
0.05	89.1
0.002	55.7

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.4	0
Sand	10.5	10.6
Silt	33.4	33.5
Clay	55.7	55.9

USDA Classification

CLAY

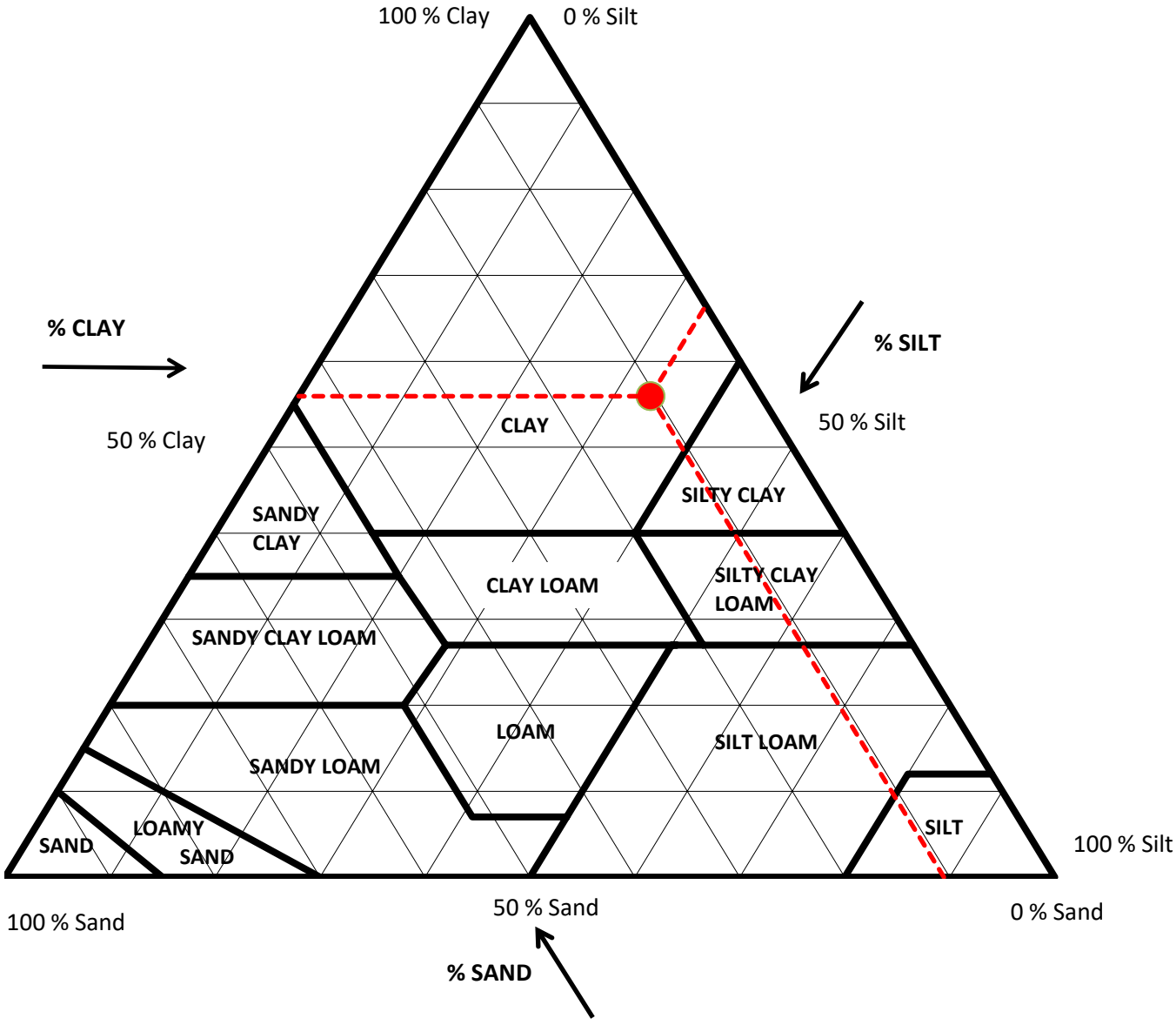
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-09
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-09-SD
		Lab Sample	40901009

Sample Color: **YELLOWISH RED**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (34)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	10.6
Percent Silt, %	33.5
Percent Clay, %	55.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.2
Coarse Sand; 1-0.5	0.2
Medium Sand; 0.5-0.25	0.3
Fine Sand; 0.25-0.1	4.1
Very Fine Sand; 0.1-0.05	5.7
Total	**10.6**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-10
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-10-SD
		Lab Sample	40901010

Sample Color: **BROWN**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (33)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1012
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1012
Dry Wt. Passing Split, gm	672
Total Sample Dry Wt, gm	672

Split Sample - Passing No. 4	
Tare No.	85
Tare + WS., gm	602.22
Tare + DS., gm	449.07
Tare, gm	146.04
Water Content of Split Sample	**50.5%**
Wt. of DS., gm	303.03
Wt. of +#200 Sample, gm	39.67

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.66	0.2%	99.8%	
No. 20	0.85	0.76	0.3%	99.5%	
No. 40	0.425	0.59	0.2%	99.3%	
No. 60	0.25	0.87	0.3%	99.0%	
No. 140	0.106	23.6	7.8%	91.3%	
No. 200	0.075	13.19	4.4%	86.9%	

HYDROMETER (-#200)

Tare No.	238	Wt. Dispers., gm	5	Specific Gravity	2.69
Wt. Tare + DS., gm	237.26	Wt. Dry Soil, gm (*-#200*)	52.38		Tested
Wt. Tare, gm	179.88	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9911*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	55	21.5	5.6	49.4	0.0133	93.5	0.0252	81.2%
5	52.5	21.5	5.6	46.9	0.0133	88.7	0.0164	77.1%
15	50	21.6	5.6	44.4	0.0133	84.0	0.0097	73.0%
30	48	21.7	5.6	42.4	0.0132	80.2	0.0070	69.7%
60	44.5	21.8	5.5	39.0	0.0132	73.8	0.0051	64.1%
250	38.5	22.7	5.3	33.2	0.0131	62.8	0.0026	54.6%
1440	32	21.3	5.7	26.3	0.0133	49.8	0.0012	43.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23% Clay=63.9%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**13.1**	D30, mm	NA
Coarse=0.2; Medium=0.4; Fine=12.4		D10, mm	NA
% Fines (-#200)	**86.9**	Cc	NA
% Plus #200 (-3")	**13.1**	Cu	NA

USCS Description
FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.2	0
2	99.8			
		Sand	15.0	15.0
0.05	84.8			
		Silt	33.9	34.0
0.002	50.9			
		Clay	50.9	51.0

USDA Classification
CLAY

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-10
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-10-SD
		Lab Sample	40901010

Soil Description: BROWN FAT CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	85
Wt. Tare & WS, gm	602.22
Wt. Tare & DS, gm	449.07
Wt. Tare, gm	146.04
Water Content, %	50.5

SAMPLE SUMMARY

Liquid Limit (LL), %	**56**
Plastic Limit (PL), %	**20**
Plasticity Index (PI)	**36**
USCS Group Symbol (*-#40 Fraction*)	**CH**
USCS Group Name (*-#40 Fraction*)	**FAT CLAY**
Sample Color:	**BROWN**

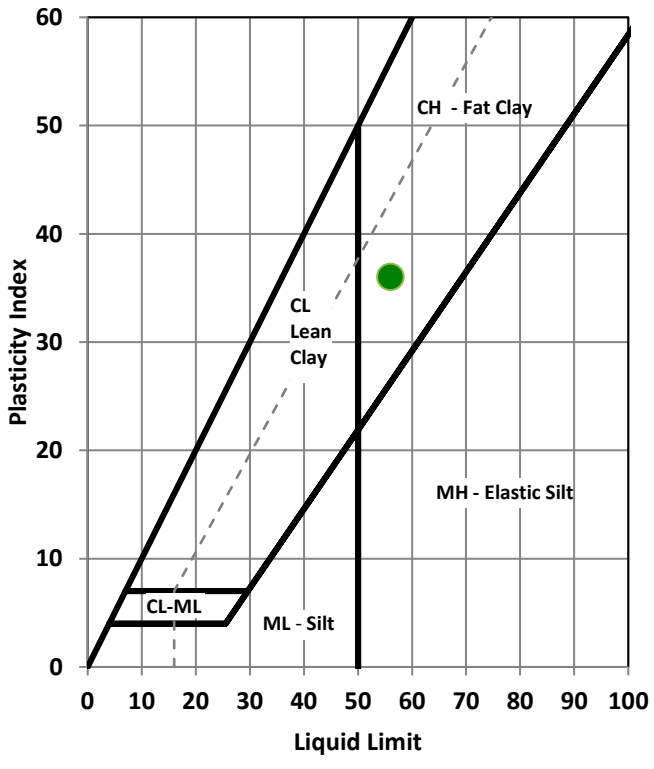
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	477	446	492
Wt. Tare & WS, gm	16.76	17.14	17.93
Wt. Tare & DS, gm	15.74	16.01	16.76
Wt. Tare, gm	10.73	10.68	10.76
Water Content, %	20.4	21.2	19.5

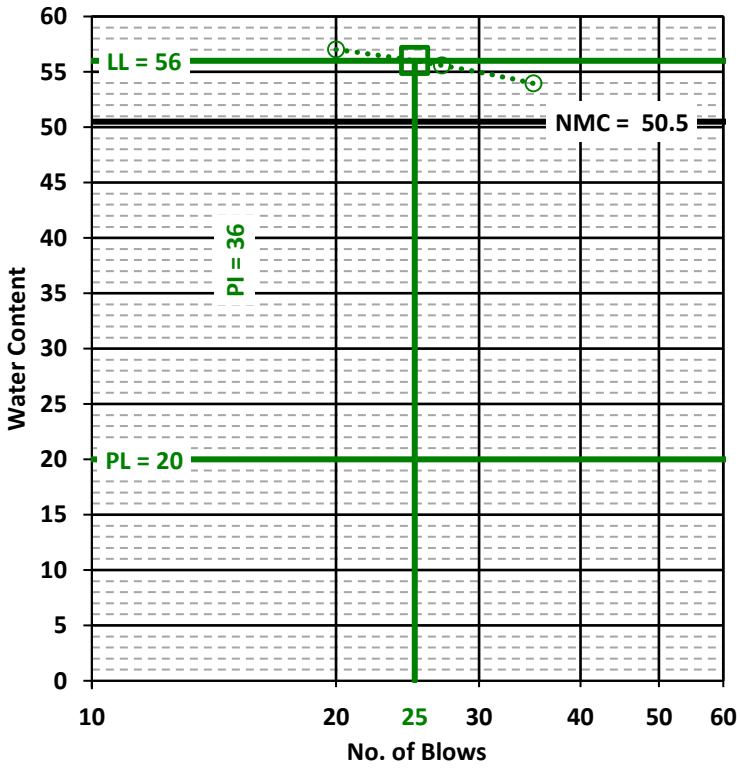
LIQUID LIMIT

	3 Points		
	711	703	512
	18.67	19.74	19.90
	15.99	16.70	16.69
	11.29	11.23	10.74
	57.0	55.6	53.9
# of Blows	20	27	35

PLASTICITY CHART



FLOW CURVE

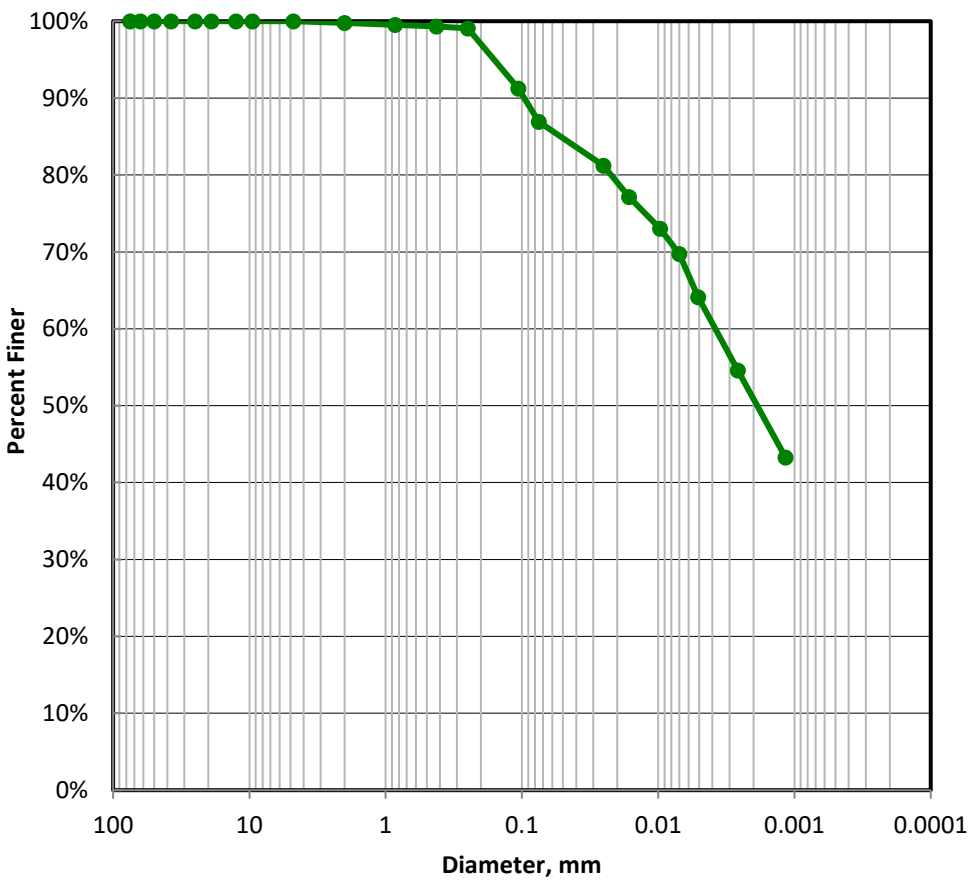


Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-10
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-10-SD
		Lab Sample	40901010

Sample Color: **BROWN**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (33)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.8%
No. 20	0.85	99.5%
No. 40	0.425	99.3%
No. 60	0.25	99.0%
No. 140	0.106	91.3%
No. 200	0.075	86.9%
NA	0.0252	81.2%
NA	0.0164	77.1%
NA	0.0097	73.0%
NA	0.0070	69.7%
NA	0.0051	64.1%
NA	0.0026	54.6%
NA	0.0012	43.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23% Clay=63.9%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**13.1**	D30, mm	NA
Coarse=0.2; Medium=0.4; Fine=12.4		D10, mm	NA
% Fines (-#200)	**86.9**	Cc	NA
% Plus #200 (-3")	**13.1**	Cu	NA

USCS Description
FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	**CH - FAT CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.2	0
2	99.8			
		Sand	15.0	15.0
0.05	84.8			
		Silt	33.9	34.0
0.002	50.9			
		Clay	50.9	51.0

USDA Classification
CLAY

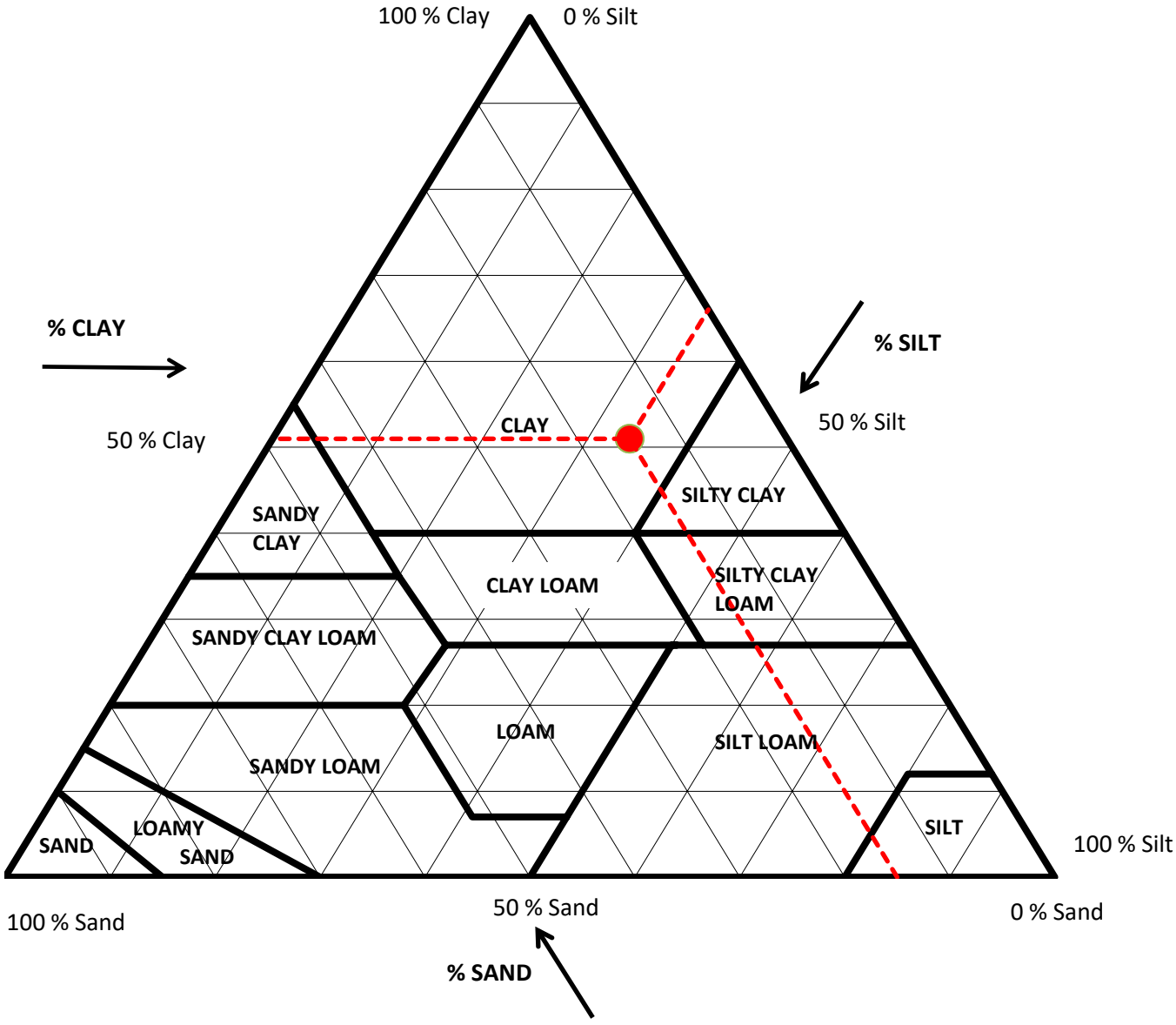
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-10
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-10-SD
		Lab Sample	40901010

Sample Color: **BROWN**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY** AASHTO: **A-7-6 (33)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	15.0
Percent Silt, %	34.0
Percent Clay, %	51.0

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.2
Coarse Sand; 1-0.5	0.2
Medium Sand; 0.5-0.25	0.3
Fine Sand; 0.25-0.1	8.5
Very Fine Sand; 0.1-0.05	5.7
Total	**15.0**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-11
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-11-SD
		Lab Sample	40901011

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (7)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1064
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1064
Dry Wt. Passing Split, gm	775
Total Sample Dry Wt, gm	775

Split Sample - Passing No. 4	
Tare No.	B04
Tare + WS., gm	508.55
Tare + DS., gm	393.4
Tare, gm	84.25
Water Content of Split Sample	**37.2%**
Wt. of DS., gm	309.15
Wt. of +#200 Sample, gm	130.78

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	1.16	0.4%	99.6%	
No. 20	0.85	0.69	0.2%	99.4%	
No. 40	0.425	1.03	0.3%	99.1%	
No. 60	0.25	10.52	3.4%	95.7%	
No. 140	0.106	94.18	30.5%	65.2%	
No. 200	0.075	23.2	7.5%	57.7%	

HYDROMETER (-#200)

Tare No.	237	Wt. Dispers., gm	5	Specific Gravity	2.66
Wt. Tare + DS., gm	219.53	Wt. Dry Soil, gm (*-#200*)	41.1		Tested
Wt. Tare, gm	173.43	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9977*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	41.5	21.4	5.6	35.9	0.0134	87.1	0.0291	50.3%
5	39	21.4	5.6	33.4	0.0134	81.1	0.0188	46.8%
15	36	21.4	5.6	30.4	0.0134	73.8	0.0111	42.6%
30	34	21.5	5.6	28.4	0.0134	68.9	0.0080	39.8%
60	31	21.6	5.6	25.4	0.0134	61.7	0.0058	35.6%
250	27.5	22.8	5.3	22.2	0.0132	53.9	0.0029	31.1%
1440	24	21.3	5.7	18.3	0.0134	44.4	0.0012	25.6%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23.0% Clay=34.7%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**42.3**	D30, mm	NA
Coarse=0.4; Medium=0.6; Fine=41.4		D10, mm	NA
% Fines (-#200)	**57.7**	Cc	NA
% Plus #200 (-3")	**42.3**	Cu	NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	45.1	45.3
0.05	54.5			
		Silt	25.8	25.9
0.002	28.8			
		Clay	28.8	28.9

USDA Classification
SANDY CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-11
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-11-SD
		Lab Sample	40901011

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	B04
Wt. Tare & WS, gm	508.55
Wt. Tare & DS, gm	393.40
Wt. Tare, gm	84.25
Water Content, %	37.2

SAMPLE SUMMARY

Liquid Limit (LL), %	**32**
Plastic Limit (PL), %	**14**
Plasticity Index (PI)	**18**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

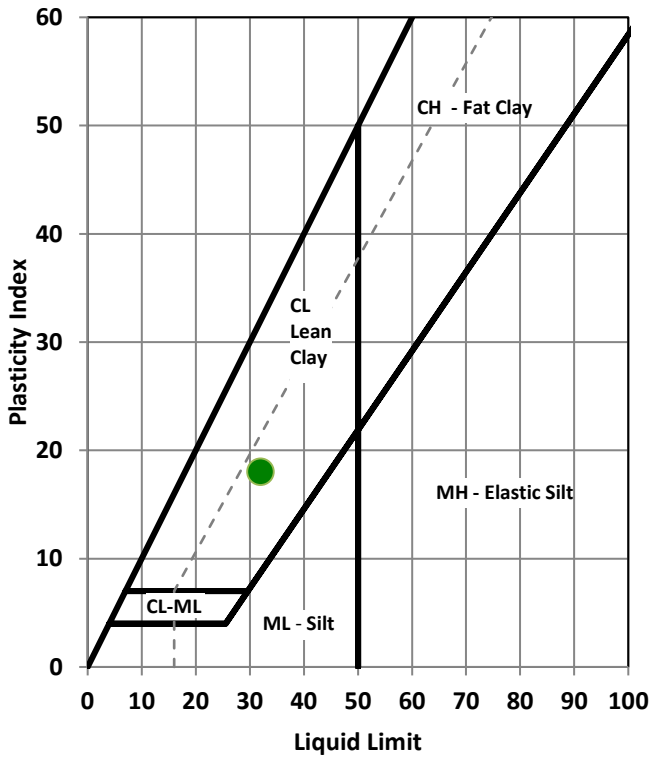
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	476	429	493
Wt. Tare & WS, gm	17.98	17.45	18.51
Wt. Tare & DS, gm	17.12	16.62	17.59
Wt. Tare, gm	10.81	10.63	10.72
Water Content, %	13.6	13.9	13.4

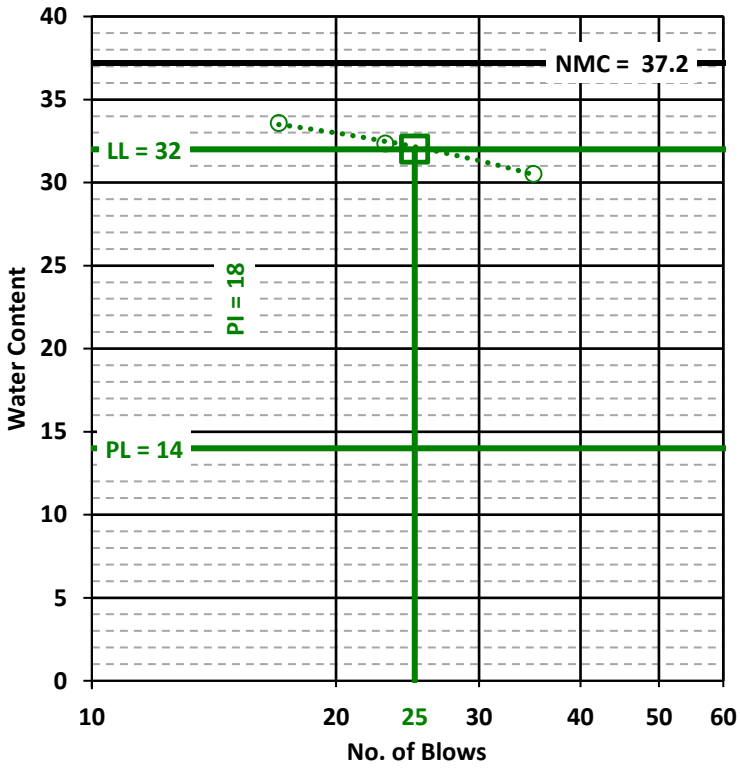
LIQUID LIMIT

	3 Points		
	462	412	490
	19.81	20.64	19.93
	17.54	18.22	17.79
	10.78	10.74	10.78
	33.6	32.4	30.5
# of Blows	17	23	35

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

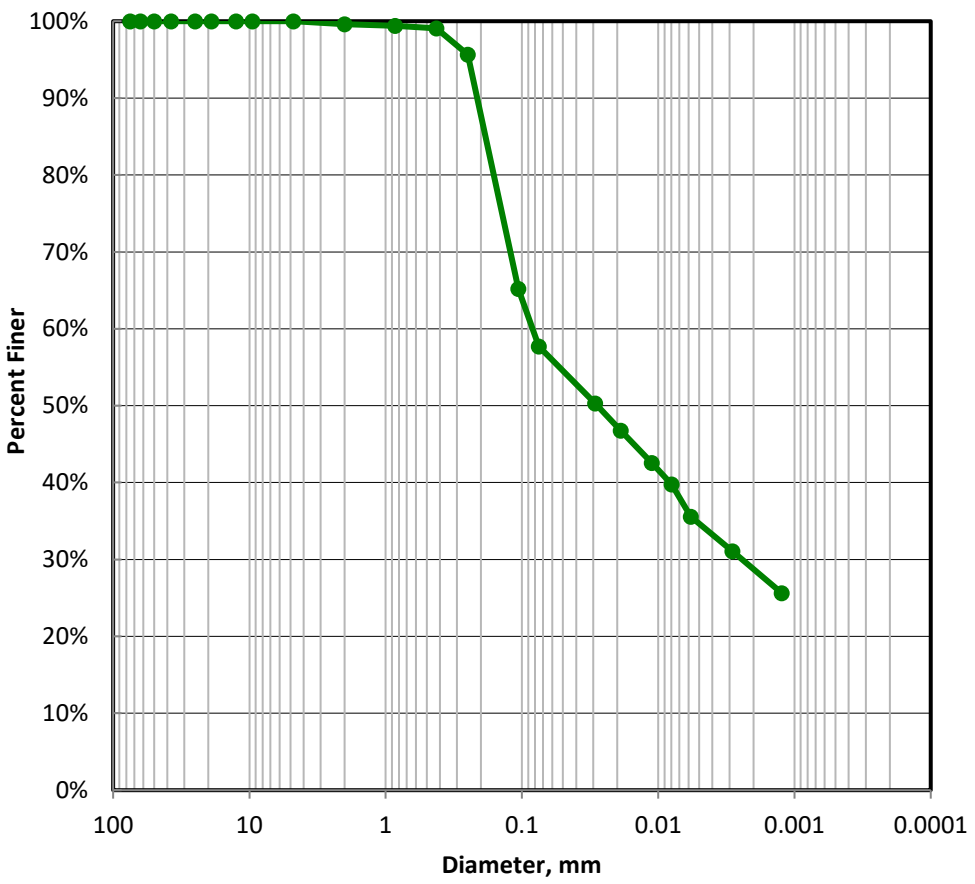
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-11
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-11-SD
		Lab Sample	40901011

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (7)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.6%
No. 20	0.85	99.4%
No. 40	0.425	99.1%
No. 60	0.25	95.7%
No. 140	0.106	65.2%
No. 200	0.075	57.7%
NA	0.0291	50.3%
NA	0.0188	46.8%
NA	0.0111	42.6%
NA	0.0080	39.8%
NA	0.0058	35.6%
NA	0.0029	31.1%
NA	0.0012	25.6%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23.0% Clay=34.7%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**42.3**	D30, mm	NA
Coarse=0.4; Medium=0.6; Fine=41.4		D10, mm	NA
% Fines (-#200)	**57.7**	Cc	NA
% Plus #200 (-3")	**42.3**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.4	0
2	99.6			
		Sand	45.1	45.3
0.05	54.5			
		Silt	25.8	25.9
0.002	28.8			
		Clay	28.8	28.9

USDA Classification

SANDY CLAY LOAM

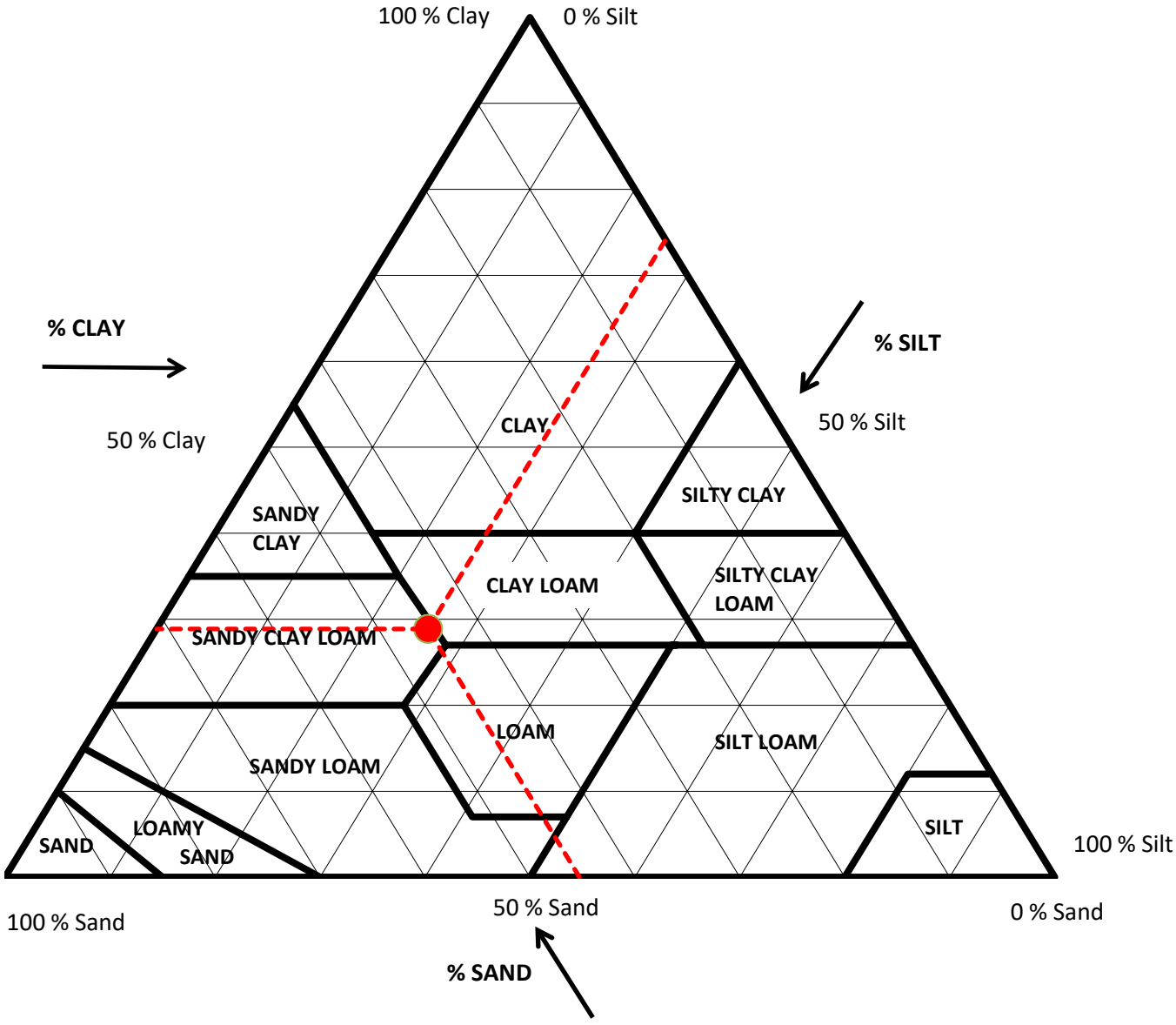
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-11
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-11-SD
		Lab Sample	40901011

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (7)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	45.3
Percent Silt, %	25.9
Percent Clay, %	28.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.2
Coarse Sand; 1-0.5	0.3
Medium Sand; 0.5-0.25	3.5
Fine Sand; 0.25-0.1	31.8
Very Fine Sand; 0.1-0.05	9.4
Total	**45.3**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-12
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-DUP
		Lab Sample	40901012

Sample Color: **GRAYISH BROWN**
USCS Group Name: **CLAYEY SAND**
USCS Group Symbol: **SC** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**

MECHANICAL SIEVE

Total Sample	
Total Sample Wet Wt, gm (-3")	1041
Sample Split on Sieve	No. 4
Coarse Washed Dry Sample, gm	0
Wet Wt Passing Split, gm	1041
Dry Wt. Passing Split, gm	821
Total Sample Dry Wt, gm	821

Split Sample - Passing No. 4	
Tare No.	B11
Tare + WS., gm	479.73
Tare + DS., gm	396.27
Tare, gm	84.26
Water Content of Split Sample	**26.7%**
Wt. of DS., gm	312.01
Wt. of +#200 Sample, gm	157.67

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	1.76	0.6%	99.4%	
No. 20	0.85	1.46	0.5%	99.0%	
No. 40	0.425	2.06	0.7%	98.3%	
No. 60	0.25	15.69	5.0%	93.3%	
No. 140	0.106	112.8	36.2%	57.1%	
No. 200	0.075	23.9	7.7%	49.5%	

HYDROMETER (-#200)

Tare No.	236	Wt. Dispers., gm	5	Specific Gravity	2.69
Wt. Tare + DS., gm	209.1	Wt. Dry Soil, gm (*-#200*)	29.94		Tested
Wt. Tare, gm	174.16	*-#10 Dispersed 1min in Hamilton Beach Mixer*		*a Factor*	*0.9911*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	29	21.2	5.7	23.3	0.0133	77.1	0.0319	38.2%
5	26	21.2	5.7	20.3	0.0133	67.2	0.0206	33.2%
15	24	21.2	5.7	18.3	0.0133	60.6	0.0121	30.0%
30	23	21.4	5.6	17.4	0.0133	57.6	0.0086	28.5%
60	22	21.6	5.6	16.4	0.0133	54.3	0.0061	26.9%
250	20	22.8	5.3	14.7	0.0131	48.7	0.0030	24.1%
1440	17.5	20.9	5.8	11.7	0.0134	38.7	0.0013	19.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23.4% Clay=26.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**50.5**	D30, mm	NA
Coarse=0.6; Medium=1.1; Fine=48.8		D10, mm	NA
% Fines (-#200)	**49.5**	Cc	NA
% Plus #200 (-3")	**50.5**	Cu	NA

USCS Description
CLAYEY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SC	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.6	0
2	99.4			
		Sand	55.3	55.6
0.05	44.1			
		Silt	22.4	22.5
0.002	21.7			
		Clay	21.7	21.9

USDA Classification
SANDY CLAY LOAM

Performed By: TF/MAC Input Validation: AR Reviewed By: ALO Date Tested: 10/19/2018

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-12
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-DUP
		Lab Sample	40901012

Soil Description: GRAYISH BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	B11
Wt. Tare & WS, gm	479.73
Wt. Tare & DS, gm	396.27
Wt. Tare, gm	84.26
Water Content, %	26.7

SAMPLE SUMMARY

Liquid Limit (LL), %	**25**
Plastic Limit (PL), %	**11**
Plasticity Index (PI)	**14**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**GRAYISH BROWN**

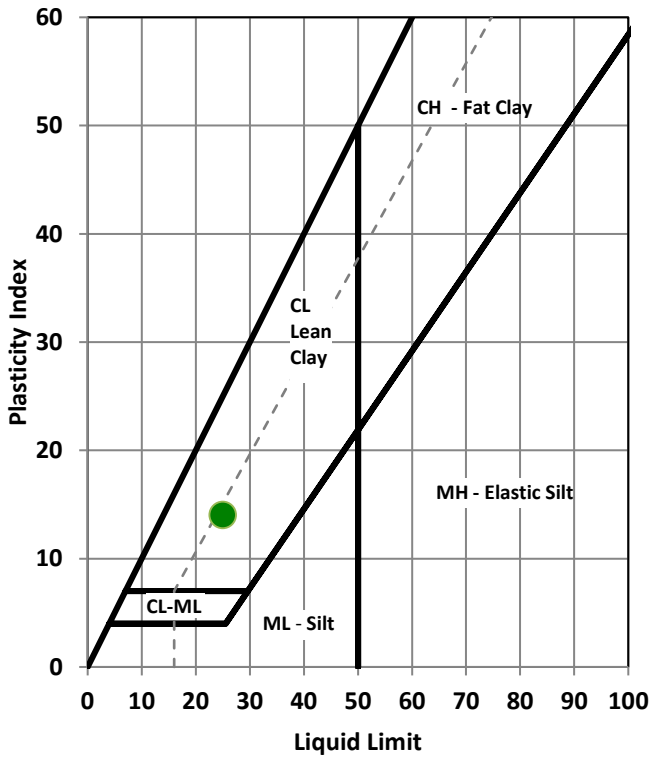
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	420	417	466
Wt. Tare & WS, gm	17.11	18.43	19.01
Wt. Tare & DS, gm	16.48	17.64	18.19
Wt. Tare, gm	10.72	10.72	10.74
Water Content, %	10.9	11.4	11.0

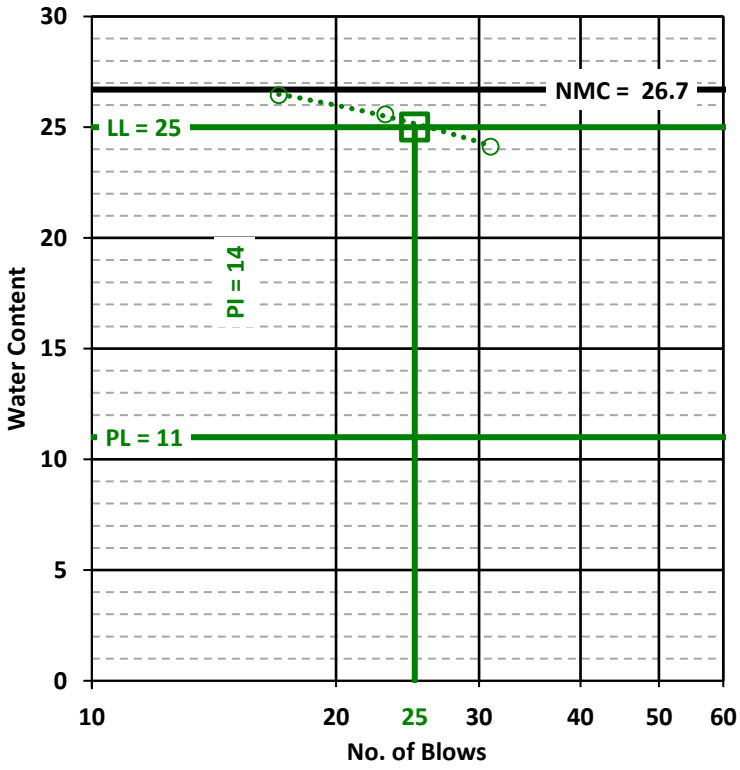
LIQUID LIMIT

	3 Points		
	709	453	701
	22.54	20.06	20.14
	20.43	18.17	18.42
	12.45	10.78	11.29
	26.4	25.6	24.1
# of Blows	17	23	31

PLASTICITY CHART



FLOW CURVE



Performed By: ZH | Input Validation: AR | Reviewed By: ALO | Date Tested: 10/19/2018

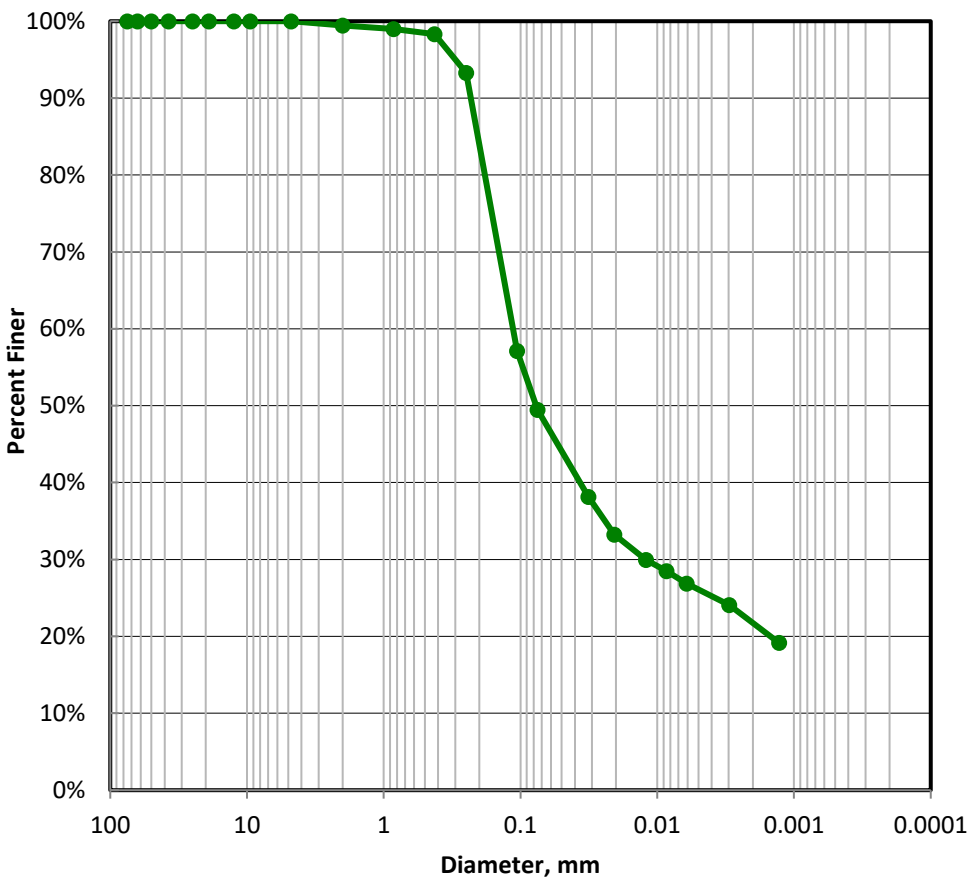
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-12
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-DUP
		Lab Sample	40901012

Sample Color: **GRAYISH BROWN**

USCS Group Name: **CLAYEY SAND**

USCS Group Symbol: **SC** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.4%
No. 20	0.85	99.0%
No. 40	0.425	98.3%
No. 60	0.25	93.3%
No. 140	0.106	57.1%
No. 200	0.075	49.5%
NA	0.0319	38.2%
NA	0.0206	33.2%
NA	0.0121	30.0%
NA	0.0086	28.5%
NA	0.0061	26.9%
NA	0.0030	24.1%
NA	0.0013	19.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23.4% Clay=26.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**50.5**	D30, mm	NA
Coarse=0.6; Medium=1.1; Fine=48.8		D10, mm	NA
% Fines (-#200)	**49.5**	Cc	NA
% Plus #200 (-3")	**50.5**	Cu	NA

USCS Description

CLAYEY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SC	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.6	0
2	99.4			
		Sand	55.3	55.6
0.05	44.1			
		Silt	22.4	22.5
0.002	21.7			
		Clay	21.7	21.9

USDA Classification

SANDY CLAY LOAM

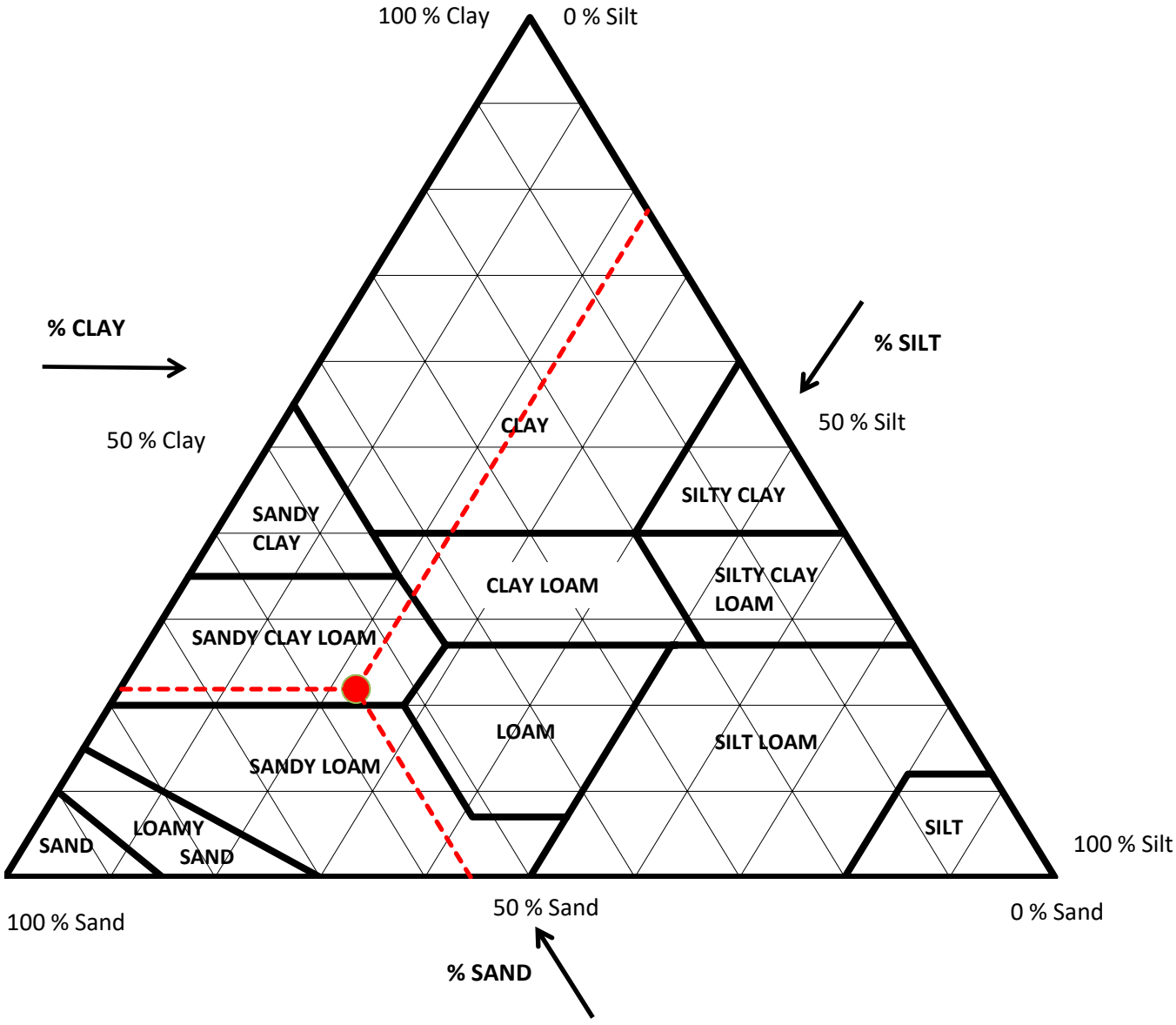
USDA CLASSIFICATION CHART

Client	Air Water & Soil Laboratories, Inc.	Boring	18J0402-12
Client Project	18J0402	Depth	NA
Project No.	40901	Sample	HSCNew-NMP-03-DUP
		Lab Sample	40901012

Sample Color: **GRAYISH BROWN**
USCS Group Name: **CLAYEY SAND**
USCS Group Symbol: **SC** USDA: **SANDY CLAY LOAM** AASHTO: **A-6 (3)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	55.6
Percent Silt, %	22.5
Percent Clay, %	21.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.4
Coarse Sand; 1-0.5	0.6
Medium Sand; 0.5-0.25	5.2
Fine Sand; 0.25-0.1	37.7
Very Fine Sand; 0.1-0.05	11.8
Total	**55.6**



ERDC SAMPLE RECEIPT CHECKLIST

Client: ERDC-Vicksburg (EL)				Work Order: 18J0402
Project: Houston Ship Channel ECIP North of Morgan's Point				Date/Time Received: 10/9/18
Shipping Company: N/A				
Suspected Hazard Information	Yes	No	N/A	Comments:
Shipped as DOT Hazardous?		X		
Samples identified as foreign material?		X		
Sample Receipt Criteria	Yes	No	N/A	Comments:
Shipping containers received intact and sealed?	X			
Chain of Custody documents included with shipment?	X			
COC form is properly signed in relinquished/received sections?	X			
Samples requiring chemical preservation at proper pH?			X	
Samples requiring cold preservation within 0-5°C?	X			3°C
Sample IDs on COC match IDs on containers?	X			
Date and time of COC match date and time on containers?	X			
Number of containers received match number indicated on COC?	X			
Samples received within holding time?	X			
Aqueous samples found to have visible solids?			X	
Additional Comments:				
Checklist performed by: Kelli Hartman				
Date/Time Completed: 10/9/18				

18J0402

CHAIN OF CUSTODY RECORD
USACE ERDC Laboratories, 3909 Halls Ferry Road, Vicksburg, MS 39180

Page _____

Houston Ship Channel North of Morgan's Point	Sampling Company:	ERDC:	EL, CEERD-EP-R	EL, CEERD-EP-R
	POC:	Project Manager:	Cheryl Montgomery	Dan Farrar
	Address:	Address:	696 Virginia Road Concord, MA 01742	3909 Halls Ferry Road Bldg 6009 Vicksburg, MS 39180
	Email:	Email:	cheryl.montgomery@usace.army.mil	daniel.farrar@erdc.dren.mil
	Phone:	Phone:	W: 978-318-8644 C: 781-530-8317	W: 601-634-2118 M: 601-529-8042

Additional Notes:

								1 10L HDPE Cubitainer, Pre-filtered time: 48 hours						Hold	2 40 ml Clear VOA w/ HCl, non-filtered Hold Time: 7 days	2 1L HDPE Cubitainer, non-filtered Hold Time: 48 hours				3 40 ml Clear VOA w/ HCl, non-filtered Hold time: 7 days	125 ml HDPE pre-filtered Hold Time: 24 HOURS	Terra Core Kit Hold Time: 14 days		1 4 oz. clear glass jar, Hold Time: 14 days		
																						Sediment			
	Sample Name	Date	Time	Depth	Media	# of containers	Station	DOC	Dissolved Ammonia	Dissolved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/ Furans, OC Pests, PAH/PCP, PCBs, SVOC	TPH high-level	TOC	Total Hg and Se	TSS	Bulk sediment*	VOC	Cr III and VI	VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ MeOH)	TPH
1	HSCNew-NMP-06	10-4-18	0750	NA	Sed	8												X			X	X	X
2	HSCNew-NMP-05	10-4-18	1215	|	|	8												X			X	X	X
3	HSCNew-NMP-04	10-5-18	0940	|	|	8												X			X	X	X
4	HSCNew-NMP-03	10-5-18	1430	|	|	8												X			X	X	X
5	HSCNew-NMP-02	10-6-18	0920	|	|	8												X			X	X	X
6	HSCNew-NMP-01	10-6-18	1220	|	|	8												X			X	X	X
7 (Field Duplicate)	HSCNew-NMP-03-DUP	10-5-18	1710	|	|	8												X			X	X	X
8	HSCNew-NMP-EQPB	10-6-18	1414	|	H_2O	9 11		X	X	X	X	X	X		X	X	X				X	X	
9	HSCNew-NMP-02-sed-DUP	10-6-18	0920	|	~~H_2~~ Sed	5															X	X	X
10																							
11																							
12																							
13																							
14																							
15																							
Total																							

* Bulk sediment includes (3) two-gallon buckets

1. I hereby transfer the samples containers to ERDC. Samples have been properly labeled and kept on ice or refrigerated.

Signature — Date: 10-9-18

2. I accept these samples for transfer to ERDC.

Signature of ERDC Representative — Date: 10/9/18

Tempurature of Cooler

18J0402

CHAIN OF CUSTODY RECORD

USACE ERDC Laboratories, 3909 Halls Ferry Road, Vicksburg, MS 39180

Page 1

Houston Ship Channel North of Morgan's Point	
Sampling Company:	Benchmark
POC:	Neil Henthorne
Address:	PO Box 158, Katy, TX 77492
Email:	
Phone:	281-703-0257

	EL, CEERD-EP-R	EL, CEERD-EP-R
ERDC:	EL, CEERD-EP-R	EL, CEERD-EP-R
Project Manager:	Cheryl Montgomery	Dan Farrar
Address:	696 Virginia Road Concord, MA 01742	3909 Halls Ferry Road Bldg 6009 Vicksburg, MS 39180
Email:	cheryl.montgomery@usace.army.mil	daniel.farrar@erdc.dren.mil
Phone:	W: 978-318-8644 C: 781-530-8317	W: 601-634-2118 M: 601-529-8042

Additional Notes:

								1 10L HDPE Cubitainer, Pre-filtered Hold time: 48 hours						2 40 ml Clear VOA w/ HCl, non-filtered Hold Time: 7 days	2 1L HDPE Cubitainer, non-filtered Hold Time: 48 hours			3 40 ml Clear VOA w/ HCl, non-filtered Hold time: 7 days	125 ml HDPE pre-filtered Hold Time: 24 HOURS	Terra Core Kit Hold Time: 14 days (Sediment)		1 4 oz clear glass jar, Hold Time: 14 days (Sediment)	Bulk Sediment 3 two gallon Buckets (sediment)
	Sample Name	Date	Time	Depth	Media	# of containers	Station	DOC	Dissolved Ammonia	Dissoleved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/ Furans, OC Pests, PAH/PCP, PCBs, SVOC	TPH high-level	TOC	Total Hg and Se	TSS	VOC	Cr III and VI	VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ MeOH)	TPH	
1	HSCNew-NMP-11	10-2-18	0831	N/A	Sed	8	11													X	X	X	X
2	HSCNew-NMP-10	10-2-18	1300				10													X	X	X	X
3	HSCNew-NMP-09	10-2-18	0715				9													X	X	X	X
4	HSCNew-NMP-08	10-3-18	0931				8													X	X	X	X
5	HSCNew-NMP-07	10-3-18	1313			9	7													X	X	X	X (4 Buckets)
6																							
7																							
8																							
9																							
10																							
11																							
12																							
13																							
14																							
15																							
Total																							

1. I hereby transfer the sample containers to ERDC. Samples have been properly labeled and kept on ice or refrigerated.

Signature: [signature] Date: 10-4-18

Neil Henthorne 10-6-18

2. I accept these samples for transfer to ERDC:

[signature] 10-6-18 [signature] Signature of ERDC Representative

Date

Tempurature of Cooler

Items for Project Manager Review

LabNumber	Analysis	Analyte	Exception
			Data included from: W:\TransferIn\18J0402 TRANSFER 21 Dec 2018 1111.mdb
			Data included from: W:\TransferIn\18J0402 TRANSFER 21 Dec 2018 1942.mdb
			Data included from: W:\TransferIn\18J0402 TRANSFER 21 Dec 2018 1943.mdb
			Data included from: W:\TransferIn\18J0402 TRANSFER 21 Dec 2018 1949.mdb
			Data included from: W:\TransferIn\18J0402 TRANSFER 21 Dec 2018 2008.mdb

Analytical Reports: Elutriate

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

23 May 2019

Cheryl Montgomery
ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg, MS 39180

RE: Houston Ship Channel-North of Morgan's Point

Enclosed are the results of analyses for samples received by the laboratory on 29-Oct-2018. The samples associated with this report will be held for 90 days from the date of this report. The raw data associated with this report will be held for 5 years from the date of this report. If you need us to hold onto the samples or the data longer then these specified times, you will need to notify us in writing at least 30 days before the expiration dates. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jenifer Milam
Database Manager

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

WORK ORDER SUMMARY

Sample ID	Laboratory ID	Matrix	Date Sampled	Date of Work Order
HSCNew-NMP-01-EL	18J0403-01	Water	29-Oct-2018	29-Oct-2018
HSCNew-NMP-02-EL	18J0403-02	Water	29-Oct-2018	29-Oct-2018
HSCNew-NMP-03-EL	18J0403-03	Water	29-Oct-2018	29-Oct-2018
HSCNew-NMP-04-EL	18J0403-04	Water	29-Oct-2018	29-Oct-2018
HSCNew-NMP-05-EL	18J0403-05	Water	29-Oct-2018	29-Oct-2018
HSCNew-NMP-06-EL	18J0403-06	Water	29-Oct-2018	29-Oct-2018
HSCNew-NMP-07-EL	18J0403-07	Water	29-Oct-2018	29-Oct-2018
HSCNew-NMP-08-EL	18J0403-08	Water	29-Oct-2018	29-Oct-2018
HSCNew-NMP-09-EL	18J0403-09	Water	29-Oct-2018	29-Oct-2018
HSCNew-NMP-10-EL	18J0403-10	Water	29-Oct-2018	29-Oct-2018
HSCNew-NMP-11-EL	18J0403-11	Water	29-Oct-2018	29-Oct-2018
HSCNew-NMP-03-DUP-EL	18J0403-12	Water	29-Oct-2018	29-Oct-2018

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Case Narrative

No issues were experienced during the analysis of Work Order 18J0403 unless specified below.
SVOC/PAH/PCP- The RL of 20 ug/L exceeded the TDL of 1 ug/L for benzidine for all the samples. Benzidine was not detected in any of the samples. Azobenzene was reported instead of 1,2-phenylhydrazine due to the degradation of 1,2-phenylhydrazine in the injection port of the GC/MS. The WG1175786-4 MS recoveries, performed on HSCNew-NMP-03-DUP-EL (L1844499-12), were outside the acceptance criteria of 40-140% for acenaphthene (36%); however, the associated MSD and LCS/LCSD recoveries are within overall method allowances. No significant bias was observed for the results of acenaphthene.
Pests- One of the continuing calibration verification (CCV) standards had low recoveries of 83.3 and 82.9% for 4,4'- DDT and oxychlordane, respectively (Project Limits 85-115%). These analytes were within DOD QSM 5.1 limits of 80-120%. The ICV had a slightly elevated recovery of 127% (Project limits 80-120%) for delta-BHC; however, delta-BHC was not detected in any of the samples. The results of toxaphene in the ICV was not reportable. The ICV is a second source standard that did not match the pattern of the standard used for the calibration. SW846 states that some toxaphene components, particularly the more heavily chlorinated components, are subject to dechlorination reactions. As a result, standards from different vendors may exhibit differences, which could lead to possible false negative results or large differences in quantitative results. No bias was observed for the pesticide results based on the quality control samples.
PCBs- We originally analyzed PCBs congeners on December 9, 2018 but due to failing CCVs the data was not reportable. Originally, the PCBs were not detected in any of the samples. After multiple re-analyses of the extracts, acceptable CCVs recoveries were achieved based on the project limits of 85-115%; however, it was 7 days outside of the analytical holding time. PCBs were still not detected in the final analysis of the samples. The surrogate, PCB 198, had a low recovery in one of the LCS at 28.9% (Project Limit 30-150%). However, the other surrogate, TMX, had an acceptable recovery of 87%. No bias was observed for the PCB congener results based on the quality control samples.
TPH- The RL of 5,000-10,000 ug/L exceeded the TDL of 100 µg/L for TPH by TCEQ (TNRRC) 1005. The hydrocarbon ranges were not detected above the RL for all of the samples.
CN- Residual Chlorine or other oxidizing agent was detected in the container of all the elutriates. Chlorine is an interference that can decompose cyanides; therefore, the results may have a negative bias.
Dioxins/Furans- The peak detected does not meet ratio criteria and has resulted in an elevated detection limit of 29.6 pg/ L for octa CDD for sample HSCNew-NMP-03-EL. The peak detected does not meet ratio criteria and has resulted in an elevated detection limit of 1.33 pg/L for 2,3,7,8-tetra CDF for sample HSCNew-NMP-03-EL. The peak detected does not meet ratio criteria and has resulted in an elevated detection limit of 1.33 pg/ L for total tetra CDF for sample HSCNew-NMP-03-EL. The peak detected does not meet ratio criteria and has resulted in an elevated detection limit of 2.57 pg/L for total hepta CDD for sample HSCNew-NMP-10-EL.
Metals- One of the two matrix spike duplicates had a low recovery of 57.8% (Project Limits=70-130%) for zinc. The recoveries for the LCSs and MS and MS/MSD were within the acceptable project limits for zinc. No bias was observed for the metal results based on the quality control samples.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Notes and Definitions

Jc	The reported result is an estimated value.
*	Duplicate analysis not within control limits
A3470	RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds
A4910	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
A4997	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit. RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds
CCV-L	The CCV was below acceptable limits leading to negative bias in the results for this analyte.
Cl	Residual Chlorine or other oxidizing agent was detected in the container used to analyze this sample.
E	Reported concentration exceeds the calibration range of the instrument for that specific analysis for organics. Reported value is estimated due to the presence of an interference for inorganics
H	This sample was extracted and/or analyzed outside of the EPA recommended holding time.
J	Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.
Jb	Estimated value less than RL
Z-03	See case narrative.
N	Spiked sample recovery not within control limits
Q	Value is outside of acceptance limits.
QM-07	The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
S-GC	Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate/s.
U	Analyte included in the analysis, but not detected
Ua	Analyte included in the analysis, but not detected at or above the Reporting Limit
Ub	Compound was analyzed for but was not detected (non-detect)
Uc	Indicates the compound was analyzed for but not detected above the specified level.
Ud	Undetected at the limit of quantitation.
Ja	Estimated concentration between the EDL and RDL
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

HSCNew-NMP-01-EL

18J0403-01 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0057**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Arsenic-75 [3]	**0.0051**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Barium-135 [1]	**0.265**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0019**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	**0.0088**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0455**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	**0.022**	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	
Selenium	ND	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	**0.00354**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	**0.00364**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	**0.00363**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep3	**0.00577**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep4	**0.00446**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	**0.00430**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0639**		*63.9 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0820**		*68.4 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**21.4**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.096**		*95.8 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Surrogate: PCB 198	**0.055**		*45.5 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.212**	0.0234		0.168	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	
Wet Chemistry									
Total Suspended Solids	**22.5**	0.833	1.67	4.17	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**20.8**		*104 %*		*15-115*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**14.7**		*74 %*		*30-130*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**8.72**		*44 %*		*15-115*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.104		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.115		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.113		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.172**	0.081		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.085		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.18		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.675**	0.1		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	
Di-n-octylphthalate	ND	0.079		1	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**14.8**		*74 %*		*15-115*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**6.11**		*31 %*		*15-115*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**18.3**		*91 %*		*30-130*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3700		4800	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3700		4800	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**80.0**		*80.0 %*		*70-130*	*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	1900		4800	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6600		9500	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**102.**		*102. %*		*70-130*	*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	

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Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	**32.8**	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Benzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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Project Manager: Cheryl Montgomery

Reported:
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Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methylene chloride	**4.59**	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**55.5**		*111 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**52.0**		*104 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**56.3**		*113 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**51.9**		*104 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	06-Nov-2018	06-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.32**		*65 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**0.0614**	0.00159		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Acenaphthylene	**0.00333**	0.00175		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Anthracene	**0.0114**	0.00192		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benz(a)anthracene	**0.00216**	0.00171		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(a)pyrene	**0.00124**	0.000832		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	ND	0.00146		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Surrogate: Benzo(b)fluoranthene-d12	**0.363**		*73 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00184**	0.00126		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00174**	0.0013		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	ND	0.00116		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Chrysene	**0.00289**	0.000927		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-01-EL

18J0403-01 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	ND	0.000678		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Fluoranthene	**0.0208**	0.00148		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**0.0348**	0.00171		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**0.00594**	0.000528		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.00646**	0.00175		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Phenanthrene	**0.0356**	0.00187		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Pyrene	**0.0227**	0.0015		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.405**		*82 %*		*30-130*	*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**6.18**	2.02		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ja
1,2,3,4,6,7,8-Hepta CDF	ND	1.76		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.75		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.17		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.48		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.19		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.59		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.2		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.53		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.42		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.59		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.43		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.45		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.15		10.1	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.35		10.1	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	197		101	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	A3470, U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-01-EL

18J0403-01 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	**10.7**	1.96		101	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ja
Total Hepta CDD	**22.8**	2.02		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ja
Total Hepta CDF	ND	1.76		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	2.91		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.5		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.42		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.52		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.15		10.1	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.35		10.1	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1320**		*66 %*	*35-197*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1520**		*76 %*	*23-140*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1540**		*77 %*	*28-143*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1700**		*85 %*	*32-141*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1680**		*84 %*	*26-152*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1420**		*71 %*	*28-143*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1920**		*96 %*	*28-130*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1740**		*87 %*	*26-123*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1560**		*78 %*	*25-181*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1240**		*62 %*	*24-185*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1520**		*76 %*	*28-136*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1600**		*80 %*	*29-147*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1500**		*75 %*	*21-178*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1420**		*71 %*	*24-164*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1620**		*81 %*	*24-169*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3200**		*80 %*	*17-157*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

HSCNew-NMP-02-EL

18J0403-02 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0034**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0017**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.167**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0024**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	**0.0014**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0502**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	**0.016**	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	J
Selenium	ND	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	**0.00358**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-02-EL

18J0403-02 (Water)

ERDC-EL-EP-C

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0763**		*76.3 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0896**		*74.7 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-02-EL

18J0403-02 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**8.59**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.10**		*104 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Surrogate: PCB 198	**0.054**		*45.4 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-02-EL

18J0403-02 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**2.66**	0.0237		0.170	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	
Wet Chemistry									
Total Suspended Solids	**8.00**	0.286	0.571	1.43	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.097		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.069		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	**0.1**	0.079		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
1,4-Dichlorobenzene	ND	0.084		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**19**		*94 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.154		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.101		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.243		2.02	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.735		5.05	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.165		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.17		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.091		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.092		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**14.5**		*72 %*	*30-130*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**8.3**		*41 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.105		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.116		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.195		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.515		2.02	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.101		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.104		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.08		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.114		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.596		2.52	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Azobenzene	ND	0.129		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Benzidine	ND	0.469		20.2	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.086		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.094		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.109		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.102**	0.082		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.086		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-02-EL

18J0403-02 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.182		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.118		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.219**	0.101		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.079		1.01	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.123		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.154		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.103		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Isophorone	ND	0.127		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.103		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**14.5**		*72 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.073		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.124		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.073		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.434		2.02	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Phenol	ND	0.052		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**5.63**		*28 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**17.2**		*85 %*	*30-130*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3800		4900	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3800		4900	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**82.6**		*82.6 %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	2000		4900	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6800		9800	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**100.**		*100. %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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18J0403-02 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	**18.7**	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Benzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-02-EL

18J0403-02 (Water)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methylene chloride	**3.95**	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**56.1**		*112 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**59.2**		*118 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**54.7**		*109 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**47.8**		*95.7 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	06-Nov-2018	06-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.318**		*64 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**0.594**	0.00161		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Acenaphthylene	**0.0865**	0.00177		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Anthracene	**0.0787**	0.00194		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benz(a)anthracene	**0.0062**	0.00173		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(a)pyrene	**0.00186**	0.00084		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	ND	0.00148		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Surrogate: Benzo(b)fluoranthene-d12	**0.456**		*91 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.002**	0.00127		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00237**	0.00131		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	ND	0.00117		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Chrysene	**0.00749**	0.000936		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-02-EL

18J0403-02 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	ND	0.000685		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Fluoranthene	**0.263**	0.00149		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**0.298**	0.00173		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**0.00598**	0.000533		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.522**	0.00177		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Phenanthrene	**0.459**	0.00189		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Pyrene	**0.331**	0.00152		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.447**		*89 %*		*30-130*	*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.54		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.16		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.16		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.56		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.13		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.59		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.22		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.61		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.18		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.5		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.78		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.1		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.62		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.02		10	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	**5.24**	1.46		10	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ja
Octa CDD	ND	2.09		100	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-02-EL

18J0403-02 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	1.69		100	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	1.54		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hepta CDF	ND	1.16		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.61		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.16		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.5		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.7		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.02		10	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	**7.7**	1.46		10	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ja
Surrogate: 37CL4 2378 Tetra CDD	**1400**		*70 %*	*35-197*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1660**		*83 %*	*23-140*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1700**		*85 %*	*28-143*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1880**		*94 %*	*32-141*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1860**		*93 %*	*26-152*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1540**		*77 %*	*28-143*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2040**		*102 %*	*28-130*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**2020**		*101 %*	*26-123*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1580**		*79 %*	*25-181*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1320**		*66 %*	*24-185*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1620**		*81 %*	*28-136*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1700**		*85 %*	*29-147*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1600**		*80 %*	*21-178*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1480**		*74 %*	*24-164*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1700**		*85 %*	*24-169*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3360**		*84 %*	*17-157*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-EL

18J0403-03 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0011**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0027**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.215**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	**0.0015**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0025**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0443**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	**0.005**	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	J
Selenium	ND	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	**0.00401**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	**0.00438**	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	J
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	**0.00364**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep4	**0.00381**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-EL

18J0403-03 (Water)

ERDC-EL-EP-C

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	**0.006**	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0607**		*60.7 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.111**		*92.3 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-EL

18J0403-03 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**1.53**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.097**		*97.0 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Surrogate: PCB 198	**0.058**		*48.7 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-EL

18J0403-03 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.0729**	0.0223		0.160	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	J
Wet Chemistry									
Total Suspended Solids	**10.6**	0.303	0.606	1.52	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**19.8**		*99 %*		*15-115*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**12.7**		*64 %*		*30-130*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**6.07**		*30 %*		*15-115*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.104		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.115		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.113		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.1**	0.081		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.085		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-EL

18J0403-03 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.18		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.359**	0.1		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.079		1	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**11.4**		*57 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**4.44**		*22 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**19.6**		*98 %*	*30-130*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3700		4700	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3700		4700	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**80.4**		*80.4 %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	1900		4700	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6500		9400	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**104.**		*104. %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-EL

18J0403-03 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	ND	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Benzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-EL

18J0403-03 (Water)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methylene chloride	**3.98**	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**57.3**		*115 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**50.9**		*102 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**55.7**		*111 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**52.0**		*104 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	06-Nov-2018	06-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.294**		*62 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**0.00993**	0.00152	0.00943		ug/l	04-Nov-2018	21-Nov-2018	8270D	
Acenaphthylene	ND	0.00167	0.00943		ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Anthracene	**0.00448**	0.00183	0.00943		ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benz(a)anthracene	ND	0.00163	0.00943		ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Benzo(a)pyrene	ND	0.000792	0.00943		ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Benzo(b)fluoranthene	ND	0.0014	0.00943		ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Surrogate: Benzo(b)fluoranthene-d12	**0.41**		*87 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	ND	0.0012	0.00943		ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Benzo(g,h,i)perylene	ND	0.00124	0.00943		ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Benzo(k)fluoranthene	ND	0.0011	0.00943		ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Chrysene	**0.00138**	0.000883	0.00943		ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-EL

18J0403-03 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	ND	0.000646		0.00943	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Fluoranthene	**0.0167**	0.0014		0.00943	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**0.00596**	0.00163		0.00943	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Indeno(1,2,3-cd)pyrene	**0.00518**	0.000503		0.00943	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.00579**	0.00167		0.00943	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Phenanthrene	**0.00669**	0.00178		0.00943	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Pyrene	**0.0168**	0.00143		0.00943	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.389**		*82 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.72		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.39		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.38		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.39		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.16		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.41		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.25		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.43		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.21		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.05		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.76		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.12		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.6		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.77		10	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.06		10	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	4.09		100	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-EL

18J0403-03 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	3.08		100	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	1.72		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hepta CDF	ND	1.38		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.43		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.18		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.05		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.68		50	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.77		10	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.06		10	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1420**		*71 %*	*35-197*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1560**		*78 %*	*23-140*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1540**		*77 %*	*28-143*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1660**		*83 %*	*32-141*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1720**		*86 %*	*26-152*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1380**		*69 %*	*28-143*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1960**		*98 %*	*28-130*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1880**		*94 %*	*26-123*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1580**		*79 %*	*25-181*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1300**		*65 %*	*24-185*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1560**		*78 %*	*28-136*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1600**		*80 %*	*29-147*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1540**		*77 %*	*21-178*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1500**		*75 %*	*24-164*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1660**		*83 %*	*24-169*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3040**		*76 %*	*17-157*		*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-04-EL

18J0403-04 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0037**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0041**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.189**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0023**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0437**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	**0.051**	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	
Selenium	ND	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	**0.00442**	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	J
TOC rep1	**0.00417**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep2	**0.00383**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep3	**0.00451**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep4	**0.00468**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	**0.00430**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.111**		*111 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0787**		*65.6 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**17.2**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.079**		*78.5 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Surrogate: PCB 198	**0.058**		*48.2 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**2.84**	0.0242		0.173	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	
Wet Chemistry									
Total Suspended Solids	**43.0**	1.00	2.00	5.00	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.097		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.069		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	**0.149**	0.079		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
1,4-Dichlorobenzene	ND	0.084		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**18.6**		*92 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.154		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.101		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.243		2.02	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.735		5.05	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.165		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.17		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.091		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.092		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**15.2**		*75 %*	*30-130*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**8.54**		*42 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.105		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.116		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.195		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.515		2.02	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.101		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.104		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.08		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.114		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.596		2.52	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Azobenzene	ND	0.129		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Benzidine	ND	0.469		20.2	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.086		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.094		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.109		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.152**	0.082		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.086		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.182		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.118		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.154**	0.101		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.079		1.01	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.123		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.154		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.103		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Isophorone	ND	0.127		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.103		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**15.6**		*77 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.073		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.124		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.073		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.434		2.02	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Phenol	ND	0.052		0.505	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**6.04**		*30 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**16**		*79 %*	*30-130*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3800		4800	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3800		4800	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**80.8**		*80.8 %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	1900		4800	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6600		9600	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**100.**		*100. %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	

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Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	**0.47**	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	**5.11**	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	**49.0**	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Benzene	**0.47**	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	**0.98**	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methylene chloride	**4.04**	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	**0.92**	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**57.2**		*114 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**50.5**		*101 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**56.9**		*114 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**52.4**		*105 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	06-Nov-2018	06-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.262**		*51 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**0.682**	0.00164		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Acenaphthylene	**0.024**	0.00181		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Anthracene	**0.145**	0.00198		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benz(a)anthracene	**0.021**	0.00176		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benzo(a)pyrene	**0.0044**	0.000857		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00408**	0.00151		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.379**		*74 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00514**	0.0013		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.0026**	0.00134		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00206**	0.00119		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Chrysene	**0.022**	0.000955		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	ND	0.000699		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Fluoranthene	**0.264**	0.00152		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**0.532**	0.00176		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**0.00643**	0.000544		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.0095**	0.00181		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Phenanthrene	**0.91**	0.00193		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Pyrene	**0.202**	0.00155		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.427**		*84 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.82		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	2.1		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	2.09		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.32		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.47		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.34		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.58		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.35		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.53		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.06		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.63		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.42		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.49		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	**7.9**	1.13		10.1	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ja
2,3,7,8-Tetra CDF	**22.1**	1.38		10.1	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	
Octa CDD	ND	4.1		101	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	2.15		101	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	1.82		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hepta CDF	ND	2.09		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.35		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.5		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.06		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.56		50.5	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	**7.9**	1.13		10.1	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	Ja
Total Tetra CDF	**34.1**	1.38		10.1	pg/L	14-Nov-2018	17-Nov-2018	EPA 1613B m	

Surrogate: 37CL4 2378 Tetra CDD	**1420**	*71 %*	*35-197*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-1234678 HeptaCDD	**1520**	*76 %*	*23-140*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-1234678 HeptaCDF	**1580**	*79 %*	*28-143*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-123478 HexaCDD	**1620**	*81 %*	*32-141*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-123478 HexaCDF	**1700**	*85 %*	*26-152*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-1234789 HeptaCDF	**1400**	*70 %*	*28-143*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-123678 HexaCDD	**2080**	*104 %*	*28-130*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-123678 HexaCDF	**1880**	*94 %*	*26-123*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-12378 PentaCDD	**1500**	*75 %*	*25-181*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-12378 PentaCDF	**1280**	*64 %*	*24-185*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-123789 HexaCDF	**1600**	*80 %*	*28-136*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-234678 HexaCDF	**1640**	*82 %*	*29-147*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-23478 PentaCDF	**1540**	*77 %*	*21-178*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-2378 TetraCDD	**1480**	*74 %*	*24-164*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-2378 TetraCDF	**1580**	*79 %*	*24-169*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*
Surrogate: C13-OCDD	**3080**	*77 %*	*17-157*	*14-Nov-2018*	*17-Nov-2018*	*EPA 1613B m*

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-04-EL

18J0403-04 (Water)

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
EPA M8290A / M1613									
2,3,7,8-Tetra CDF	**25.6**	1		10	pg/L	14-Nov-2018	20-Nov-2018	EPA M8290A / M1613	
Surrogate: C13-2378 TetraCDF	**72**		*72 %*	*40-135*		*14-Nov-2018*	*20-Nov-2018*	*EPA M8290A / M1613*	

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HSCNew-NMP-05-EL

18J0403-05 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0026**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0022**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.189**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0015**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0693**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	**0.005**	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	J
Selenium	ND	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	**0.00420**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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18J0403-05 (Water)

ERDC-EL-EP-C

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	**0.006**	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0725**		*72.5 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0858**		*71.5 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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18J0403-05 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**13.3**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.092**		*92.5 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Surrogate: PCB 198	**0.052**		*43.4 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-05-EL

18J0403-05 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.774**	0.0234		0.168	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	
Wet Chemistry									
Total Suspended Solids	**23.0**	1.00	2.00	5.00	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**21.9**		*110 %*		*15-115*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**16.4**		*82 %*		*30-130*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**8.34**		*42 %*		*15-115*	*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.104		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.115		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.113		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.194**	0.081		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.085		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-05-EL

18J0403-05 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.18		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.206**	0.1		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.079		1	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**15.8**		*79 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**5.9**		*30 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**19**		*95 %*	*30-130*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3700		4800	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3700		4800	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**91.1**		*91.1 %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	1900		4800	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6600		9600	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**107.**		*107. %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	

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18J0403-05 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	**3.53**	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	**73.8**	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Benzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-05-EL

18J0403-05 (Water)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methylene chloride	**8.80**	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**56.7**		*113 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**53.4**		*107 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**57.0**		*114 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**51.8**		*104 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	06-Nov-2018	06-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.28**		*57 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**0.176**	0.00159		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Acenaphthylene	**0.012**	0.00175		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Anthracene	**0.037**	0.00192		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benz(a)anthracene	**0.00907**	0.00171		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(a)pyrene	**0.00284**	0.000832		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00296**	0.00146		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.372**		*75 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00352**	0.00126		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00213**	0.0013		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00223**	0.00116		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Chrysene	**0.0118**	0.000927		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	

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ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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18J0403-05 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	ND	0.000678		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Fluoranthene	**0.0852**	0.00148		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**0.151**	0.00171		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**0.00682**	0.000528		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.00936**	0.00175		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Phenanthrene	**0.195**	0.00187		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Pyrene	**0.0667**	0.0015		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.378**		*76 %*		*30-130*	*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.36		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.18		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.17		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	0.991		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.19		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.01		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.28		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.02		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.24		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.38		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.04		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.15		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	0.945		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.8		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A4910, U
2,3,7,8-Tetra CDF	**4.14**	1.16		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
Octa CDD	**11.2**	1.69		100	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja

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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-05-EL

18J0403-05 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	2.17		100	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	1.36		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDF	ND	1.18		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.02		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.21		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.38		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	0.989		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.8		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A4910, U
Total Tetra CDF	**5.86**	1.16		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
Surrogate: 37CL4 2378 Tetra CDD	**1460**		*73 %*	*35-197*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1540**		*77 %*	*23-140*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1620**		*81 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1540**		*77 %*	*32-141*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1720**		*86 %*	*26-152*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1560**		*78 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2040**		*102 %*	*28-130*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1920**		*96 %*	*26-123*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1580**		*79 %*	*25-181*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1300**		*65 %*	*24-185*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1640**		*82 %*	*28-136*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1640**		*82 %*	*29-147*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1620**		*81 %*	*21-178*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1460**		*73 %*	*24-164*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1760**		*88 %*	*24-169*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3240**		*81 %*	*17-157*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-06-EL

18J0403-06 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0027**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0028**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.186**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0015**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0707**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	**0.031**	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	
Selenium	ND	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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HSCNew-NMP-06-EL

18J0403-06 (Water)

ERDC-EL-EP-C

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0682**		*68.2 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0878**		*73.2 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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18J0403-06 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**14.1**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.051**		*51.2 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Surrogate: PCB 198	**0.10**		*83.8 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

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HSCNew-NMP-06-EL

18J0403-06 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.382**	0.0244		0.175	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	
Wet Chemistry									
Total Suspended Solids	**12.8**	0.400	0.800	2.00	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.099		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.07		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.081		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.085		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**22.3**		*108 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.157		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.103		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.248		2.06	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.75		5.15	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.168		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.173		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.093		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.094		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**15.8**		*77 %*	*30-130*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**8.3**		*40 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.107		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.118		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.199		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.526		2.06	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.103		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.106		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.082		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.116		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.608		2.58	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Azobenzene	ND	0.132		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Benzidine	ND	0.478		20.6	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.088		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.096		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.111		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.142**	0.083		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.087		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub

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HSCNew-NMP-06-EL

18J0403-06 (Water)

Alpha

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.186		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.121		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.215**	0.103		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.081		1.03	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.126		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.088		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.158		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.105		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Isophorone	ND	0.13		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.105		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**15.2**		*74 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.074		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.127		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.074		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.443		2.06	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Phenol	ND	0.053		0.515	ug/l	03-Nov-2018	15-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**6.02**		*29 %*	*15-115*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**19.5**		*95 %*	*30-130*		*03-Nov-2018*	*15-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**93.4**		*93.4 %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4600	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6300		9200	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**110.**		*110. %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-06-EL

18J0403-06 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	**3.29**	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	**41.9**	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Benzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	**3.35**	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-06-EL

18J0403-06 (Water)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methylene chloride	**13.9**	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**55.9**		*112 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**50.5**		*101 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**57.4**		*115 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**51.2**		*102 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	06-Nov-2018	06-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.281**		*55 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**0.0601**	0.00166		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Acenaphthylene	**0.0066**	0.00182		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Anthracene	**0.0125**	0.002		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benz(a)anthracene	**0.0133**	0.00178		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benzo(a)pyrene	**0.00361**	0.000866		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00451**	0.00152		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.387**		*75 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00456**	0.00131		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00235**	0.00135		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00237**	0.00121		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Chrysene	**0.0168**	0.000965		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-06-EL

18J0403-06 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	ND	0.000706		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Fluoranthene	**0.122**	0.00154		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**0.0228**	0.00178		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**0.00695**	0.000549		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.00587**	0.00182		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Phenanthrene	**0.005**	0.00195		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Pyrene	**0.0923**	0.00157		0.0103	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.418**		*81 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	2.49		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A4910, U
1,2,3,4,6,7,8-Hepta CDF	ND	1.25		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.25		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.17		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.18		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.19		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.26		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.2		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.22		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.34		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.08		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.14		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	0.981		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.26		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.33		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A3470, U
Octa CDD	ND	29.6		100	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A3470, U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-06-EL

18J0403-06 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	2.49		100	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	**3.57**	1.77		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
Total Hepta CDF	ND	1.25		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.2		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.2		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.34		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.03		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.26		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.33		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A3470, U
Surrogate: 37CL4 2378 Tetra CDD	**1460**		*73 %*	*35-197*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1540**		*77 %*	*23-140*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1580**		*79 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1660**		*83 %*	*32-141*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1760**		*88 %*	*26-152*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1520**		*76 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1980**		*99 %*	*28-130*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1840**		*92 %*	*26-123*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1620**		*81 %*	*25-181*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1380**		*69 %*	*24-185*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1620**		*81 %*	*28-136*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1680**		*84 %*	*29-147*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1680**		*84 %*	*21-178*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1560**		*78 %*	*24-164*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1780**		*89 %*	*24-169*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3120**		*78 %*	*17-157*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-07-EL

18J0403-07 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0040**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0036**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.161**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0015**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0655**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	**0.039**	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	
Selenium	ND	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	**0.00364**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
DOC rep4	**0.00384**	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	J
Sulfide	**0.00303**	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	J
TOC rep1	**0.00382**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep2	**0.00361**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep3	**0.00439**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep4	**0.00383**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	**0.00391**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0702**		*70.2 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0731**		*60.9 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**27.8**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.10**		*99.5 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Surrogate: PCB 198	**0.047**		*39.0 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**1.88**	0.0242		0.173	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	
Wet Chemistry									
Total Suspended Solids	**13.3**	0.476	0.952	2.38	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**21.4**		*107 %*		*15-115*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**14.6**		*73 %*		*30-130*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**7.13**		*36 %*		*15-115*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.104		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.115		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.113		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**1.7**	0.081		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	
Butylbenzylphthalate	ND	0.085		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
			Alpha						
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.18		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.152**	0.1		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.079		1	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**13.5**		*67 %*		*15-115*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**5.15**		*26 %*		*15-115*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**18.9**		*95 %*		*30-130*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**96.8**		*96.8 %*		*70-130*	*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4600	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6400		9200	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**114.**		*114. %*		*70-130*	*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	

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Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	**5.62**	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	**45.4**	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Benzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	**2.70**	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methylene chloride	**14.1**	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	**0.43**	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**54.3**		*109 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**50.6**		*101 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**54.0**		*108 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**51.3**		*103 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	06-Nov-2018	06-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.335**		*66 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**0.466**	0.00164		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Acenaphthylene	**0.0174**	0.00181		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Anthracene	**0.0957**	0.00198		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benz(a)anthracene	**0.0218**	0.00176		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benzo(a)pyrene	**0.00559**	0.000857		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00723**	0.00151		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.392**		*77 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.0068**	0.0013		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00309**	0.00134		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00397**	0.00119		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Chrysene	**0.0256**	0.000955		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

HSCNew-NMP-07-EL

18J0403-07 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Alpha									
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	**0.000758**	0.000699		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Fluoranthene	**0.25**	0.00152		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**0.36**	0.00176		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**0.00769**	0.000544		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.0484**	0.00181		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Phenanthrene	**0.429**	0.00193		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Pyrene	**0.133**	0.00155		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.461**		*90 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	**5.58**	1.49		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
1,2,3,4,6,7,8-Hepta CDF	ND	1.39		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.38		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.15		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.12		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.17		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.2		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.18		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.16		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.14		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	0.98		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.08		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	0.892		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	**2.47**	1.23		9.43	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
2,3,7,8-Tetra CDF	**6.13**	0.924		9.43	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
Octa CDD	ND	85.9		94.3	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A3470, U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-07-EL

18J0403-07 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	1.27		94.3	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	**12.2**	1.49		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
Total Hepta CDF	**2.71**	1.39		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
Total Hexa CDD	ND	1.18		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.14		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.14		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	0.934		47.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	**2.47**	1.23		9.43	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
Total Tetra CDF	**9.19**	0.924		9.43	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
Surrogate: 37CL4 2378 Tetra CDD	**1480**		*74 %*	*35-197*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1440**		*72 %*	*23-140*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1480**		*74 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1660**		*83 %*	*32-141*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1580**		*79 %*	*26-152*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1420**		*71 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1820**		*91 %*	*28-130*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1700**		*85 %*	*26-123*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1580**		*79 %*	*25-181*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1300**		*65 %*	*24-185*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1520**		*76 %*	*28-136*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1500**		*75 %*	*29-147*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1540**		*77 %*	*21-178*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1540**		*77 %*	*24-164*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1740**		*87 %*	*24-169*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3080**		*77 %*	*17-157*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	

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ERDC -- Vicksburg (EL)
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Project Manager: Cheryl Montgomery

Reported:
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HSCNew-NMP-08-EL

18J0403-08 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0021**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0017**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.288**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0015**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.162**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	**0.052**	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	
Selenium	**0.0015**	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	J
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	**0.00379**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	**0.00354**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-08-EL

18J0403-08 (Water)

ERDC-EL-EP-C

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0666**		*66.6 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0752**		*62.6 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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HSCNew-NMP-08-EL

18J0403-08 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**14.0**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.094**		*93.7 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Surrogate: PCB 198	**0.045**		*37.4 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

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HSCNew-NMP-08-EL

18J0403-08 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**5.76**	0.0234		0.168	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	
Wet Chemistry									
Total Suspended Solids	**10.0**	0.400	0.800	2.00	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.097		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.069		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.079		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.084		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**19.7**		*98 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.154		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.101		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.243		2.02	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.735		5.05	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.165		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.17		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.091		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.092		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**14.2**		*70 %*	*30-130*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**7.27**		*36 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.105		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.116		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.195		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.515		2.02	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.101		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.104		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.08		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.114		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.596		2.52	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Azobenzene	ND	0.129		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Benzidine	ND	0.469		20.2	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.086		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.094		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.109		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.122**	0.082		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.086		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-08-EL

18J0403-08 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.182		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.118		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.192**	0.101		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.079		1.01	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.123		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.154		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.103		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Isophorone	ND	0.127		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.103		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**13.2**		*66 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.073		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.124		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.073		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.434		2.02	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Phenol	ND	0.052		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**5.02**		*25 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**18.5**		*92 %*	*30-130*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3600		4700	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4700	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**86.1**		*86.1 %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	1900		4700	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6400		9300	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**101.**		*101. %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	

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18J0403-08 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	**4.02**	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	**46.1**	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Benzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-08-EL

18J0403-08 (Water)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	**0.90**	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	**1.18**	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Methylene chloride	**14.8**	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	**1.99**	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**55.1**		*110 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**52.7**		*105 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**54.2**		*108 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**51.1**		*102 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	06-Nov-2018	06-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.374**		*76 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**1.31**	0.00159		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Acenaphthylene	**0.0288**	0.00175		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Anthracene	**0.622**	0.00192		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benz(a)anthracene	**0.0261**	0.00171		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benzo(a)pyrene	**0.0033**	0.000832		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00327**	0.00146		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.399**		*81 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00346**	0.00126		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	ND	0.0013		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Benzo(k)fluoranthene	**0.00258**	0.00116		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Chrysene	**0.0251**	0.000927		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-08-EL

18J0403-08 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	ND	0.000678		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Fluoranthene	**0.483**	0.00148		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**1.35**	0.00171		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**0.00612**	0.000528		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.0528**	0.00175		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Phenanthrene	**1.6**	0.00187		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Pyrene	**0.247**	0.0015		0.0099	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.443**		*89 %*		*30-130*	*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.13		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.03		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.02		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.24		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	0.893		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.26		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	0.958		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.27		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	0.927		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.2		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	0.94		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	0.862		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	0.856		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.08		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.24		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Octa CDD	**11.8**	3.93		100	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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18J0403-08 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	1.67		100	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	1.13		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDF	ND	1.02		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.27		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	0.909		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.2		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	0.896		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.08		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.24		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1480**		*74 %*	*35-197*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1600**		*80 %*	*23-140*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1660**		*83 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1680**		*84 %*	*32-141*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1720**		*86 %*	*26-152*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1580**		*79 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1980**		*99 %*	*28-130*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1760**		*88 %*	*26-123*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1680**		*84 %*	*25-181*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1320**		*66 %*	*24-185*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1640**		*82 %*	*28-136*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1600**		*80 %*	*29-147*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1680**		*84 %*	*21-178*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1520**		*76 %*	*24-164*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1720**		*86 %*	*24-169*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3400**		*85 %*	*17-157*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0034**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0018**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.951**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	**0.0002**	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0014**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	**0.0032**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0469**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	**0.006**	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	J
Selenium	**0.0018**	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	J
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	**0.00352**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	**0.00355**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	**0.00405**	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	J
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	**0.00372**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep4	**0.00400**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	**0.00359**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0652**		*65.2 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0887**		*73.9 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**10.6**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.097**		*96.7 %*		*30-150*	*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Surrogate: PCB 198	**0.055**		*45.7 %*		*30-150*	*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*Z-03, H*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**15.5**	0.0450		0.293	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	
Wet Chemistry									
Total Suspended Solids	**19.5**	0.500	1.00	2.50	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.097		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.069		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.079		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.084		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**20.6**		*102 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.154		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.101		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.243		2.02	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.735		5.05	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.165		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.17		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.091		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.092		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**14.2**		*70 %*	*30-130*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**6.78**		*34 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.105		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.116		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.195		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.515		2.02	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.101		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.104		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.08		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.114		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.596		2.52	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Azobenzene	ND	0.129		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Benzidine	ND	0.469		20.2	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.086		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.094		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.109		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.161**	0.082		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.086		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.182		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.118		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.396**	0.101		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.079		1.01	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.123		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.154		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.103		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Isophorone	ND	0.127		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.103		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**13.2**		*66 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.073		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.124		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.073		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.434		2.02	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Phenol	ND	0.052		0.505	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**4.76**		*24 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**19**		*94 %*	*30-130*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3800		4900	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3800		4900	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**88.8**		*88.8 %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	2000		4900	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6800		9800	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**102.**		*102. %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-09-EL

18J0403-09 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	**46.1**	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Benzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	**2.13**	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-09-EL

18J0403-09 (Water)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methylene chloride	**16.1**	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**54.7**		*109 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**52.0**		*104 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**54.0**		*108 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**51.1**		*102 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	06-Nov-2018	06-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.317**		*63 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**4.42**	0.00163		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	E
Acenaphthylene	**0.0293**	0.00179		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Anthracene	**0.853**	0.00196		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benz(a)anthracene	**0.0293**	0.00175		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benzo(a)pyrene	**0.00319**	0.000848		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00337**	0.00149		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.429**		*85 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00335**	0.00128		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	ND	0.00132		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Benzo(k)fluoranthene	**0.00238**	0.00118		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Chrysene	**0.0262**	0.000945		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-09-EL

18J0403-09 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	ND	0.000692		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Fluoranthene	**0.613**	0.0015		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**3.24**	0.00175		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	E
Indeno(1,2,3-cd)pyrene	**0.00597**	0.000538		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.0983**	0.00179		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Phenanthrene	**3.14**	0.00191		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	E
Pyrene	**0.28**	0.00154		0.0101	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.421**		*83 %*		*30-130*	*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.5		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.2		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.19		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.27		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.44		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.29		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.55		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.3		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.5		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.42		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.48		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.39		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.35		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.35		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	1.15		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	4.89		100	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A3470, U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-09-EL

18J0403-09 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	2.33		100	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	1.5		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDF	ND	1.19		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.3		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.47		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.42		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.41		50.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.35		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	1.15		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1360**		*68 %*	*35-197*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1600**		*80 %*	*23-140*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1640**		*82 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1640**		*82 %*	*32-141*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1740**		*87 %*	*26-152*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1560**		*78 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2060**		*103 %*	*28-130*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1700**		*85 %*	*26-123*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1560**		*78 %*	*25-181*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1280**		*64 %*	*24-185*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1660**		*83 %*	*28-136*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1660**		*83 %*	*29-147*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1680**		*84 %*	*21-178*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1460**		*73 %*	*24-164*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1600**		*80 %*	*24-169*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3320**		*83 %*	*17-157*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	

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HSCNew-NMP-09-EL

18J0403-09RE1 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Alpha									
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.341**		*67 %*	*30-130*		*04-Nov-2018*	*26-Nov-2018*	*8270D*	
Acenaphthene	**5.88**	0.00813		0.0505	ug/l	04-Nov-2018	26-Nov-2018	8270D	
Surrogate: Benzo(b)fluoranthene-d12	**0.447**		*88 %*	*30-130*		*04-Nov-2018*	*26-Nov-2018*	*8270D*	
Fluorene	**3.84**	0.00874		0.0505	ug/l	04-Nov-2018	26-Nov-2018	8270D	
Phenanthrene	**3.83**	0.00954		0.0505	ug/l	04-Nov-2018	26-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.464**		*92 %*	*30-130*		*04-Nov-2018*	*26-Nov-2018*	*8270D*	

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18J0403-10 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0034**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0023**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.532**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	**0.0002**	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	**0.0007**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	**0.0161**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Nickel-60 [1]	**0.0017**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	**0.0012**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.0730**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	**0.009**	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	J
Selenium	ND	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	**0.00530**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	**0.00369**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep4	**0.00406**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0662**		*66.2 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0894**		*74.5 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**15.9**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.094**		*94.4 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Surrogate: PCB 198	**0.053**		*44.5 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*Z-03, H*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**1.95**	0.0242		0.173	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	
Wet Chemistry									
Total Suspended Solids	**19.0**	1.00	2.00	5.00	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.099		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.07		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.081		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.085		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**21.1**		*102 %*		*15-115*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.157		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.103		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.248		2.06	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.75		5.15	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.168		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.173		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.093		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.094		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**14.9**		*72 %*		*30-130*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**7.78**		*38 %*		*15-115*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.107		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.118		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.199		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.526		2.06	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.103		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.106		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.082		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.116		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.608		2.58	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Azobenzene	ND	0.132		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Benzidine	ND	0.478		20.6	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.088		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.096		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.111		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.129**	0.083		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.087		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub

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Alpha

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.186		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.121		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.215**	0.103		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.081		1.03	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.126		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.088		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.158		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.105		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Isophorone	ND	0.13		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.105		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**14.4**		*70 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.074		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.127		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.074		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.443		2.06	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Phenol	ND	0.053		0.515	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**5.35**		*26 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**18.9**		*92 %*	*30-130*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3500		4400	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3500		4400	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**96.6**		*96.6 %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4400	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6100		8900	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**106.**		*106. %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	

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Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	**60.2**	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Benzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methylene chloride	**4.71**	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**53.6**		*107 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**52.1**		*104 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**54.5**		*109 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**51.0**		*102 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	06-Nov-2018	06-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.302**		*59 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**0.582**	0.00164		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Acenaphthylene	**0.0113**	0.00181		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Anthracene	**0.103**	0.00198		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benz(a)anthracene	**0.012**	0.00176		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benzo(a)pyrene	**0.00222**	0.000857		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00269**	0.00151		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.415**		*81 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00262**	0.0013		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	ND	0.00134		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Benzo(k)fluoranthene	**0.00182**	0.00119		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Chrysene	**0.0126**	0.000955		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	ND	0.000699		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Fluoranthene	**0.2**	0.00152		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**0.438**	0.00176		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**0.00627**	0.000544		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.0965**	0.00181		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Phenanthrene	**0.376**	0.00193		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Pyrene	**0.099**	0.00155		0.0102	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.413**		*81 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.58		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.2		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.2		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.17		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	0.848		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.19		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	0.91		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.2		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	0.881		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.1		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.33		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	0.819		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.22		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.04		10.1	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	0.94		10.1	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	12.8		101	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A4997, U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	1.5		101	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	1.58		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDF	ND	1.2		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.2		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	0.863		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.1		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.27		50.5	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.04		10.1	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	0.94		10.1	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1560**		*78 %*	*35-197*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1620**		*81 %*	*23-140*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1540**		*77 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1740**		*87 %*	*32-141*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1800**		*90 %*	*26-152*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1500**		*75 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1940**		*97 %*	*28-130*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1860**		*93 %*	*26-123*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1660**		*83 %*	*25-181*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1380**		*69 %*	*24-185*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1640**		*82 %*	*28-136*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1620**		*81 %*	*29-147*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1700**		*85 %*	*21-178*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1640**		*82 %*	*24-164*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1760**		*88 %*	*24-169*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3360**		*84 %*	*17-157*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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18J0403-11 (Water)

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0027**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0025**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.340**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	**0.00069**	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	**0.0006**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0015**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.149**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	**0.002**	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	J
Selenium	ND	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	U
TOC rep1	**0.00426**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep2	**0.00369**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep3	**0.00409**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
TOC rep4	**0.00415**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	**0.00405**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J

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18J0403-11 (Water)

ERDC-EL-EP-C

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0603**		*60.3 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.0892**		*74.4 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**15.8**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, S-GC, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	**0.002**	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, J
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 52	**0.004**	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, J
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.091**		*90.7 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Surrogate: PCB 198	**0.054**		*44.9 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*Z-03, H*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

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ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-11-EL

18J0403-11 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.524**	0.0237		0.170	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	
Wet Chemistry									
Total Suspended Solids	**5.71**	0.286	0.571	1.43	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.091		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.064		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.074		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.078		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**18.6**		*99 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.143		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.094		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.227		1.89	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.687		4.72	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.154		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.158		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.085		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.086		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**12.9**		*68 %*	*30-130*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**6.24**		*33 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.098		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.108		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.182		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.481		1.89	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.094		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.097		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.075		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.107		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.557		2.36	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Azobenzene	ND	0.121		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Benzidine	ND	0.438		18.9	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.081		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.088		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.102		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.115**	0.076		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.08		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-11-EL

18J0403-11 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.17		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.11		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.287**	0.094		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.074		0.943	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.115		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.081		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.144		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.096		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Isophorone	ND	0.119		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.096		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**12.6**		*67 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.068		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.116		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.068		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.406		1.89	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Phenol	ND	0.048		0.472	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**4.25**		*23 %*	*15-115*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**16**		*85 %*	*30-130*		*03-Nov-2018*	*16-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3600		4600	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3600		4600	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**89.7**		*89.7 %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4600	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6400		9200	ug/L	01-Nov-2018	11-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**104.**		*104. %*	*70-130*		*01-Nov-2018*	*11-Nov-2018*	*TNRCC 1005*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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18J0403-11 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroetha ne	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	**3.21**	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Jc
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	**54.1**	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Benzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-11-EL

18J0403-11 (Water)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methylene chloride	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**55.4**		*111 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**52.0**		*104 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**54.3**		*109 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**51.2**		*102 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	08-Nov-2018	08-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.292**		*58 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**0.168**	0.00161		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Acenaphthylene	**0.0152**	0.00177		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Anthracene	**0.0131**	0.00194		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benz(a)anthracene	**0.0135**	0.00173		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benzo(a)pyrene	**0.00347**	0.00084		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(b)fluoranthene	**0.00385**	0.00148		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Surrogate: Benzo(b)fluoranthene-d12	**0.437**		*87 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	**0.00376**	0.00127		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(g,h,i)perylene	**0.00218**	0.00131		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(k)fluoranthene	**0.00296**	0.00117		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Chrysene	**0.0145**	0.000936		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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18J0403-11 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	ND	0.000685		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Fluoranthene	**0.135**	0.00149		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**0.0405**	0.00173		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**0.00683**	0.000533		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.00287**	0.00177		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Phenanthrene	**0.00683**	0.00189		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Pyrene	**0.0917**	0.00152		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.436**		*87 %*		*30-130*	*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.55		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.25		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.25		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.06		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	1.19		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.08		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	1.28		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.09		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	1.23		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.04		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.02		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	1.15		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	0.931		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	ND	1.25		9.52	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDF	ND	0.923		9.52	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Octa CDD	ND	18.9		95.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A3470, U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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18J0403-11 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	1.36		95.2	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	2.57		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A4997, U
Total Hepta CDF	ND	1.25		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.09		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	1.21		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.04		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	0.974		47.6	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	ND	1.25		9.52	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDF	ND	0.923		9.52	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Surrogate: 37CL4 2378 Tetra CDD	**1480**		*74 %*	*35-197*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1420**		*71 %*	*23-140*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1380**		*69 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1600**		*80 %*	*32-141*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1520**		*76 %*	*26-152*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1400**		*70 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**1780**		*89 %*	*28-130*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1620**		*81 %*	*26-123*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1600**		*80 %*	*25-181*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1200**		*60 %*	*24-185*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1520**		*76 %*	*28-136*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1480**		*74 %*	*29-147*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1560**		*78 %*	*21-178*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1520**		*76 %*	*24-164*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1680**		*84 %*	*24-169*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3080**		*77 %*	*17-157*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Metals (Dissolved) by EPA 6000/7000 Series Methods									
Antimony-121 [1]	**0.0011**	0.0007	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Arsenic-75 [3]	**0.0021**	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Barium-135 [1]	**0.386**	0.0020	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Copper-63 [1]	ND	0.0006	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Nickel-60 [1]	**0.0015**	0.0005	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Silver-107 [1]	**0.0011**	0.0008	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	J
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	U
Zinc-66 [1]	**0.184**	0.0010	0.0025	0.0050	mg/L	15-Nov-2018	15-Nov-2018	SW 846/6020	
Metals by EPA 6000/7000 Series Methods									
Chromium (3+)	ND	0.001	0.004	0.008	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Chromium (VI)	ND	0.0007	0.001	0.003	mg/L	29-Oct-2018	29-Oct-2018	EPA 7199M	U
Mercury	ND	0.002	0.010	0.020	ug/L	14-Nov-2018	16-Nov-2018	EPA 7474	U
Selenium	ND	0.0015	0.0050	0.0100	mg/L	30-Oct-2018	30-Oct-2018	GF-AAS 7000 Series	U
Miscellaneous Physical/Conventional Chemistry Parameters									
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
DOC rep4	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	19-Nov-2018	EPA 9060	U
Sulfide	ND	0.00150	0.00500	0.0100	mg/L	30-Oct-2018	30-Oct-2018	EPA 376	U
TOC rep1	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep2	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep3	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U
TOC rep4	**0.00359**	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%	05-Nov-2018	08-Nov-2018	EPA 9060	U

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
4,4´-DDD	ND	0.00090	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDE	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
4,4´-DDT	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Aldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
alpha-Chlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
beta-BHC	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
cis-Nonachlor	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
delta-BHC	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Dieldrin	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan I	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan II	ND	0.0005	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endosulfan sulfate	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Endrin aldehyde	ND	0.00060	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
gamma-Chlordane	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Heptachlor epoxide	ND	0.0007	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Oxychlordane	ND	0.001	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Toxaphene	ND	0.073	0.100	0.300	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
trans-Nonachlor	ND	0.0008	0.002	0.006	ug/L	03-Nov-2018	17-Nov-2018	EPA 8081A	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.0639**		*63.9 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	
Surrogate: PCB 198	**0.104**		*86.5 %*		*30-150*	*03-Nov-2018*	*17-Nov-2018*	*EPA 8081A*	

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ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Nutrients									
Ammonia as N, filtered	**2.97**	0.0880	0.100	0.200	mg/L	01-Nov-2018	01-Nov-2018	EPA 350.2	
Polychlorinated Biphenyls (as Congeners) by EPA Method 8082									
PCB 101	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 105	ND	0.00030	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 118	ND	0.0008	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 126	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	Z-03, H, U
PCB 128	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 138	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 153	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 169	ND	0.0002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 170	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 18	ND	0.004	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 180	ND	0.001	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 187	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 28	ND	0.005	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 44	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 52	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 66	ND	0.0007	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 77	ND	0.002	0.003	0.006	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
PCB 8	ND	0.006	0.006	0.012	ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	**0.089**		*89.4 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*Z-03, H*
Surrogate: PCB 198	**0.059**		*49.0 %*	*30-150*		*03-Nov-2018*	*20-Dec-2018*	*EPA 8082*	*H, Z-03*
Total PCB Congeners-CALC	0.00				ug/L	03-Nov-2018	20-Dec-2018	EPA 8082	H, Z-03, U

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
ERDC-EL-EP-C									
Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring									
Total PAH-CALC	**0.703**	0.0237		0.170	ug/L	03-Nov-2018	21-Nov-2018	EPA 8270C	
Wet Chemistry									
Total Suspended Solids	**14.0**	0.400	0.800	2.00	mg/L	31-Oct-2018	31-Oct-2018	EPA 160.2	
Semivolatile Organics by GC-MS									
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2,4,6-Tribromophenol	**21**		*105 %*		*15-115*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2,4,6-Trichlorophenol	ND	0.152		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Chlorophenol	ND	0.091		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: 2-Fluorobiphenyl	**14.2**		*71 %*		*30-130*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: 2-Fluorophenol	**7.87**		*39 %*		*15-115*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
2-Methylphenol	ND	0.104		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
2-Nitrophenol	ND	0.115		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Methylphenol	ND	0.113		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
4-Nitrophenol	ND	0.59		2.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Azobenzene	ND	0.128		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Benzidine	ND	0.464		20	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
bis(2-Ethylhexyl)phthalate	**0.198**	0.081		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Jb
Butylbenzylphthalate	ND	0.085		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

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Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
Semivolatile Organics by GC-MS									
Diethylphthalate	ND	0.18		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Dimethylphthalate	ND	0.117		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Di-n-butylphthalate	**0.323**	0.1		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Jb
Di-n-octylphthalate	ND	0.079		1	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Hexachloroethane	ND	0.102		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Isophorone	ND	0.126		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Nitrobenzene	ND	0.102		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Nitrobenzene-d5	**14.3**		*71 %*		*15-115*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Pentachlorophenol	ND	0.43		2	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Phenol	ND	0.051		0.5	ug/l	03-Nov-2018	16-Nov-2018	8270D	Ub
Surrogate: Phenol-d5	**5.25**		*26 %*		*15-115*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
Surrogate: Terphenyl-d14	**20**		*100 %*		*30-130*	*03-Nov-2018*	*16-Nov-2018*	*8270D*	
TNRCC 1005									
>C12-C28	ND	3400		4400	ug/L	01-Nov-2018	12-Nov-2018	TNRCC 1005	Uc
>C28-C35	ND	3400		4400	ug/L	01-Nov-2018	12-Nov-2018	TNRCC 1005	Uc
Surrogate: 1-Chlorooctane	**92.0**		*92.0 %*		*70-130*	*01-Nov-2018*	*12-Nov-2018*	*TNRCC 1005*	
C6-C12	ND	1800		4400	ug/L	01-Nov-2018	12-Nov-2018	TNRCC 1005	Uc
C6-C35	ND	6000		8800	ug/L	01-Nov-2018	12-Nov-2018	TNRCC 1005	Uc
Surrogate: O-TERPHENYL	**103.**		*103. %*		*70-130*	*01-Nov-2018*	*12-Nov-2018*	*TNRCC 1005*	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-DUP-EL

18J0403-12 (Water)

Air Water & Soil Laboratories, Inc.

Volatile Organic Compounds by GCMS

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
1,4-Dioxane	ND	40.0		80.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Acetone	**27.4**	7.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Benzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromodichloromethane	ND	0.40		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromoform	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Bromomethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon disulfide	ND	1.00		10.0	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chlorobenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroethane	ND	0.70		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloroform	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Chloromethane	**3.07**	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dibromochloromethane	ND	0.35		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-DUP-EL

18J0403-12 (Water)

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Volatile Organic Compounds by GCMS									
Ethylbenzene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Isopropylbenzene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
m+p-Xylenes	ND	0.60		2.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl acetate	ND	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Methylene chloride	**6.15**	1.00		4.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
o-Xylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Styrene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Toluene	ND	0.50		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichloroethylene	ND	0.40		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Vinyl chloride	ND	0.50		0.50	ug/L	02-Nov-2018	02-Nov-2018	SW8260B	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	**55.6**		*111 %*	*70-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: 4-Bromofluorobenzene (Surr)	**52.9**		*106 %*	*75-120*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Dibromofluoromethane (Surr)	**55.0**		*110 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Surrogate: Toluene-d8 (Surr)	**51.4**		*103 %*	*70-130*		*02-Nov-2018*	*02-Nov-2018*	*SW8260B*	
Wet Chemistry Analysis									
Cyanide	ND	10		10	ug/L	08-Nov-2018	08-Nov-2018	SW9012B	Cl, U
PAHs by GC/MS SIM									
Surrogate: 2-Methylnaphthalene-d10	**0.359**		*72 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Acenaphthene	**0.173**	0.00161		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Acenaphthylene	**0.00564**	0.00177		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Anthracene	**0.057**	0.00194		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Benz(a)anthracene	**0.00655**	0.00173		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Benzo(a)pyrene	ND	0.00084		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Benzo(b)fluoranthene	ND	0.00148		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Surrogate: Benzo(b)fluoranthene-d12	**0.438**		*88 %*	*30-130*		*04-Nov-2018*	*21-Nov-2018*	*8270D*	
Benzo(e)pyrene	ND	0.00127		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Benzo(g,h,i)perylene	ND	0.00131		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Benzo(k)fluoranthene	ND	0.00117		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Chrysene	**0.00666**	0.000936		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-DUP-EL

18J0403-12 (Water)

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
				Alpha					
PAHs by GC/MS SIM									
Dibenz(a,h)anthracene	ND	0.000685		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Ub
Fluoranthene	**0.103**	0.00149		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Fluorene	**0.117**	0.00173		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Indeno(1,2,3-cd)pyrene	**0.0055**	0.000533		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	Jb
Naphthalene	**0.0106**	0.00177		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Phenanthrene	**0.144**	0.00189		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Pyrene	**0.0743**	0.00152		0.01	ug/l	04-Nov-2018	21-Nov-2018	8270D	
Surrogate: Pyrene-d10	**0.431**		*86 %*		*30-130*	*04-Nov-2018*	*21-Nov-2018*	*8270D*	
EPA 1613B m									
1,2,3,4,6,7,8-Hepta CDD	ND	1.14		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.36		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.35		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDD	ND	1.11		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,4,7,8-Hexa CDF	ND	0.732		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDD	ND	1.13		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,6,7,8-Hexa CDF	ND	0.786		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDD	ND	1.14		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8,9-Hexa CDF	ND	0.76		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDD	ND	1.04		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
1,2,3,7,8-Penta CDF	ND	1.19		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,6,7,8-Hexa CDF	ND	0.707		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,4,7,8-Penta CDF	ND	1.08		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
2,3,7,8-Tetra CDD	**2.54**	1.08		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
2,3,7,8-Tetra CDF	**5.74**	1.09		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
Octa CDD	ND	4.16		100	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	A3470, U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

HSCNew-NMP-03-DUP-EL

18J0403-12 (Water)

MAXXAM ANALYTICS, Mississauga

EPA 1613B m

Analyte	Result	MDL	DL	RL	Units	Prepared	Analyzed	Method	Notes
Octa CDF	ND	1.35		100	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDD	ND	1.14		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hepta CDF	ND	1.36		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDD	ND	1.14		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Hexa CDF	ND	0.745		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDD	ND	1.04		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Penta CDF	ND	1.14		50	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ud
Total Tetra CDD	**2.54**	1.08		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
Total Tetra CDF	**8.8**	1.09		10	pg/L	14-Nov-2018	18-Nov-2018	EPA 1613B m	Ja
Surrogate: 37CL4 2378 Tetra CDD	**1480**		*74 %*	*35-197*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDD	**1540**		*77 %*	*23-140*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234678 HeptaCDF	**1600**		*80 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDD	**1640**		*82 %*	*32-141*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123478 HexaCDF	**1780**		*89 %*	*26-152*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-1234789 HeptaCDF	**1440**		*72 %*	*28-143*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDD	**2080**		*104 %*	*28-130*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123678 HexaCDF	**1980**		*99 %*	*26-123*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDD	**1640**		*82 %*	*25-181*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-12378 PentaCDF	**1420**		*71 %*	*24-185*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-123789 HexaCDF	**1660**		*83 %*	*28-136*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-234678 HexaCDF	**1680**		*84 %*	*29-147*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-23478 PentaCDF	**1640**		*82 %*	*21-178*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDD	**1580**		*79 %*	*24-164*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-2378 TetraCDF	**1720**		*86 %*	*24-169*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	
Surrogate: C13-OCDD	**3320**		*83 %*	*17-157*		*14-Nov-2018*	*18-Nov-2018*	*EPA 1613B m*	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Blank (B18K085-BLK1)					Prepared & Analyzed: 15-Nov-2018							
Antimony-121 [1]	0.00012	0.00007	0.00025	0.0005	mg/L							J
Arsenic-75 [3]	ND	0.00006	0.00025	0.0005	mg/L							U
Barium-135 [1]	ND	0.0002	0.00025	0.0005	mg/L							U
Beryllium-9 [1]	ND	0.00002	0.00025	0.0005	mg/L							U
Cadmium-111 [1]	ND	0.00003	0.00025	0.0005	mg/L							U
Chromium-52 [1]	ND	0.00006	0.00025	0.0005	mg/L							U
Copper-63 [1]	ND	0.00006	0.00025	0.0005	mg/L							U
Lead-206 [1]	ND	0.00008	0.00025	0.0005	mg/L							U
Nickel-60 [1]	ND	0.00005	0.00025	0.0005	mg/L							U
Silver-107 [1]	0.0001	0.00008	0.00025	0.0005	mg/L							J
Thallium-203 [1]	ND	0.00003	0.00025	0.0005	mg/L							U
Zinc-66 [1]	ND	0.0001	0.00025	0.0005	mg/L							U
Blank (B18K085-BLK2)					Prepared & Analyzed: 15-Nov-2018							
Antimony-121 [1]	0.0001	0.00007	0.00025	0.0005	mg/L							J
Arsenic-75 [3]	ND	0.00006	0.00025	0.0005	mg/L							U
Barium-135 [1]	ND	0.0002	0.00025	0.0005	mg/L							U
Beryllium-9 [1]	0.00002	0.00002	0.00025	0.0005	mg/L							J
Cadmium-111 [1]	ND	0.00003	0.00025	0.0005	mg/L							U
Chromium-52 [1]	ND	0.00006	0.00025	0.0005	mg/L							U
Copper-63 [1]	ND	0.00006	0.00025	0.0005	mg/L							U
Lead-206 [1]	ND	0.00008	0.00025	0.0005	mg/L							U
Nickel-60 [1]	ND	0.00005	0.00025	0.0005	mg/L							U
Silver-107 [1]	0.0001	0.00008	0.00025	0.0005	mg/L							J
Thallium-203 [1]	ND	0.00003	0.00025	0.0005	mg/L							U
Zinc-66 [1]	ND	0.0001	0.00025	0.0005	mg/L							U
LCS (B18K085-BS1)					Prepared & Analyzed: 15-Nov-2018							
Antimony-121 [1]	0.0397	0.00007	0.00025	0.0005	mg/L	0.04000		99.2	70-130			
Arsenic-75 [3]	0.0368	0.00006	0.00025	0.0005	mg/L	0.04000		92.0	70-130			

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
LCS (B18K085-BS1)						Prepared & Analyzed: 15-Nov-2018						
Barium-135 [1]	0.0399	0.0002	0.00025	0.0005	mg/L	0.04000		99.7	70-130			
Beryllium-9 [1]	0.0385	0.00002	0.00025	0.0005	mg/L	0.04000		96.2	70-130			
Cadmium-111 [1]	0.0400	0.00003	0.00025	0.0005	mg/L	0.04000		100	70-130			
Chromium-52 [1]	0.0398	0.00006	0.00025	0.0005	mg/L	0.04000		99.5	70-130			
Copper-63 [1]	0.0408	0.00006	0.00025	0.0005	mg/L	0.04000		102	70-130			
Lead-206 [1]	0.0383	0.00008	0.00025	0.0005	mg/L	0.04000		95.6	70-130			
Nickel-60 [1]	0.0400	0.00005	0.00025	0.0005	mg/L	0.04000		99.9	70-130			
Silver-107 [1]	0.0384	0.00008	0.00025	0.0005	mg/L	0.04000		96.0	70-130			
Thallium-203 [1]	0.0395	0.00003	0.00025	0.0005	mg/L	0.04000		98.7	70-130			
Zinc-66 [1]	0.0450	0.0001	0.00025	0.0005	mg/L	0.04000		113	70-130			
LCS (B18K085-BS2)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0390	0.00007	0.00025	0.0005	mg/L	0.04000		97.6	70-130			
Arsenic-75 [3]	0.0392	0.00006	0.00025	0.0005	mg/L	0.04000		98.1	70-130			
Barium-135 [1]	0.0405	0.0002	0.00025	0.0005	mg/L	0.04000		101	70-130			
Beryllium-9 [1]	0.0416	0.00002	0.00025	0.0005	mg/L	0.04000		104	70-130			
Cadmium-111 [1]	0.0405	0.00003	0.00025	0.0005	mg/L	0.04000		101	70-130			
Chromium-52 [1]	0.0408	0.00006	0.00025	0.0005	mg/L	0.04000		102	70-130			
Copper-63 [1]	0.0408	0.00006	0.00025	0.0005	mg/L	0.04000		102	70-130			
Lead-206 [1]	0.0393	0.00008	0.00025	0.0005	mg/L	0.04000		98.2	70-130			
Nickel-60 [1]	0.0403	0.00005	0.00025	0.0005	mg/L	0.04000		101	70-130			
Silver-107 [1]	0.0379	0.00008	0.00025	0.0005	mg/L	0.04000		94.8	70-130			
Thallium-203 [1]	0.0397	0.00003	0.00025	0.0005	mg/L	0.04000		99.2	70-130			
Zinc-66 [1]	0.0474	0.0001	0.00025	0.0005	mg/L	0.04000		119	70-130			
Calibration Check (B18K085-CCV1)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0428	0.00007	0.00025	0.0005	mg/L	0.04000		107	90-110			
Arsenic-75 [3]	0.0386	0.00006	0.00025	0.0005	mg/L	0.04000		96.4	90-110			
Barium-135 [1]	0.0382	0.0002	0.00025	0.0005	mg/L	0.04000		95.6	90-110			
Beryllium-9 [1]	0.0373	0.00002	0.00025	0.0005	mg/L	0.04000		93.3	90-110			

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Calibration Check (B18K085-CCV1)						Prepared & Analyzed: 15-Nov-2018						
Cadmium-111 [1]	0.0409	0.00003	0.00025	0.0005	mg/L	0.04000		102	90-110			
Chromium-52 [1]	0.0385	0.00006	0.00025	0.0005	mg/L	0.04000		96.2	90-110			
Copper-63 [1]	0.0383	0.00006	0.00025	0.0005	mg/L	0.04000		95.8	90-110			
Lead-206 [1]	0.0376	0.00008	0.00025	0.0005	mg/L	0.04000		93.9	90-110			
Nickel-60 [1]	0.0398	0.00005	0.00025	0.0005	mg/L	0.04000		99.6	90-110			
Silver-107 [1]	0.0422	0.00008	0.00025	0.0005	mg/L	0.04000		105	90-110			
Thallium-203 [1]	0.0387	0.00003	0.00025	0.0005	mg/L	0.04000		96.6	90-110			
Zinc-66 [1]	0.0389	0.0001	0.00025	0.0005	mg/L	0.04000		97.1	90-110			
Calibration Check (B18K085-CCV2)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0508	0.00007	0.00025	0.0005	mg/L	0.05000		102	90-110			
Arsenic-75 [3]	0.0464	0.00006	0.00025	0.0005	mg/L	0.05000		92.9	90-110			
Barium-135 [1]	0.0492	0.0002	0.00025	0.0005	mg/L	0.05000		98.4	90-110			
Beryllium-9 [1]	0.0462	0.00002	0.00025	0.0005	mg/L	0.05000		92.3	90-110			
Cadmium-111 [1]	0.0496	0.00003	0.00025	0.0005	mg/L	0.05000		99.1	90-110			
Chromium-52 [1]	0.0491	0.00006	0.00025	0.0005	mg/L	0.05000		98.2	90-110			
Copper-63 [1]	0.0492	0.00006	0.00025	0.0005	mg/L	0.05000		98.5	90-110			
Lead-206 [1]	0.0485	0.00008	0.00025	0.0005	mg/L	0.05000		97.0	90-110			
Nickel-60 [1]	0.0466	0.00005	0.00025	0.0005	mg/L	0.05000		93.1	90-110			
Silver-107 [1]	0.0481	0.00008	0.00025	0.0005	mg/L	0.05000		96.1	90-110			
Thallium-203 [1]	0.0497	0.00003	0.00025	0.0005	mg/L	0.05000		99.4	90-110			
Zinc-66 [1]	0.0477	0.0001	0.00025	0.0005	mg/L	0.05000		95.3	90-110			
Calibration Check (B18K085-CCV3)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0487	0.00007	0.00025	0.0005	mg/L	0.05000		97.3	90-110			
Arsenic-75 [3]	0.0479	0.00006	0.00025	0.0005	mg/L	0.05000		95.9	90-110			
Barium-135 [1]	0.0509	0.0002	0.00025	0.0005	mg/L	0.05000		102	90-110			
Beryllium-9 [1]	0.0478	0.00002	0.00025	0.0005	mg/L	0.05000		95.6	90-110			
Cadmium-111 [1]	0.0523	0.00003	0.00025	0.0005	mg/L	0.05000		105	90-110			
Chromium-52 [1]	0.0484	0.00006	0.00025	0.0005	mg/L	0.05000		96.9	90-110			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Calibration Check (B18K085-CCV3)						Prepared & Analyzed: 15-Nov-2018						
Copper-63 [1]	0.0501	0.00006	0.00025	0.0005	mg/L	0.05000		100	90-110			
Lead-206 [1]	0.0477	0.00008	0.00025	0.0005	mg/L	0.05000		95.4	90-110			
Nickel-60 [1]	0.0469	0.00005	0.00025	0.0005	mg/L	0.05000		93.8	90-110			
Silver-107 [1]	0.0483	0.00008	0.00025	0.0005	mg/L	0.05000		96.5	90-110			
Thallium-203 [1]	0.0486	0.00003	0.00025	0.0005	mg/L	0.05000		97.3	90-110			
Zinc-66 [1]	0.0490	0.0001	0.00025	0.0005	mg/L	0.05000		98.0	90-110			
Calibration Check (B18K085-CCV4)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0517	0.00007	0.00025	0.0005	mg/L	0.05000		103	90-110			
Arsenic-75 [3]	0.0490	0.00006	0.00025	0.0005	mg/L	0.05000		97.9	90-110			
Barium-135 [1]	0.0497	0.0002	0.00025	0.0005	mg/L	0.05000		99.5	90-110			
Beryllium-9 [1]	0.0497	0.00002	0.00025	0.0005	mg/L	0.05000		99.4	90-110			
Cadmium-111 [1]	0.0519	0.00003	0.00025	0.0005	mg/L	0.05000		104	90-110			
Chromium-52 [1]	0.0509	0.00006	0.00025	0.0005	mg/L	0.05000		102	90-110			
Copper-63 [1]	0.0521	0.00006	0.00025	0.0005	mg/L	0.05000		104	90-110			
Lead-206 [1]	0.0510	0.00008	0.00025	0.0005	mg/L	0.05000		102	90-110			
Nickel-60 [1]	0.0526	0.00005	0.00025	0.0005	mg/L	0.05000		105	90-110			
Silver-107 [1]	0.0498	0.00008	0.00025	0.0005	mg/L	0.05000		99.6	90-110			
Thallium-203 [1]	0.0510	0.00003	0.00025	0.0005	mg/L	0.05000		102	90-110			
Zinc-66 [1]	0.0516	0.0001	0.00025	0.0005	mg/L	0.05000		103	90-110			
Calibration Check (B18K085-CCV5)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0490	0.00007	0.00025	0.0005	mg/L	0.05000		98.0	90-110			
Arsenic-75 [3]	0.0473	0.00006	0.00025	0.0005	mg/L	0.05000		94.5	90-110			
Barium-135 [1]	0.0487	0.0002	0.00025	0.0005	mg/L	0.05000		97.5	90-110			
Beryllium-9 [1]	0.0476	0.00002	0.00025	0.0005	mg/L	0.05000		95.1	90-110			
Cadmium-111 [1]	0.0503	0.00003	0.00025	0.0005	mg/L	0.05000		101	90-110			
Chromium-52 [1]	0.0486	0.00006	0.00025	0.0005	mg/L	0.05000		97.3	90-110			
Copper-63 [1]	0.0492	0.00006	0.00025	0.0005	mg/L	0.05000		98.4	90-110			
Lead-206 [1]	0.0490	0.00008	0.00025	0.0005	mg/L	0.05000		98.0	90-110			

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)
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Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Calibration Check (B18K085-CCV5)						Prepared & Analyzed: 15-Nov-2018						
Nickel-60 [1]	0.0484	0.00005	0.00025	0.0005	mg/L	0.05000		96.9	90-110			
Silver-107 [1]	0.0480	0.00008	0.00025	0.0005	mg/L	0.05000		95.9	90-110			
Thallium-203 [1]	0.0493	0.00003	0.00025	0.0005	mg/L	0.05000		98.5	90-110			
Zinc-66 [1]	0.0504	0.0001	0.00025	0.0005	mg/L	0.05000		101	90-110			
Calibration Check (B18K085-CCV6)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0531	0.00007	0.00025	0.0005	mg/L	0.05000		106	90-110			
Arsenic-75 [3]	0.0471	0.00006	0.00025	0.0005	mg/L	0.05000		94.1	90-110			
Barium-135 [1]	0.0482	0.0002	0.00025	0.0005	mg/L	0.05000		96.3	90-110			
Beryllium-9 [1]	0.0482	0.00002	0.00025	0.0005	mg/L	0.05000		96.4	90-110			
Cadmium-111 [1]	0.0524	0.00003	0.00025	0.0005	mg/L	0.05000		105	90-110			
Chromium-52 [1]	0.0486	0.00006	0.00025	0.0005	mg/L	0.05000		97.3	90-110			
Copper-63 [1]	0.0491	0.00006	0.00025	0.0005	mg/L	0.05000		98.2	90-110			
Lead-206 [1]	0.0479	0.00008	0.00025	0.0005	mg/L	0.05000		95.9	90-110			
Nickel-60 [1]	0.0480	0.00005	0.00025	0.0005	mg/L	0.05000		96.0	90-110			
Silver-107 [1]	0.0503	0.00008	0.00025	0.0005	mg/L	0.05000		101	90-110			
Thallium-203 [1]	0.0496	0.00003	0.00025	0.0005	mg/L	0.05000		99.3	90-110			
Zinc-66 [1]	0.0491	0.0001	0.00025	0.0005	mg/L	0.05000		98.3	90-110			
Duplicate (B18K085-DUP1)			**Source: 18J0401-13**			Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	ND	0.0007	0.0025	0.0050	mg/L		ND				30	U
Arsenic-75 [3]	0.0029	0.0006	0.0025	0.0050	mg/L		0.0031			5.99	30	J
Barium-135 [1]	0.0745	0.0020	0.0025	0.0050	mg/L		0.0823			9.97	30	
Beryllium-9 [1]	0.0002	0.00015	0.0025	0.0050	mg/L		ND				30	J
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L		ND				30	U
Chromium-52 [1]	0.0012	0.0006	0.0025	0.0050	mg/L		0.0014			13.5	30	J
Copper-63 [1]	0.0034	0.0006	0.0025	0.0050	mg/L		0.0032			6.39	30	J
Lead-206 [1]	0.00089	0.0008	0.0025	0.0050	mg/L		0.0008			6.15	30	J
Nickel-60 [1]	0.0021	0.0005	0.0025	0.0050	mg/L		0.0021			4.29	30	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L		0.0013				30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)
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Project Manager: Cheryl Montgomery

Reported:
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Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Duplicate (B18K085-DUP1)		**Source: 18J0401-13**				Prepared & Analyzed: 15-Nov-2018						
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L		ND				30	U
Zinc-66 [1]	0.0653	0.0010	0.0025	0.0050	mg/L		0.0680			3.97	30	
Duplicate (B18K085-DUP2)		**Source: 18J0403-12**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.0009	0.0007	0.0025	0.0050	mg/L		0.0011			17.6	30	J
Arsenic-75 [3]	0.0017	0.0006	0.0025	0.0050	mg/L		0.0021			16.5	30	J
Barium-135 [1]	0.367	0.0020	0.0025	0.0050	mg/L		0.386			4.95	30	
Beryllium-9 [1]	ND	0.00015	0.0025	0.0050	mg/L		ND				30	U
Cadmium-111 [1]	ND	0.0003	0.0025	0.0050	mg/L		ND				30	U
Chromium-52 [1]	ND	0.0006	0.0025	0.0050	mg/L		ND				30	U
Copper-63 [1]	ND	0.0006	0.0025	0.0050	mg/L		ND				30	U
Lead-206 [1]	ND	0.0008	0.0025	0.0050	mg/L		ND				30	U
Nickel-60 [1]	0.0017	0.0005	0.0025	0.0050	mg/L		0.0015			13.3	30	J
Silver-107 [1]	ND	0.0008	0.0025	0.0050	mg/L		0.0011				30	U
Thallium-203 [1]	ND	0.0003	0.0025	0.0050	mg/L		ND				30	U
Zinc-66 [1]	0.182	0.0010	0.0025	0.0050	mg/L		0.184			1.09	30	
Matrix Spike (B18K085-MS1)		**Source: 18J0401-13**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.436	0.0007	0.0025	0.0050	mg/L	0.4000	ND	109	70-130			
Arsenic-75 [3]	0.431	0.0006	0.0025	0.0050	mg/L	0.4000	0.0031	107	70-130			
Barium-135 [1]	0.455	0.0020	0.0025	0.0050	mg/L	0.4000	0.0823	93.3	70-130			
Beryllium-9 [1]	0.403	0.00015	0.0025	0.0050	mg/L	0.4000	ND	101	70-130			
Cadmium-111 [1]	0.407	0.0003	0.0025	0.0050	mg/L	0.4000	ND	102	70-130			
Chromium-52 [1]	0.382	0.0006	0.0025	0.0050	mg/L	0.4000	0.0014	95.3	70-130			
Copper-63 [1]	0.347	0.0006	0.0025	0.0050	mg/L	0.4000	0.0032	85.9	70-130			
Lead-206 [1]	0.404	0.0008	0.0025	0.0050	mg/L	0.4000	0.0008	101	70-130			
Nickel-60 [1]	0.375	0.0005	0.0025	0.0050	mg/L	0.4000	0.0021	93.2	70-130			
Silver-107 [1]	0.360	0.0008	0.0025	0.0050	mg/L	0.4000	0.0013	89.7	70-130			
Thallium-203 [1]	0.414	0.0003	0.0025	0.0050	mg/L	0.4000	ND	103	70-130			
Zinc-66 [1]	0.460	0.0010	0.0025	0.0050	mg/L	0.4000	0.0680	98.0	70-130			

USACE ERDC-EP-C
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Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Matrix Spike (B18K085-MS2)		**Source: 18J0403-12**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.436	0.0007	0.0025	0.0050	mg/L	0.4000	0.0011	109	70-130			
Arsenic-75 [3]	0.442	0.0006	0.0025	0.0050	mg/L	0.4000	0.0021	110	70-130			
Barium-135 [1]	0.792	0.0020	0.0025	0.0050	mg/L	0.4000	0.386	101	70-130			
Beryllium-9 [1]	0.403	0.00015	0.0025	0.0050	mg/L	0.4000	ND	101	70-130			
Cadmium-111 [1]	0.407	0.0003	0.0025	0.0050	mg/L	0.4000	ND	102	70-130			
Chromium-52 [1]	0.382	0.0006	0.0025	0.0050	mg/L	0.4000	ND	95.6	70-130			
Copper-63 [1]	0.359	0.0006	0.0025	0.0050	mg/L	0.4000	ND	89.6	70-130			
Lead-206 [1]	0.404	0.0008	0.0025	0.0050	mg/L	0.4000	ND	101	70-130			
Nickel-60 [1]	0.375	0.0005	0.0025	0.0050	mg/L	0.4000	0.0015	93.3	70-130			
Silver-107 [1]	0.362	0.0008	0.0025	0.0050	mg/L	0.4000	0.0011	90.2	70-130			
Thallium-203 [1]	0.426	0.0003	0.0025	0.0050	mg/L	0.4000	ND	106	70-130			
Zinc-66 [1]	0.469	0.0010	0.0025	0.0050	mg/L	0.4000	0.184	71.3	70-130			
Matrix Spike Dup (B18K085-MSD1)		**Source: 18J0401-13**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.445	0.0007	0.0025	0.0050	mg/L	0.4000	ND	111	70-130	1.99	30	
Arsenic-75 [3]	0.428	0.0006	0.0025	0.0050	mg/L	0.4000	0.0031	106	70-130	0.746	30	
Barium-135 [1]	0.471	0.0020	0.0025	0.0050	mg/L	0.4000	0.0823	97.3	70-130	4.23	30	
Beryllium-9 [1]	0.404	0.00015	0.0025	0.0050	mg/L	0.4000	ND	101	70-130	0.218	30	
Cadmium-111 [1]	0.412	0.0003	0.0025	0.0050	mg/L	0.4000	ND	103	70-130	1.28	30	
Chromium-52 [1]	0.386	0.0006	0.0025	0.0050	mg/L	0.4000	0.0014	96.1	70-130	0.862	30	
Copper-63 [1]	0.363	0.0006	0.0025	0.0050	mg/L	0.4000	0.0032	89.9	70-130	4.62	30	
Lead-206 [1]	0.402	0.0008	0.0025	0.0050	mg/L	0.4000	0.0008	100	70-130	0.452	30	
Nickel-60 [1]	0.365	0.0005	0.0025	0.0050	mg/L	0.4000	0.0021	90.8	70-130	2.55	30	
Silver-107 [1]	0.368	0.0008	0.0025	0.0050	mg/L	0.4000	0.0013	91.6	70-130	2.19	30	
Thallium-203 [1]	0.417	0.0003	0.0025	0.0050	mg/L	0.4000	ND	104	70-130	0.842	30	
Zinc-66 [1]	0.442	0.0010	0.0025	0.0050	mg/L	0.4000	0.0680	93.6	70-130	4.65	30	
Matrix Spike Dup (B18K085-MSD2)		**Source: 18J0403-12**				Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.446	0.0007	0.0025	0.0050	mg/L	0.4000	0.0011	111	70-130	2.18	30	
Arsenic-75 [3]	0.464	0.0006	0.0025	0.0050	mg/L	0.4000	0.0021	115	70-130	4.76	30	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K085 - Default Prep Metals												
Matrix Spike Dup (B18K085-MSD2)		**Source: 18J0403-12**				Prepared & Analyzed: 15-Nov-2018						
Barium-135 [1]	0.818	0.0020	0.0025	0.0050	mg/L	0.4000	0.386	108	70-130	6.36	30	
Beryllium-9 [1]	0.409	0.00015	0.0025	0.0050	mg/L	0.4000	ND	102	70-130	1.36	30	
Cadmium-111 [1]	0.427	0.0003	0.0025	0.0050	mg/L	0.4000	ND	107	70-130	4.91	30	
Chromium-52 [1]	0.386	0.0006	0.0025	0.0050	mg/L	0.4000	ND	96.5	70-130	0.867	30	
Copper-63 [1]	0.363	0.0006	0.0025	0.0050	mg/L	0.4000	ND	90.6	70-130	1.11	30	
Lead-206 [1]	0.405	0.0008	0.0025	0.0050	mg/L	0.4000	ND	101	70-130	0.248	30	
Nickel-60 [1]	0.371	0.0005	0.0025	0.0050	mg/L	0.4000	0.0015	92.4	70-130	0.949	30	
Silver-107 [1]	0.373	0.0008	0.0025	0.0050	mg/L	0.4000	0.0011	93.0	70-130	3.15	30	
Thallium-203 [1]	0.424	0.0003	0.0025	0.0050	mg/L	0.4000	ND	106	70-130	0.517	30	
Zinc-66 [1]	0.415	0.0010	0.0025	0.0050	mg/L	0.4000	0.184	57.9	70-130	20.8	30	QM-07
Reference (B18K085-SRM1)						Prepared & Analyzed: 15-Nov-2018						
Antimony-121 [1]	0.599	0.0014	0.0050	0.0100	mg/L	0.6160		97.3	70-130			
Arsenic-75 [3]	0.644	0.0011	0.0050	0.0100	mg/L	0.6880		93.6	70-130			
Barium-135 [1]	0.465	0.0040	0.0050	0.0100	mg/L	0.5000		93.0	70-130			
Beryllium-9 [1]	0.236	0.0003	0.0050	0.0100	mg/L	0.2530		93.5	70-130			
Cadmium-111 [1]	0.133	0.00069	0.0050	0.0100	mg/L	0.1320		101	70-130			
Chromium-52 [1]	0.897	0.0013	0.0050	0.0100	mg/L	0.8910		101	70-130			
Copper-63 [1]	0.902	0.0011	0.0050	0.0100	mg/L	0.8790		103	70-130			
Lead-206 [1]	0.528	0.0016	0.0050	0.0100	mg/L	0.5460		96.7	70-130			
Nickel-60 [1]	0.816	0.0010	0.0050	0.0100	mg/L	0.8010		102	70-130			
Silver-107 [1]	0.865	0.0016	0.0050	0.0100	mg/L	0.9170		94.3	70-130			
Thallium-203 [1]	0.765	0.0006	0.0050	0.0100	mg/L	0.7750		98.7	70-130			
Zinc-66 [1]	1.16	0.0020	0.0050	0.0100	mg/L	1.250		93.0	70-130			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K016 - *												
Blank (B18K016-BLK1)						Prepared: 14-Nov-2018 Analyzed: 16-Nov-2018						
Mercury	ND	0.002	0.005	0.010	ug/L							U
LCS (B18K016-BS1)						Prepared: 14-Nov-2018 Analyzed: 16-Nov-2018						
Mercury	0.200	0.002	0.005	0.010	ug/L	0.2000		99.8	75-125			
Calibration Check (B18K016-CCV1)						Prepared: 14-Nov-2018 Analyzed: 16-Nov-2018						
Mercury	0.196	0.004	0.010	0.020	ug/L	0.2000		98.0	90-110			
Calibration Check (B18K016-CCV2)						Prepared: 14-Nov-2018 Analyzed: 16-Nov-2018						
Mercury	0.202	0.004	0.010	0.020	ug/L	0.2000		101	90-110			
Calibration Check (B18K016-CCV3)						Prepared: 14-Nov-2018 Analyzed: 16-Nov-2018						
Mercury	0.188	0.004	0.010	0.020	ug/L	0.2000		94.2	90-110			
Calibration Check (B18K016-CCV4)						Prepared: 14-Nov-2018 Analyzed: 16-Nov-2018						
Mercury	0.189	0.004	0.010	0.020	ug/L	0.2000		94.5	90-110			
Duplicate (B18K016-DUP1)			**Source: 18J0403-12**			Prepared: 14-Nov-2018 Analyzed: 16-Nov-2018						
Mercury	ND	0.004	0.010	0.020	ug/L		ND				25	U
Matrix Spike (B18K016-MS1)			**Source: 18J0403-12**			Prepared: 14-Nov-2018 Analyzed: 16-Nov-2018						
Mercury	0.394	0.004	0.010	0.020	ug/L	0.4000	ND	98.6	75-125			
Matrix Spike Dup (B18K016-MSD1)			**Source: 18J0403-12**			Prepared: 14-Nov-2018 Analyzed: 16-Nov-2018						
Mercury	0.376	0.004	0.010	0.020	ug/L	0.4000	ND	94.1	75-125	4.67	25	
Reference (B18K016-SRM1)						Prepared: 14-Nov-2018 Analyzed: 29-Nov-2018						
Mercury	23.1	0.004	0.010	0.020	ug/L	22.60		102	80-120			

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K101 - Default Prep Metals												
Blank (B18K101-BLK1)						Prepared & Analyzed: 30-Oct-2018						
Selenium	0.0003	0.00015	0.0005	0.0010	mg/L							J
LCS (B18K101-BS1)						Prepared & Analyzed: 30-Oct-2018						
Selenium	0.235	0.0015	0.0050	0.0100	mg/L	0.2000		117	80-120			
Calibration Check (B18K101-CCV1)						Prepared & Analyzed: 30-Oct-2018						
Selenium	0.0409	0.00015	0.0005	0.0010	mg/L	0.04000		102	90-110			
Calibration Check (B18K101-CCV2)						Prepared & Analyzed: 30-Oct-2018						
Selenium	0.0514	0.00015	0.0005	0.0010	mg/L	0.05000		103	90-110			
Calibration Check (B18K101-CCV3)						Prepared & Analyzed: 30-Oct-2018						
Selenium	0.0480	0.00015	0.0005	0.0010	mg/L	0.05000		96.0	90-110			
Calibration Check (B18K101-CCV4)						Prepared & Analyzed: 30-Oct-2018						
Selenium	0.0457	0.00015	0.0005	0.0010	mg/L	0.05000		91.4	90-110			
Duplicate (B18K101-DUP1)			**Source: 18J0403-12**			Prepared & Analyzed: 30-Oct-2018						
Selenium	ND	0.0015	0.0050	0.0100	mg/L		ND				20	U
Matrix Spike (B18K101-MS1)			**Source: 18J0403-12**			Prepared & Analyzed: 30-Oct-2018						
Selenium	0.215	0.0015	0.0050	0.0100	mg/L	0.2000	ND	107	80-120			
Matrix Spike Dup (B18K101-MSD1)			**Source: 18J0403-12**			Prepared & Analyzed: 30-Oct-2018						
Selenium	0.220	0.0015	0.0050	0.0100	mg/L	0.2000	ND	110	80-120	2.16	20	
Reference (B18K101-SRM1)						Prepared & Analyzed: 30-Oct-2018						
Selenium	0.956	0.0015	0.0050	0.0100	mg/L	0.9170		104	70-130			

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ERDC -- Vicksburg (EL)
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Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Metals by EPA 6000/7000 Series Methods - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18L043 - Default Prep Metals												
Blank (B18L043-BLK1)						Prepared & Analyzed: 29-Oct-2018						
Chromium (VI)	ND	0.00030	0.00050	0.001	mg/L							U
LCS (B18L043-BS1)						Prepared & Analyzed: 29-Oct-2018						
Chromium (VI)	0.051	0.00030	0.00050	0.001	mg/L	0.05000		102	80-120			
Calibration Check (B18L043-CCV1)						Prepared & Analyzed: 29-Oct-2018						
Chromium (VI)	0.053	0.00030	0.00050	0.001	mg/L	0.05000		107	85-115			
Calibration Check (B18L043-CCV2)						Prepared & Analyzed: 29-Oct-2018						
Chromium (VI)	0.051	0.00030	0.00050	0.001	mg/L	0.05000		102	85-115			
Calibration Check (B18L043-CCV3)						Prepared & Analyzed: 29-Oct-2018						
Chromium (VI)	0.051	0.00030	0.00050	0.001	mg/L	0.05000		102	85-115			
Duplicate (B18L043-DUP1)			**Source: 18J0403-12**			Prepared & Analyzed: 29-Oct-2018						
Chromium (VI)	ND	0.00060	0.001	0.002	mg/L		ND				20	U
Matrix Spike (B18L043-MS1)			**Source: 18J0403-12**			Prepared & Analyzed: 29-Oct-2018						
Chromium (VI)	0.050	0.00060	0.001	0.002	mg/L	0.05000	ND	101	80-120			
Matrix Spike Dup (B18L043-MSD1)			**Source: 18J0403-12**			Prepared & Analyzed: 29-Oct-2018						
Chromium (VI)	0.050	0.00060	0.001	0.002	mg/L	0.05000	ND	101	80-120	0.00	20	

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Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0024 - B18K009												
Initial Cal Check (18K0024-ICV1)						Prepared & Analyzed: 19-Nov-2018						
Dissolved Organic Carbon	9.89				mg/L	10.00		98.9	90-110			
DOC rep1	9.81				mg/L	10.00		98.1	90-110			
DOC rep2	9.86				mg/L	10.00		98.6	90-110			
DOC rep3	9.95				mg/L	10.00		99.5	90-110			
DOC rep4	9.96				mg/L	10.00		99.6	90-110			
TOC rep1	9.81				mg/L	10.00		98.1	80-120			
TOC rep2	9.86				mg/L	10.00		98.6	80-120			
TOC rep3	9.95				mg/L	10.00		99.5	80-120			
TOC rep4	9.96				mg/L	10.00		99.6	80-120			
Total Organic Carbon	9.89				mg/L	10.00		98.9	80-120			
Batch B18J235 - *												
Blank (B18J235-BLK1)						Prepared & Analyzed: 30-Oct-2018						
Sulfide	ND	0.00150	0.00500	0.0100	mg/L							U
LCS (B18J235-BS1)						Prepared & Analyzed: 30-Oct-2018						
Sulfide	0.202	0.00150	0.00500	0.0100	mg/L	0.2000		101	80-120			
Calibration Check (B18J235-CCV1)						Prepared & Analyzed: 30-Oct-2018						
Sulfide	0.524	0.00150	0.00500	0.0100	mg/L	0.5000		105	85-115			
Calibration Check (B18J235-CCV2)						Prepared & Analyzed: 30-Oct-2018						
Sulfide	0.518	0.00150	0.00500	0.0100	mg/L	0.5000		104	85-115			
Calibration Check (B18J235-CCV3)						Prepared & Analyzed: 30-Oct-2018						
Sulfide	0.494	0.00150	0.00500	0.0100	mg/L	0.5000		98.8	85-115			

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Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18J235 - *												
Calibration Check (B18J235-CCV4)						Prepared & Analyzed: 30-Oct-2018						
Sulfide	0.495	0.00150	0.00500	0.0100	mg/L	0.5000		99.0	85-115			
Duplicate (B18J235-DUP1)			Source: 18J0403-12			Prepared & Analyzed: 30-Oct-2018						
Sulfide	ND	0.00150	0.00500	0.0100	mg/L		ND				20	U
Matrix Spike (B18J235-MS1)			Source: 18J0403-12			Prepared & Analyzed: 30-Oct-2018						
Sulfide	0.179	0.00150	0.00500	0.0100	mg/L	0.2000	ND	89.5	80-120			
Matrix Spike Dup (B18J235-MSD1)			Source: 18J0403-12			Prepared & Analyzed: 30-Oct-2018						
Sulfide	0.193	0.00150	0.00500	0.0100	mg/L	0.2000	ND	96.5	80-120	7.53	20	
Batch B18K009 - * DEFAULT PREP *** **												
Blank (B18K009-BLK1)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK2)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *** **												
Blank (B18K009-BLK3)						Prepared: 05-Nov-2018 Analyzed: 19-Nov-2018						
Dissolved Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK4)						Prepared: 05-Nov-2018 Analyzed: 19-Nov-2018						
Dissolved Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
DOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK5)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Total Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK6)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Total Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK7)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep3	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep4	ND	3.50E-5	5.00E-5	1.00E-4	%							U

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
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Project Manager: Cheryl Montgomery

Reported:
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Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *** **												
Blank (B18K009-BLK7)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Total Organic Carbon	ND	3.50E-5	5.00E-5	1.00E-4	%							U
Blank (B18K009-BLK8)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	4.96E-5	3.50E-5	5.00E-5	1.00E-4	%							J
TOC rep2	ND	3.50E-5	5.00E-5	1.00E-4	%							U
TOC rep3	3.90E-5	3.50E-5	5.00E-5	1.00E-4	%							J
TOC rep4	3.87E-5	3.50E-5	5.00E-5	1.00E-4	%							J
Total Organic Carbon	4.04E-5	3.50E-5	5.00E-5	1.00E-4	%							J
LCS (B18K009-BS1)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	9.65E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		96.5	80-120			
DOC rep1	9.55E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		95.5	80-120			
DOC rep2	9.64E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		96.4	80-120			
DOC rep3	9.67E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		96.7	80-120			
DOC rep4	9.75E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		97.5	80-120			
LCS (B18K009-BS2)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	9.13E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		91.3	80-120			
DOC rep1	9.15E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		91.5	80-120			
DOC rep2	9.21E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		92.1	80-120			
DOC rep3	9.27E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		92.7	80-120			
DOC rep4	8.90E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		89.0	80-120			
LCS (B18K009-BS3)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	9.94E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		99.4	80-120			
TOC rep2	0.00101	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		101	80-120			
TOC rep3	0.00101	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		101	80-120			
TOC rep4	0.00101	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		101	80-120			
Total Organic Carbon	0.00101	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		101	80-120			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *** **												
LCS (B18K009-BS4)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	9.67E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		96.7	80-120			
TOC rep2	9.73E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		97.3	80-120			
TOC rep3	9.76E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		97.6	80-120			
TOC rep4	9.74E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		97.4	80-120			
Total Organic Carbon	9.73E-4	3.50E-5	5.00E-5	1.00E-4	%	1.000E-3		97.3	80-120			
Calibration Check (B18K009-CCV1)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	4.97E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		99.4	90-110			
DOC rep1	4.84E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		96.8	90-110			
DOC rep2	4.94E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		98.8	90-110			
DOC rep3	5.05E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		101	90-110			
DOC rep4	5.01E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		100	90-110			
Calibration Check (B18K009-CCV2)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	5.03E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		101	90-110			
DOC rep1	4.87E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		97.4	90-110			
DOC rep2	4.89E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		97.8	90-110			
DOC rep3	4.95E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		99.0	90-110			
DOC rep4	5.42E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		108	90-110			
Calibration Check (B18K009-CCV3)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	5.08E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
DOC rep1	5.03E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		101	90-110			
DOC rep2	5.08E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
DOC rep3	5.11E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
DOC rep4	5.11E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
Calibration Check (B18K009-CCV4)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	5.16E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
DOC rep1	5.14E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
DOC rep2	5.14E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
DOC rep3	5.17E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL) ERDC, 3909 Halls Ferry Road Vicksburg MS, 39180	Project: Houston Ship Channel-North of Morgan's Point Project Manager: Cheryl Montgomery	**Reported:** 23-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *** **												
Calibration Check (B18K009-CCV4)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
DOC rep4	5.20E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		104	90-110			
Calibration Check (B18K009-CCV5)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	5.11E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
TOC rep2	5.16E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
TOC rep3	5.18E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		104	90-110			
TOC rep4	5.27E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		105	90-110			
Total Organic Carbon	5.18E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		104	90-110			
Calibration Check (B18K009-CCV6)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	5.08E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		102	90-110			
TOC rep2	5.16E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
TOC rep3	5.20E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		104	90-110			
TOC rep4	5.24E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		105	90-110			
Total Organic Carbon	5.17E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
Calibration Check (B18K009-CCV7)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	5.15E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		103	90-110			
TOC rep2	5.21E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		104	90-110			
TOC rep3	5.27E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		105	90-110			
TOC rep4	5.42E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		108	90-110			
Total Organic Carbon	5.26E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		105	90-110			
Calibration Check (B18K009-CCV8)						Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	5.39E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		108	90-110			
TOC rep2	5.34E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		107	90-110			
TOC rep3	5.34E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		107	90-110			
TOC rep4	5.36E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		107	90-110			
Total Organic Carbon	5.36E-4	3.50E-5	5.00E-5	1.00E-4	%	5.000E-4		107	90-110			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *** **												
Duplicate (B18K009-DUP1)			**Source: 18J0401-13**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep1	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep2	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep3	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep4	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep1	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep2	ND	0.00350	0.00500	0.0100	%		0.00436				20	U
TOC rep3	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep4	ND	0.00350	0.00500	0.0100	%		ND				20	U
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%		ND				20	U
Duplicate (B18K009-DUP2)			**Source: 18J0403-12**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep1	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep2	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep3	ND	0.00350	0.00500	0.0100	%		ND				20	U
DOC rep4	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep1	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep2	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep3	ND	0.00350	0.00500	0.0100	%		ND				20	U
TOC rep4	0.00372	0.00350	0.00500	0.0100	%		0.00359			3.64	20	J
Total Organic Carbon	ND	0.00350	0.00500	0.0100	%		ND				20	U
Matrix Spike (B18K009-MS1)			**Source: 18J0401-13**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	0.0951	0.00350	0.00500	0.0100	%	0.1000	ND	95.1	70-130			
DOC rep1	0.0942	0.00350	0.00500	0.0100	%	0.1000	ND	94.2	70-130			
DOC rep2	0.0948	0.00350	0.00500	0.0100	%	0.1000	ND	94.8	70-130			
DOC rep3	0.0953	0.00350	0.00500	0.0100	%	0.1000	ND	95.3	70-130			
DOC rep4	0.0960	0.00350	0.00500	0.0100	%	0.1000	ND	96.0	70-130			

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *** **												
Matrix Spike (B18K009-MS2)			**Source: 18J0403-12**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	0.0958	0.00350	0.00500	0.0100	%	0.1000	ND	95.8	70-130			
DOC rep1	0.0947	0.00350	0.00500	0.0100	%	0.1000	ND	94.7	70-130			
DOC rep2	0.0958	0.00350	0.00500	0.0100	%	0.1000	ND	95.8	70-130			
DOC rep3	0.0966	0.00350	0.00500	0.0100	%	0.1000	ND	96.6	70-130			
DOC rep4	0.0962	0.00350	0.00500	0.0100	%	0.1000	ND	96.2	70-130			
Matrix Spike (B18K009-MS3)			**Source: 18J0401-13**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	0.0956	0.00350	0.00500	0.0100	%	0.1000	ND	95.6	70-130			
TOC rep2	0.0966	0.00350	0.00500	0.0100	%	0.1000	0.00436	92.2	70-130			
TOC rep3	0.0970	0.00350	0.00500	0.0100	%	0.1000	ND	97.0	70-130			
TOC rep4	0.0972	0.00350	0.00500	0.0100	%	0.1000	ND	97.2	70-130			
Total Organic Carbon	0.0966	0.00350	0.00500	0.0100	%	0.1000	ND	96.6	70-130			
Matrix Spike (B18K009-MS4)			**Source: 18J0403-12**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	0.0970	0.00350	0.00500	0.0100	%	0.1000	ND	97.0	70-130			
TOC rep2	0.0978	0.00350	0.00500	0.0100	%	0.1000	ND	97.8	70-130			
TOC rep3	0.0985	0.00350	0.00500	0.0100	%	0.1000	ND	98.5	70-130			
Total Organic Carbon	0.0978	0.00350	0.00500	0.0100	%	0.1000	ND	97.8	70-130			
Matrix Spike Dup (B18K009-MSD1)			**Source: 18J0401-13**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	0.0974	0.00350	0.00500	0.0100	%	0.1000	ND	97.4	70-130	2.39	20	
DOC rep1	0.0968	0.00350	0.00500	0.0100	%	0.1000	ND	96.8	70-130	2.72	20	
DOC rep2	0.0972	0.00350	0.00500	0.0100	%	0.1000	ND	97.2	70-130	2.50	20	
DOC rep3	0.0974	0.00350	0.00500	0.0100	%	0.1000	ND	97.4	70-130	2.18	20	
DOC rep4	0.0980	0.00350	0.00500	0.0100	%	0.1000	ND	98.0	70-130	2.06	20	
Matrix Spike Dup (B18K009-MSD2)			**Source: 18J0403-12**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
Dissolved Organic Carbon	0.0931	0.00350	0.00500	0.0100	%	0.1000	ND	93.1	70-130	2.86	20	
DOC rep1	0.0925	0.00350	0.00500	0.0100	%	0.1000	ND	92.5	70-130	2.35	20	
DOC rep2	0.0934	0.00350	0.00500	0.0100	%	0.1000	ND	93.4	70-130	2.54	20	
DOC rep3	0.0932	0.00350	0.00500	0.0100	%	0.1000	ND	93.2	70-130	3.58	20	
DOC rep4	0.0933	0.00350	0.00500	0.0100	%	0.1000	ND	93.3	70-130	3.06	20	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K009 - * DEFAULT PREP *** **												
Matrix Spike Dup (B18K009-MSD2)			**Source: 18J0403-12**			Prepared: 05-Nov-2018 Analyzed: 19-Nov-2018						
Matrix Spike Dup (B18K009-MSD3)			**Source: 18J0401-13**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	0.0961	0.00350	0.00500	0.0100	%	0.1000	ND	96.1	70-130	0.522	20	
TOC rep2	0.0969	0.00350	0.00500	0.0100	%	0.1000	0.00436	92.5	70-130	0.310	20	
TOC rep3	0.0974	0.00350	0.00500	0.0100	%	0.1000	ND	97.4	70-130	0.412	20	
TOC rep4	0.0976	0.00350	0.00500	0.0100	%	0.1000	ND	97.6	70-130	0.411	20	
Total Organic Carbon	0.0970	0.00350	0.00500	0.0100	%	0.1000	ND	97.0	70-130	0.413	20	
Matrix Spike Dup (B18K009-MSD4)			**Source: 18J0403-12**			Prepared: 05-Nov-2018 Analyzed: 08-Nov-2018						
TOC rep1	0.0972	0.00350	0.00500	0.0100	%	0.1000	ND	97.2	70-130	0.206	20	
TOC rep2	0.0981	0.00350	0.00500	0.0100	%	0.1000	ND	98.1	70-130	0.306	20	
TOC rep3	0.0987	0.00350	0.00500	0.0100	%	0.1000	ND	98.7	70-130	0.203	20	
TOC rep4	0.0984	0.00350	0.00500	0.0100	%	0.1000	0.00359	94.8	70-130		20	
Total Organic Carbon	0.0981	0.00350	0.00500	0.0100	%	0.1000	ND	98.1	70-130	0.306	20	
Reference (B18K009-SRM1)						Prepared: 05-Nov-2018 Analyzed: 19-Nov-2018						
Dissolved Organic Carbon	4.82E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		102	70-130			
DOC rep1	4.85E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		103	70-130			
DOC rep2	4.83E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		103	70-130			
DOC rep3	4.76E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		101	70-130			
DOC rep4	4.83E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		103	70-130			
TOC rep1	4.85E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		103	70-130			
TOC rep2	4.83E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		103	70-130			
TOC rep3	4.76E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		101	70-130			
Total Organic Carbon	4.82E-4	3.50E-5	5.00E-5	1.00E-4	%	4.710E-4		102	70-130			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCV1)						Prepared & Analyzed: 14-Nov-2018						
4,4´-DDT	21.2				ug/L	20.00		106	85-150			
Aldrin	22.0				ug/L	20.00		110	85-150			
alpha-BHC	22.3				ug/L	20.00		112	85-150			
alpha-Chlordane	42.8				ug/L	40.00		107	85-150			
beta-BHC	20.5				ug/L	20.00		102	85-150			
cis-Nonachlor	21.1				ug/L	20.00		106	85-150			
delta-BHC	21.1				ug/L	20.00		106	85-150			
Dieldrin	21.7				ug/L	20.00		108	85-150			
Endosulfan I	44.4				ug/L	40.00		111	85-150			
Endosulfan II	21.2				ug/L	20.00		106	85-150			
Endosulfan sulfate	20.4				ug/L	20.00		102	85-150			
Endrin	21.5				ug/L	20.00		108	85-150			
Endrin aldehyde	21.1				ug/L	20.00		106	85-150			
Endrin ketone	19.7				ug/L	20.00		98.5	80-120			
gamma-BHC (Lindane)	20.1				ug/L	20.00		100	85-150			
gamma-Chlordane	21.1				ug/L	20.00		105	85-150			
Heptachlor	21.6				ug/L	20.00		108	85-150			
Heptachlor epoxide	20.8				ug/L	20.00		104	85-150			
Methoxychlor	20.6				ug/L	20.00		103	85-150			
Oxychlordane	20.4				ug/L	20.00		102	85-150			
trans-Nonachlor	42.8				ug/L	40.00		107	85-150			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*20.4*				*ug/L*	*20.00*		*102*	*85-115*			
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*21.1*				*ug/L*	*20.00*		*106*	*85-115*			
Calibration Check (18K0002-CCV2)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	305				ug/L	300.0		102	85-150			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCV3)						Prepared & Analyzed: 15-Nov-2018						
4,4´-DDT	35.3				ug/L	20.00		176	80-120			
Aldrin	36.8				ug/L	20.00		184	80-120			
alpha-BHC	38.1				ug/L	20.00		190	80-120			
alpha-Chlordane	71.4				ug/L	40.00		179	80-120			
beta-BHC	34.7				ug/L	20.00		173	80-120			
cis-Nonachlor	35.1				ug/L	20.00		176	0-200			
delta-BHC	37.7				ug/L	20.00		189	80-120			
Dieldrin	36.8				ug/L	20.00		184	80-120			
Endosulfan I	35.0				ug/L	40.00		87.5	80-120			
Endosulfan II	74.2				ug/L	20.00		371	80-120			
Endosulfan sulfate	0.00				ug/L	20.00			80-120			U
Endrin	37.6				ug/L	20.00		188	80-120			
Endrin aldehyde	35.0				ug/L	20.00		175	80-120			
Endrin ketone	68.8				ug/L	20.00		344	80-120			
gamma-BHC (Lindane)	35.2				ug/L	20.00		176	80-120			
gamma-Chlordane	36.0				ug/L	20.00		180	80-120			
Heptachlor	37.9				ug/L	20.00		189	80-120			
Heptachlor epoxide	36.2				ug/L	20.00		181	80-120			
Methoxychlor	34.6				ug/L	20.00		173	80-120			
Oxychlordane	35.1				ug/L	20.00		175	0-200			
trans-Nonachlor	71.7				ug/L	40.00		179	0-200			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Calibration Check (18K0002-CCV4)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	309				ug/L	300.0		103	85-150			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCV5)						Prepared: 14-Nov-2018 Analyzed: 15-Nov-2018						
4,4´-DDT	20.0				ug/L	20.00		100	85-150			
Aldrin	21.3				ug/L	20.00		107	85-150			
alpha-BHC	22.0				ug/L	20.00		110	85-150			
alpha-Chlordane	41.4				ug/L	40.00		104	85-150			
beta-BHC	19.7				ug/L	20.00		98.7	85-150			
cis-Nonachlor	20.5				ug/L	20.00		102	85-150			
delta-BHC	21.9				ug/L	20.00		109	85-150			
Dieldrin	20.9				ug/L	20.00		104	85-150			
Endosulfan I	42.9				ug/L	40.00		107	85-150			
Endosulfan II	20.4				ug/L	20.00		102	85-150			
Endosulfan sulfate	20.5				ug/L	20.00		102	85-150			
Endrin	21.3				ug/L	20.00		106	85-150			
Endrin aldehyde	20.2				ug/L	20.00		101	85-150			
Endrin ketone	19.0				ug/L	20.00		95.0	80-120			
gamma-BHC (Lindane)	21.3				ug/L	20.00		106	85-150			
gamma-Chlordane	20.7				ug/L	20.00		103	85-150			
Heptachlor	20.9				ug/L	20.00		105	85-150			
Heptachlor epoxide	21.1				ug/L	20.00		105	85-150			
Methoxychlor	20.2				ug/L	20.00		101	85-150			
Oxychlordane	20.0				ug/L	20.00		100	85-150			
trans-Nonachlor	41.4				ug/L	40.00		104	85-150			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*19.8*				*ug/L*	*20.00*		*99.0*	*85-115*			
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*20.4*				*ug/L*	*20.00*		*102*	*85-115*			
Calibration Check (18K0002-CCV6)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	300				ug/L	300.0		100	85-150			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCV7)						Prepared: 14-Nov-2018 Analyzed: 15-Nov-2018						
4,4´-DDT	16.7				ug/L	20.00		83.3	85-150			CCV-L
Aldrin	17.4				ug/L	20.00		87.1	85-150			
alpha-BHC	17.9				ug/L	20.00		89.3	85-150			
alpha-Chlordane	34.2				ug/L	40.00		85.5	85-150			
beta-BHC	17.1				ug/L	20.00		85.5	85-150			
cis-Nonachlor	17.1				ug/L	20.00		85.5	85-150			
delta-BHC	17.3				ug/L	20.00		86.5	85-150			
Dieldrin	17.1				ug/L	20.00		85.7	85-150			
Endosulfan I	35.3				ug/L	40.00		88.2	85-150			
Endosulfan II	17.2				ug/L	20.00		86.0	85-150			
Endosulfan sulfate	17.9				ug/L	20.00		89.5	85-150			
Endrin	17.5				ug/L	20.00		87.4	85-150			
Endrin aldehyde	17.6				ug/L	20.00		87.9	85-150			
Endrin ketone	17.2				ug/L	20.00		86.0	80-120			
gamma-BHC (Lindane)	17.8				ug/L	20.00		88.9	85-150			
gamma-Chlordane	17.0				ug/L	20.00		85.2	85-150			
Heptachlor	17.2				ug/L	20.00		86.1	85-150			
Heptachlor epoxide	17.1				ug/L	20.00		85.6	85-150			
Methoxychlor	17.2				ug/L	20.00		86.0	85-150			
Oxychlordane	16.6				ug/L	20.00		82.9	85-150			CCV-L
trans-Nonachlor	34.2				ug/L	40.00		85.4	85-150			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*17.4*				*ug/L*	*20.00*		*87.0*	*85-115*			
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*17.1*				*ug/L*	*20.00*		*85.5*	*85-115*			
Calibration Check (18K0002-CCV8)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	262				ug/L	300.0		87.3	85-150			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCV9)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	0.00				ug/L	20.00			80-120			U
Aldrin	0.00				ug/L	20.00			80-120			U
alpha-BHC	0.00				ug/L	20.00			80-120			U
alpha-Chlordane	0.00				ug/L	40.00			80-120			U
beta-BHC	0.00				ug/L	20.00			80-120			U
cis-Nonachlor	0.00				ug/L	20.00			0-200			U
delta-BHC	0.00				ug/L	20.00			80-120			U
Dieldrin	0.00				ug/L	20.00			80-120			U
Endosulfan I	0.00				ug/L	40.00			80-120			U
Endosulfan II	0.00				ug/L	20.00			80-120			U
Endosulfan sulfate	0.00				ug/L	20.00			80-120			U
Endrin	0.00				ug/L	20.00			80-120			U
Endrin aldehyde	0.00				ug/L	20.00			80-120			U
Endrin ketone	0.00				ug/L	20.00			80-120			U
gamma-BHC (Lindane)	0.00				ug/L	20.00			80-120			U
gamma-Chlordane	0.00				ug/L	20.00			80-120			U
Heptachlor	0.00				ug/L	20.00			80-120			U
Heptachlor epoxide	0.00				ug/L	20.00			80-120			U
Methoxychlor	0.00				ug/L	20.00			80-120			U
Oxychlordane	0.00				ug/L	20.00			0-200			U
trans-Nonachlor	0.00				ug/L	40.00			0-200			U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Calibration Check (18K0002-CCVA)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	0.00				ug/L	300.0			80-120			U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCVB)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	0.00				ug/L	20.00			80-120			U
Aldrin	0.00				ug/L	20.00			80-120			U
alpha-BHC	0.00				ug/L	20.00			80-120			U
alpha-Chlordane	0.00				ug/L	40.00			80-120			U
beta-BHC	0.00				ug/L	20.00			80-120			U
cis-Nonachlor	0.00				ug/L	20.00			0-200			U
delta-BHC	0.00				ug/L	20.00			80-120			U
Dieldrin	0.00				ug/L	20.00			80-120			U
Endosulfan I	0.00				ug/L	40.00			80-120			U
Endosulfan II	0.00				ug/L	20.00			80-120			U
Endosulfan sulfate	0.00				ug/L	20.00			80-120			U
Endrin	0.00				ug/L	20.00			80-120			U
Endrin aldehyde	0.00				ug/L	20.00			80-120			U
Endrin ketone	0.00				ug/L	20.00			80-120			U
gamma-BHC (Lindane)	0.00				ug/L	20.00			80-120			U
gamma-Chlordane	0.00				ug/L	20.00			80-120			U
Heptachlor	0.00				ug/L	20.00			80-120			U
Heptachlor epoxide	0.00				ug/L	20.00			80-120			U
Methoxychlor	0.00				ug/L	20.00			80-120			U
Oxychlordane	0.00				ug/L	20.00			0-200			U
trans-Nonachlor	0.00				ug/L	40.00			0-200			U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Calibration Check (18K0002-CCVC)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	0.00				ug/L	300.0			80-120			U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Calibration Check (18K0002-CCVD)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	0.00				ug/L	20.00			80-120			U
Aldrin	0.00				ug/L	20.00			80-120			U
alpha-BHC	0.00				ug/L	20.00			80-120			U
alpha-Chlordane	0.00				ug/L	40.00			80-120			U
beta-BHC	0.00				ug/L	20.00			80-120			U
cis-Nonachlor	0.00				ug/L	20.00			0-200			U
delta-BHC	0.00				ug/L	20.00			80-120			U
Dieldrin	0.00				ug/L	20.00			80-120			U
Endosulfan I	0.00				ug/L	40.00			80-120			U
Endosulfan II	0.00				ug/L	20.00			80-120			U
Endosulfan sulfate	0.00				ug/L	20.00			80-120			U
Endrin	0.00				ug/L	20.00			80-120			U
Endrin aldehyde	0.00				ug/L	20.00			80-120			U
Endrin ketone	0.00				ug/L	20.00			80-120			U
gamma-BHC (Lindane)	0.00				ug/L	20.00			80-120			U
gamma-Chlordane	0.00				ug/L	20.00			80-120			U
Heptachlor	0.00				ug/L	20.00			80-120			U
Heptachlor epoxide	0.00				ug/L	20.00			80-120			U
Methoxychlor	0.00				ug/L	20.00			80-120			U
Oxychlordane	0.00				ug/L	20.00			0-200			U
trans-Nonachlor	0.00				ug/L	40.00			0-200			U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Surrogate: PCB 198	*0.00*				*ug/L*	*20.00*			*85-115*			*U*
Calibration Check (18K0002-CCVE)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	0.00				ug/L	300.0			80-120			U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Initial Cal Blank (18K0002-ICB1)					Prepared & Analyzed: 14-Nov-2018							
4,4´-DDT	0.00				ug/L							U
Aldrin	0.00				ug/L							U
alpha-BHC	0.00				ug/L							U
alpha-Chlordane	0.00				ug/L							U
beta-BHC	0.00				ug/L							U
cis-Nonachlor	0.00				ug/L							U
delta-BHC	0.00				ug/L							U
Dibutyl Chlorendate	0.00				ug/L				45-135			U
Dibutyl Chlorendate [2]	0.00				ug/L				45-135			U
Dieldrin	0.00				ug/L							U
Endosulfan I	0.00				ug/L							U
Endosulfan II	0.00				ug/L							U
Endosulfan sulfate	0.00				ug/L							U
Endrin	0.00				ug/L							U
Endrin aldehyde	0.00				ug/L							U
Endrin ketone	0.00				ug/L							U
gamma-BHC (Lindane)	0.00				ug/L							U
gamma-Chlordane	0.00				ug/L							U
Heptachlor	0.00				ug/L							U
Heptachlor epoxide	0.00				ug/L							U
Hexachlorobenzene [2]	0.00				ug/L							U
Hexachlorocyclopentadiene (2C	0.00				ug/L							U
Methoxychlor	0.00				ug/L							U
Oxychlordane	0.00				ug/L							U
Toxaphene	0.00				ug/L							U
trans-Nonachlor	0.00				ug/L							U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.00*				*ug/L*				*30-125*			*Z-03, U*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Initial Cal Blank (18K0002-ICB1)						Prepared & Analyzed: 14-Nov-2018						
Surrogate: Decachlorobiphenyl	*0.00*				*ug/L*				*40-135*			*U*
Surrogate: PCB 198	*0.00*				*ug/L*				*30-125*			*Z-03, U*
Initial Cal Check (18K0002-ICV1)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	20.2				ug/L	20.00		101	80-120			
Aldrin	21.5				ug/L	20.00		108	80-120			
alpha-BHC	21.7				ug/L	20.00		108	80-120			
alpha-Chlordane	40.2				ug/L	40.00		100	80-120			
beta-BHC	19.0				ug/L	20.00		95.0	80-120			
cis-Nonachlor	19.7				ug/L	20.00		98.5	80-120			
delta-BHC	25.4				ug/L	20.00		127	80-120			Q
Dieldrin	21.5				ug/L	20.00		108	80-120			
Endosulfan I	42.7				ug/L	40.00		107	80-120			
Endosulfan II	19.5				ug/L	20.00		97.5	80-120			
Endosulfan sulfate	20.1				ug/L	20.00		100	80-120			
Endrin	21.8				ug/L	20.00		109	80-120			
Endrin aldehyde	19.8				ug/L	20.00		99.0	80-120			
Endrin ketone	19.1				ug/L	20.00		95.5	80-120			Q
gamma-BHC (Lindane)	21.0				ug/L	20.00		105	80-120			
gamma-Chlordane	19.6				ug/L	20.00		98.0	80-120			
Heptachlor	19.9				ug/L	20.00		99.5	80-120			
Heptachlor epoxide	21.0				ug/L	20.00		105	80-120			
Methoxychlor	19.6				ug/L	20.00		98.0	80-120			
Oxychlordane	19.1				ug/L	20.00		95.5	80-120			
trans-Nonachlor	40.2				ug/L	40.00		100	80-120			
Initial Cal Check (18K0002-ICV2)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	0.00				ug/L	300.0			80-120			U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18K0002 - B18K002												
Initial Cal Check (18K0002-ICV3)						Prepared: 15-Nov-2018 Analyzed: 17-Nov-2018						
Toxaphene	0.00				ug/L	300.0			80-120			Z-03, U
Batch B18K002 - EPA 3510C												
Blank (B18K002-BLK1)						Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	ND	0.0008	0.002	0.007	ug/L							U
Aldrin	ND	0.0007	0.002	0.007	ug/L							U
alpha-BHC	ND	0.0007	0.002	0.007	ug/L							U
alpha-Chlordane	ND	0.001	0.002	0.007	ug/L							U
beta-BHC	ND	0.001	0.002	0.007	ug/L							U
cis-Nonachlor	ND	0.0007	0.002	0.007	ug/L							U
delta-BHC	ND	0.0007	0.002	0.007	ug/L							U
Dieldrin	ND	0.0007	0.002	0.007	ug/L							U
Endosulfan I	ND	0.001	0.002	0.007	ug/L							U
Endosulfan II	ND	0.0005	0.002	0.007	ug/L							U
Endosulfan sulfate	ND	0.0007	0.002	0.007	ug/L							U
Endrin	ND	0.001	0.002	0.007	ug/L							U
Endrin aldehyde	ND	0.00060	0.002	0.007	ug/L							U
Endrin ketone	ND	0.001	0.002	0.007	ug/L							U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.007	ug/L							U
gamma-Chlordane	ND	0.0007	0.002	0.007	ug/L							U
Heptachlor	ND	0.0008	0.002	0.007	ug/L							U
Heptachlor epoxide	ND	0.0007	0.002	0.007	ug/L							U
Methoxychlor	ND	0.001	0.002	0.007	ug/L							U
Oxychlordane	ND	0.001	0.002	0.007	ug/L							U
Toxaphene	ND	0.073	0.100	0.300	ug/L							U
trans-Nonachlor	ND	0.0008	0.002	0.007	ug/L							U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0774*				*ug/L*	*0.1000*		*77.4*	*30-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-150*			*U*
Surrogate: PCB 198	*0.111*				*ug/L*	*0.1200*		*92.4*	*30-125*			

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
Blank (B18K002-BLK1)						Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
LCS (B18K002-BS1)						Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	0.107	0.0008	0.002	0.007	ug/L	0.1200		89.0	50-150		30	
Aldrin	0.089	0.0007	0.002	0.007	ug/L	0.1200		74.2	50-150		30	
alpha-BHC	0.104	0.0007	0.002	0.007	ug/L	0.1200		86.5	50-150		30	
alpha-Chlordane	0.212	0.001	0.002	0.007	ug/L	0.2400		88.3	50-150		30	
beta-BHC	0.094	0.001	0.002	0.007	ug/L	0.1200		78.1	50-150		30	
cis-Nonachlor	0.108	0.0007	0.002	0.007	ug/L	0.1200		90.0	50-150		30	
delta-BHC	0.095	0.0007	0.002	0.007	ug/L	0.1200		79.3	50-150		30	
Dieldrin	0.111	0.0007	0.002	0.007	ug/L	0.1200		92.3	50-150		30	
Endosulfan I	0.200	0.001	0.002	0.007	ug/L	0.2400		83.5	50-150		30	
Endosulfan II	0.110	0.0005	0.002	0.007	ug/L	0.1200		91.8	50-150		30	
Endosulfan sulfate	0.109	0.0007	0.002	0.007	ug/L	0.1200		90.8	50-150		30	
Endrin	0.108	0.001	0.002	0.007	ug/L	0.1200		89.7	50-150		30	
Endrin aldehyde	0.104	0.00060	0.002	0.007	ug/L	0.1200		86.3	50-150		30	
Endrin ketone	0.060	0.001	0.002	0.007	ug/L	0.1200		50.0	50-150		30	
gamma-BHC (Lindane)	0.093	0.0008	0.002	0.007	ug/L	0.1200		77.6	50-150		30	
gamma-Chlordane	0.104	0.0007	0.002	0.007	ug/L	0.1200		87.0	50-150		30	
Heptachlor	0.100	0.0008	0.002	0.007	ug/L	0.1200		83.1	50-150		30	
Heptachlor epoxide	0.109	0.0007	0.002	0.007	ug/L	0.1200		90.6	50-150		30	
Methoxychlor	0.105	0.001	0.002	0.007	ug/L	0.1200		87.8	50-150		30	
Oxychlordane	0.100	0.001	0.002	0.007	ug/L	0.1200		83.1	50-150		30	
Toxaphene	ND	0.073	0.100	0.300	ug/L				50-150		30	U
trans-Nonachlor	0.212	0.0008	0.002	0.007	ug/L	0.2400		88.3	50-150		30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0753*				*ug/L*	*0.1000*		*75.3*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.104*				*ug/L*	*0.1200*		*87.0*	*30-120*			

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
LCS (B18K002-BS2)					Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018							
4,4´-DDT	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Aldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-Chlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U
beta-BHC	ND	0.001	0.002	0.007	ug/L				50-150		30	U
cis-Nonachlor	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
delta-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Dieldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Endosulfan I	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Endosulfan II	ND	0.0005	0.002	0.007	ug/L				50-150		30	U
Endosulfan sulfate	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Endrin	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Endrin aldehyde	ND	0.00060	0.002	0.007	ug/L				50-150		30	U
Endrin ketone	ND	0.001	0.002	0.007	ug/L				50-150		30	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
gamma-Chlordane	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Heptachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Heptachlor epoxide	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Methoxychlor	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Oxychlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Toxaphene	1.37	0.073	0.100	0.300	ug/L	1.200		114	50-150		30	
trans-Nonachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0730*				*ug/L*	*0.1000*		*73.0*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.0964*				*ug/L*	*0.1200*		*80.3*	*30-120*			
LCS Dup (B18K002-BSD1)					Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018							
4,4´-DDT	0.096	0.0008	0.002	0.007	ug/L	0.1200		79.9	50-150	10.8	30	
Aldrin	0.082	0.0007	0.002	0.007	ug/L	0.1200		68.0	50-150	8.79	30	

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
LCS Dup (B18K002-BSD1)						Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
alpha-BHC	0.093	0.0007	0.002	0.007	ug/L	0.1200		77.6	50-150	10.8	30	
alpha-Chlordane	0.197	0.001	0.002	0.007	ug/L	0.2400		82.2	50-150	7.15	30	
beta-BHC	0.085	0.001	0.002	0.007	ug/L	0.1200		70.9	50-150	9.65	30	
cis-Nonachlor	0.102	0.0007	0.002	0.007	ug/L	0.1200		84.8	50-150	5.88	30	
delta-BHC	0.088	0.0007	0.002	0.007	ug/L	0.1200		73.2	50-150	8.01	30	
Dieldrin	0.104	0.0007	0.002	0.007	ug/L	0.1200		86.3	50-150	6.76	30	
Endosulfan I	0.185	0.001	0.002	0.007	ug/L	0.2400		76.9	50-150	8.15	30	
Endosulfan II	0.104	0.0005	0.002	0.007	ug/L	0.1200		86.9	50-150	5.50	30	
Endosulfan sulfate	0.102	0.0007	0.002	0.007	ug/L	0.1200		85.3	50-150	6.23	30	
Endrin	0.098	0.001	0.002	0.007	ug/L	0.1200		81.9	50-150	9.14	30	
Endrin aldehyde	0.097	0.00060	0.002	0.007	ug/L	0.1200		80.7	50-150	6.67	30	
Endrin ketone	0.055	0.001	0.002	0.007	ug/L	0.1200		46.0	50-150	8.36	30	
gamma-BHC (Lindane)	0.082	0.0008	0.002	0.007	ug/L	0.1200		67.9	50-150	13.3	30	
gamma-Chlordane	0.097	0.0007	0.002	0.007	ug/L	0.1200		81.0	50-150	7.06	30	
Heptachlor	0.088	0.0008	0.002	0.007	ug/L	0.1200		73.4	50-150	12.4	30	
Heptachlor epoxide	0.099	0.0007	0.002	0.007	ug/L	0.1200		82.8	50-150	8.92	30	
Methoxychlor	0.087	0.001	0.002	0.007	ug/L	0.1200		72.6	50-150	18.9	30	
Oxychlordane	0.090	0.001	0.002	0.007	ug/L	0.1200		75.0	50-150	10.2	30	
Toxaphene	ND	0.073	0.100	0.300	ug/L				50-150		30	U
trans-Nonachlor	0.197	0.0008	0.002	0.007	ug/L	0.2400		82.2	50-150	7.15	30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0682*				*ug/L*	*0.1000*		*68.2*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.101*				*ug/L*	*0.1200*		*84.0*	*30-120*			
LCS Dup (B18K002-BSD2)						Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Aldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
alpha-Chlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
LCS Dup (B18K002-BSD2)						Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
beta-BHC	ND	0.001	0.002	0.007	ug/L				50-150		30	U
cis-Nonachlor	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
delta-BHC	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Dieldrin	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Endosulfan I	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Endosulfan II	ND	0.0005	0.002	0.007	ug/L				50-150		30	U
Endosulfan sulfate	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Endrin	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Endrin aldehyde	ND	0.00060	0.002	0.007	ug/L				50-150		30	U
Endrin ketone	ND	0.001	0.002	0.007	ug/L				50-150		30	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
gamma-Chlordane	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Heptachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Heptachlor epoxide	ND	0.0007	0.002	0.007	ug/L				50-150		30	U
Methoxychlor	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Oxychlordane	ND	0.001	0.002	0.007	ug/L				50-150		30	U
Toxaphene	1.39	0.073	0.100	0.300	ug/L	1.200		116	50-150	1.88	30	
trans-Nonachlor	ND	0.0008	0.002	0.007	ug/L				50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0950*				*ug/L*	*0.1000*		*95.0*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.114*				*ug/L*	*0.1200*		*95.1*	*30-120*			
Duplicate (B18K002-DUP1)						**Source: 18J0403-12** Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	ND	0.0008	0.002	0.007	ug/L		ND				30	U
Aldrin	ND	0.0007	0.002	0.007	ug/L		ND				30	U
alpha-BHC	ND	0.0007	0.002	0.007	ug/L		ND				30	U
alpha-Chlordane	ND	0.001	0.002	0.007	ug/L		ND				30	U
beta-BHC	ND	0.001	0.002	0.007	ug/L		ND				30	U
cis-Nonachlor	ND	0.0007	0.002	0.007	ug/L		ND				30	U

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USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
Duplicate (B18K002-DUP1)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
delta-BHC	ND	0.0007	0.002	0.007	ug/L		ND				30	U
Dieldrin	ND	0.0007	0.002	0.007	ug/L		ND				30	U
Endosulfan I	ND	0.001	0.002	0.007	ug/L		ND				30	U
Endosulfan II	ND	0.0005	0.002	0.007	ug/L		ND				30	U
Endosulfan sulfate	ND	0.0007	0.002	0.007	ug/L		ND				30	U
Endrin	ND	0.001	0.002	0.007	ug/L		ND				30	U
Endrin aldehyde	ND	0.00060	0.002	0.007	ug/L		ND				30	U
Endrin ketone	ND	0.001	0.002	0.007	ug/L		ND				30	U
gamma-BHC (Lindane)	ND	0.0008	0.002	0.007	ug/L		ND				30	U
gamma-Chlordane	ND	0.0007	0.002	0.007	ug/L		ND				30	U
Heptachlor	ND	0.0008	0.002	0.007	ug/L		ND				30	U
Heptachlor epoxide	ND	0.0007	0.002	0.007	ug/L		ND				30	U
Methoxychlor	ND	0.001	0.002	0.007	ug/L		ND				30	U
Oxychlordane	ND	0.001	0.002	0.007	ug/L		ND				30	U
Toxaphene	ND	0.073	0.100	0.300	ug/L		ND				30	U
trans-Nonachlor	ND	0.0008	0.002	0.007	ug/L		ND				30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0666*				*ug/L*	*0.1000*		*66.6*	*30-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-150*			*U*
Surrogate: PCB 198	*0.101*				*ug/L*	*0.1200*		*84.0*	*30-125*			
Matrix Spike (B18K002-MS1)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	0.193	0.002	0.004	0.015	ug/L	0.2400	ND	80.4	50-150		30	
Aldrin	0.172	0.001	0.004	0.015	ug/L	0.2400	ND	71.7	50-150		30	
alpha-BHC	0.194	0.001	0.004	0.015	ug/L	0.2400	ND	80.8	50-150		30	
alpha-Chlordane	0.378	0.002	0.004	0.015	ug/L	0.4800	ND	78.7	50-150		30	
beta-BHC	0.172	0.002	0.004	0.015	ug/L	0.2400	ND	71.5	50-150		30	
cis-Nonachlor	0.193	0.001	0.004	0.015	ug/L	0.2400	ND	80.4	50-150		30	
delta-BHC	0.275	0.001	0.004	0.015	ug/L	0.2400	ND	114	50-150		30	
Dieldrin	0.190	0.001	0.004	0.015	ug/L	0.2400	ND	79.0	50-150		30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
Matrix Spike (B18K002-MS1)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
Endosulfan I	0.365	0.003	0.004	0.015	ug/L	0.4800	ND	76.0	50-150		30	
Endosulfan II	0.199	0.001	0.004	0.015	ug/L	0.2400	ND	83.0	50-150		30	
Endosulfan sulfate	0.198	0.001	0.004	0.015	ug/L	0.2400	ND	82.5	50-150		30	
Endrin	0.190	0.002	0.004	0.015	ug/L	0.2400	ND	79.3	50-150		30	
Endrin aldehyde	0.189	0.001	0.004	0.015	ug/L	0.2400	ND	78.6	50-150		30	
Endrin ketone	0.105	0.002	0.004	0.015	ug/L	0.2400	ND	43.7	50-150		30	
gamma-BHC (Lindane)	0.184	0.002	0.004	0.015	ug/L	0.2400	ND	76.7	50-150		30	
gamma-Chlordane	0.194	0.001	0.004	0.015	ug/L	0.2400	ND	80.9	50-150		30	
Heptachlor	0.180	0.002	0.004	0.015	ug/L	0.2400	ND	74.9	50-150		30	
Heptachlor epoxide	0.197	0.001	0.004	0.015	ug/L	0.2400	ND	82.2	50-150		30	
Methoxychlor	0.194	0.003	0.004	0.015	ug/L	0.2400	ND	81.0	50-150		30	
Oxychlordane	0.213	0.002	0.004	0.015	ug/L	0.2400	ND	88.6	50-150		30	
Toxaphene	ND	0.146	0.199	0.600	ug/L		ND		50-150		30	U
trans-Nonachlor	0.378	0.002	0.004	0.015	ug/L	0.4800	ND	78.7	50-150		30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.141*				*ug/L*	*0.2000*		*70.6*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.208*				*ug/L*	*0.2400*		*86.6*	*30-120*			
Matrix Spike (B18K002-MS2)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Aldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-Chlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
beta-BHC	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
cis-Nonachlor	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
delta-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Dieldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan I	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan II	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
Matrix Spike (B18K002-MS2)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
Endosulfan sulfate	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Endrin aldehyde	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin ketone	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
gamma-BHC (Lindane)	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
gamma-Chlordane	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor epoxide	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Methoxychlor	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Oxychlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Toxaphene	2.75	0.146	0.199	0.600	ug/L	2.400	ND	115	50-150		30	
trans-Nonachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.189*				*ug/L*	*0.2000*		*94.6*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.222*				*ug/L*	*0.2400*		*92.6*	*30-120*			
Matrix Spike Dup (B18K002-MSD1)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	0.220	0.002	0.004	0.015	ug/L	0.2400	ND	91.5	50-150	12.9	30	
Aldrin	0.189	0.001	0.004	0.015	ug/L	0.2400	ND	78.8	50-150	9.45	30	
alpha-BHC	0.217	0.001	0.004	0.015	ug/L	0.2400	ND	90.6	50-150	11.4	30	
alpha-Chlordane	0.410	0.002	0.004	0.015	ug/L	0.4800	ND	85.4	50-150	8.10	30	
beta-BHC	0.188	0.002	0.004	0.015	ug/L	0.2400	ND	78.2	50-150	9.05	30	
cis-Nonachlor	0.212	0.001	0.004	0.015	ug/L	0.2400	ND	88.1	50-150	9.19	30	
delta-BHC	0.287	0.001	0.004	0.015	ug/L	0.2400	ND	119	50-150	4.29	30	
Dieldrin	0.210	0.001	0.004	0.015	ug/L	0.2400	ND	87.4	50-150	10.1	30	
Endosulfan I	0.402	0.003	0.004	0.015	ug/L	0.4800	ND	83.8	50-150	9.70	30	
Endosulfan II	0.216	0.001	0.004	0.015	ug/L	0.2400	ND	90.0	50-150	8.09	30	
Endosulfan sulfate	0.217	0.001	0.004	0.015	ug/L	0.2400	ND	90.5	50-150	9.25	30	
Endrin	0.213	0.002	0.004	0.015	ug/L	0.2400	ND	88.9	50-150	11.5	30	

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
Matrix Spike Dup (B18K002-MSD1)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
Endrin aldehyde	0.208	0.001	0.004	0.015	ug/L	0.2400	ND	86.5	50-150	9.62	30	
Endrin ketone	0.115	0.002	0.004	0.015	ug/L	0.2400	ND	48.1	50-150	9.58	30	
gamma-BHC (Lindane)	0.205	0.002	0.004	0.015	ug/L	0.2400	ND	85.2	50-150	10.5	30	
gamma-Chlordane	0.208	0.001	0.004	0.015	ug/L	0.2400	ND	86.6	50-150	6.81	30	
Heptachlor	0.198	0.002	0.004	0.015	ug/L	0.2400	ND	82.4	50-150	9.59	30	
Heptachlor epoxide	0.217	0.001	0.004	0.015	ug/L	0.2400	ND	90.5	50-150	9.67	30	
Methoxychlor	0.221	0.003	0.004	0.015	ug/L	0.2400	ND	92.1	50-150	12.8	30	
Oxychlordane	0.238	0.002	0.004	0.015	ug/L	0.2400	ND	99.1	50-150	11.2	30	
Toxaphene	ND	0.146	0.199	0.600	ug/L		ND		50-150		30	U
trans-Nonachlor	0.410	0.002	0.004	0.015	ug/L	0.4800	ND	85.4	50-150	8.10	30	
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.153*				*ug/L*	*0.2000*		*76.6*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.223*				*ug/L*	*0.2400*		*92.7*	*30-120*			
Matrix Spike Dup (B18K002-MSD2)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
4,4´-DDT	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Aldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
alpha-Chlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
beta-BHC	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
cis-Nonachlor	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
delta-BHC	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Dieldrin	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan I	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan II	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endosulfan sulfate	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Endrin aldehyde	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Endrin ketone	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Organochlorine Pesticides by EPA Method 8081A - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
Matrix Spike Dup (B18K002-MSD2)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 17-Nov-2018						
gamma-BHC (Lindane)	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
gamma-Chlordane	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Heptachlor epoxide	ND	0.001	0.004	0.015	ug/L		ND		50-150		30	U
Methoxychlor	ND	0.003	0.004	0.015	ug/L		ND		50-150		30	U
Oxychlordane	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Toxaphene	2.58	0.146	0.199	0.600	ug/L	2.400	ND	107	50-150	6.66	30	
trans-Nonachlor	ND	0.002	0.004	0.015	ug/L		ND		50-150		30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.182*				*ug/L*	*0.2000*		*91.1*	*25-150*			
Surrogate: Decachlorobiphenyl	*ND*				*ug/L*				*30-120*			*U*
Surrogate: PCB 198	*0.205*				*ug/L*	*0.2400*		*85.3*	*30-120*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Nutrients - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K001 - *												
Blank (B18K001-BLK1)						Prepared & Analyzed: 01-Nov-2018						
Ammonia as N, filtered	ND	0.00440	0.00500	0.0100	mg/L							U
LCS (B18K001-BS1)						Prepared & Analyzed: 01-Nov-2018						
Ammonia as N, filtered	0.112	0.00440	0.00500	0.0100	mg/L	0.1000		112	80-120			
Calibration Check (B18K001-CCV1)						Prepared & Analyzed: 01-Nov-2018						
Ammonia as N, filtered	0.396	0.00440	0.00500	0.0100	mg/L	0.4000		99.0	90-110			
Calibration Check (B18K001-CCV2)						Prepared & Analyzed: 01-Nov-2018						
Ammonia as N, filtered	0.502	0.00440	0.00500	0.0100	mg/L	0.5000		100	90-110			
Calibration Check (B18K001-CCV3)						Prepared & Analyzed: 01-Nov-2018						
Ammonia as N, filtered	0.508	0.00440	0.00500	0.0100	mg/L	0.5000		102	90-110			
Calibration Check (B18K001-CCV4)						Prepared & Analyzed: 01-Nov-2018						
Ammonia as N, filtered	0.511	0.00440	0.00500	0.0100	mg/L	0.5000		102	90-110			
Duplicate (B18K001-DUP1)			**Source: 18J0403-12**			Prepared & Analyzed: 01-Nov-2018						
Ammonia as N, filtered	2.80	0.0880	0.100	0.200	mg/L		2.97			5.89	30	
Matrix Spike (B18K001-MS1)			**Source: 18J0403-12**			Prepared & Analyzed: 01-Nov-2018						
Ammonia as N, filtered	5.05	0.0880	0.100	0.200	mg/L	2.000	2.97	104	80-120			
Matrix Spike Dup (B18K001-MSD1)			**Source: 18J0403-12**			Prepared & Analyzed: 01-Nov-2018						
Ammonia as N, filtered	5.12	0.0880	0.100	0.200	mg/L	2.000	2.97	108	80-120	1.38	30	
Reference (B18K001-SRM1)						Prepared: 01-Nov-2018 Analyzed: 26-Dec-2018						
Ammonia as N, filtered	0.999	0.00440	0.00500	0.0100	mg/L	1.000		99.9	70-130			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18L0023 - B18K002												
Calibration Check (18L0023-CCV1)						Prepared & Analyzed: 28-Dec-2018						
PCB 101	32				ng/mL	30.00		105	80-120			
PCB 105	9.9				ng/mL	10.00		99.1	80-120			
PCB 118	10				ng/mL	10.00		101	80-120			
PCB 126	21				ng/mL	20.00		103	80-120			
PCB 128	9.9				ng/mL	10.00		98.7	80-120			
PCB 138	30				ng/mL	30.00		101	80-120			
PCB 153	19				ng/mL	20.00		96.7	80-120			
PCB 169	10				ng/mL	10.00		103	80-120			
PCB 170	19				ng/mL	20.00		97.5	80-120			
PCB 18	10				ng/mL	10.00		102	80-120			
PCB 180	9.6				ng/mL	10.00		95.6	80-120			
PCB 187	10				ng/mL	10.00		101	80-120			
PCB 28	20				ng/mL	20.00		102	80-120			
PCB 44	10				ng/mL	10.00		102	80-120			
PCB 52	21				ng/mL	20.00		104	80-120			
PCB 66	20				ng/mL	20.00		102	80-120			
PCB 77	11				ng/mL	10.00		108	80-120			
PCB 8	21				ng/mL	20.00		105	80-120			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*9.9*				*ng/mL*	*10.00*		*99.3*	*80-120*			
Surrogate: PCB 198	*9.4*				*ng/mL*	*10.00*		*94.4*	*90-110*			
Calibration Check (18L0023-CCV2)						Prepared & Analyzed: 28-Dec-2018						
PCB 101	29				ng/mL	30.00		96.3	80-120			
PCB 105	10				ng/mL	10.00		101	80-120			
PCB 118	10				ng/mL	10.00		100	80-120			
PCB 126	22				ng/mL	20.00		108	80-120			
PCB 128	11				ng/mL	10.00		106	80-120			
PCB 138	29				ng/mL	30.00		98.3	80-120			
PCB 153	20				ng/mL	20.00		102	80-120			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18L0023 - B18K002												
Calibration Check (18L0023-CCV2)						Prepared & Analyzed: 28-Dec-2018						
PCB 169	11				ng/mL	10.00		106	80-120			
PCB 170	19				ng/mL	20.00		97.0	80-120			
PCB 18	11				ng/mL	10.00		106	80-120			
PCB 180	9.5				ng/mL	10.00		95.4	80-120			
PCB 187	10				ng/mL	10.00		99.6	80-120			
PCB 28	22				ng/mL	20.00		108	80-120			
PCB 44	11				ng/mL	10.00		106	80-120			
PCB 52	19				ng/mL	20.00		96.1	80-120			
PCB 66	20				ng/mL	20.00		99.8	80-120			
PCB 77	9.9				ng/mL	10.00		99.4	80-120			
PCB 8	22				ng/mL	20.00		108	80-120			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*9.9*				*ng/mL*	*10.00*		*98.9*	*80-120*			
Surrogate: PCB 198	*10*				*ng/mL*	*10.00*		*99.6*	*90-110*			
Calibration Check (18L0023-CCV3)						Prepared & Analyzed: 28-Dec-2018						
PCB 101	29				ng/mL	30.00		96.0	80-120			
PCB 105	10				ng/mL	10.00		104	80-120			
PCB 118	11				ng/mL	10.00		110	80-120			
PCB 126	21				ng/mL	20.00		105	80-120			
PCB 128	11				ng/mL	10.00		109	80-120			
PCB 138	29				ng/mL	30.00		98.0	80-120			
PCB 153	20				ng/mL	20.00		102	80-120			
PCB 169	10				ng/mL	10.00		104	80-120			
PCB 170	19				ng/mL	20.00		95.2	80-120			
PCB 18	11				ng/mL	10.00		108	80-120			
PCB 180	9.9				ng/mL	10.00		98.8	80-120			
PCB 187	9.9				ng/mL	10.00		99.5	80-120			
PCB 28	21				ng/mL	20.00		104	80-120			
PCB 44	10				ng/mL	10.00		104	80-120			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18L0023 - B18K002												
Calibration Check (18L0023-CCV3)						Prepared & Analyzed: 28-Dec-2018						
PCB 52	21				ng/mL	20.00		106	80-120			
PCB 66	21				ng/mL	20.00		103	80-120			
PCB 77	10				ng/mL	10.00		101	80-120			
PCB 8	22				ng/mL	20.00		108	80-120			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*9.8*				*ng/mL*	*10.00*		*98.2*	*80-120*			
Surrogate: PCB 198	*9.8*				*ng/mL*	*10.00*		*98.2*	*90-110*			
Initial Cal Blank (18L0023-ICB1)						Prepared & Analyzed: 28-Dec-2018						
PCB 101	0.0				ng/mL							U
PCB 105	0.0				ng/mL							U
PCB 118	0.0				ng/mL							U
PCB 126	0.0				ng/mL							U
PCB 128	0.0				ng/mL							U
PCB 138	0.0				ng/mL							U
PCB 153	0.0				ng/mL							U
PCB 169	0.0				ng/mL							U
PCB 170	0.0				ng/mL							U
PCB 18	0.0				ng/mL							U
PCB 180	0.0				ng/mL							U
PCB 187	0.0				ng/mL							U
PCB 28	0.0				ng/mL							U
PCB 44	0.0				ng/mL							U
PCB 52	0.0				ng/mL							U
PCB 66	0.0				ng/mL							U
PCB 77	0.0				ng/mL							U
PCB 8	0.0				ng/mL							U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.0*				*ng/mL*				*30-150*			*Z-03, U*
Surrogate: PCB 198	*0.0*				*ng/mL*				*30-150*			*Z-03, U*

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 18L0023 - B18K002												
Initial Cal Check (18L0023-ICV1)						Prepared & Analyzed: 28-Dec-2018						
PCB 101	60				ng/mL	60.00		101	80-120			
PCB 105	20				ng/mL	20.00		102	80-120			
PCB 118	20				ng/mL	20.00		99.3	80-120			
PCB 126	39				ng/mL	40.00		97.7	80-120			
PCB 128	21				ng/mL	20.00		105	80-120			
PCB 138	54				ng/mL	60.00		89.6	80-120			
PCB 153	40				ng/mL	40.00		98.8	80-120			
PCB 169	18				ng/mL	20.00		89.8	80-120			
PCB 170	36				ng/mL	40.00		90.5	80-120			
PCB 18	21				ng/mL	20.00		105	80-120			
PCB 180	21				ng/mL	20.00		104	80-120			
PCB 187	21				ng/mL	20.00		104	80-120			
PCB 28	39				ng/mL	40.00		97.1	80-120			
PCB 44	20				ng/mL	20.00		101	80-120			
PCB 52	41				ng/mL	40.00		102	80-120			
PCB 66	39				ng/mL	40.00		98.5	80-120			
PCB 77	20				ng/mL	20.00		102	80-120			
PCB 8	44				ng/mL	40.00		110	80-120			
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*20*				*ng/mL*	*20.00*		*97.5*	*80-120*			
Surrogate: PCB 198	*18*				*ng/mL*	*20.00*		*90.1*	*80-120*			
Batch B18K002 - EPA 3510C												
Blank (B18K002-BLK1)						Prepared: 03-Nov-2018 Analyzed: 20-Dec-2018						
PCB 101	ND	0.420	0.004	1.20	ug/L							U
PCB 105	ND	0.420	0.004	1.20	ug/L							U
PCB 118	ND	0.420	0.004	1.20	ug/L							U
PCB 126	ND	0.420	0.004	1.20	ug/L							U
PCB 128	ND	0.420	0.004	1.20	ug/L							U
PCB 138	ND	0.420	0.004	1.20	ug/L							U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
Blank (B18K002-BLK1)						Prepared: 03-Nov-2018 Analyzed: 20-Dec-2018						
PCB 153	ND	0.420	0.004	1.20	ug/L							U
PCB 169	ND	0.420	0.004	1.20	ug/L							U
PCB 170	ND	0.420	0.004	1.20	ug/L							U
PCB 18	ND	0.420	0.004	1.20	ug/L							U
PCB 180	ND	0.420	0.004	1.20	ug/L							U
PCB 187	ND	0.420	0.004	1.20	ug/L							U
PCB 28	ND	0.420	0.004	1.20	ug/L							U
PCB 44	ND	0.420	0.004	1.20	ug/L							U
PCB 52	ND	0.420	0.004	1.20	ug/L							U
PCB 66	ND	0.420	0.004	1.20	ug/L							U
PCB 77	ND	0.420	0.004	1.20	ug/L							U
PCB 8	ND	0.006	1.50	3.00	ug/L							U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.10*				*ug/L*	*0.1000*		*101*	*30-150*			
Surrogate: PCB 198	*0.062*				*ug/L*	*0.1200*		*51.8*	*30-150*			
LCS (B18K002-BS3)						Prepared: 03-Nov-2018 Analyzed: 20-Dec-2018						
PCB 101	ND	0.420	0.004	1.20	ug/L	0.1600			50-150			U
PCB 105	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 118	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 126	ND	0.420	0.004	1.20	ug/L	0.1600			50-150			U
PCB 128	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 138	ND	0.420	0.004	1.20	ug/L	0.2400			50-150			U
PCB 153	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 169	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 170	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			Q, U
PCB 18	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 180	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 187	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 28	ND	0.420	0.004	1.20	ug/L	0.1600			50-150			U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
LCS (B18K002-BS3)						Prepared: 03-Nov-2018 Analyzed: 20-Dec-2018						
PCB 44	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 52	ND	0.420	0.004	1.20	ug/L	0.1600			50-150			U
PCB 66	ND	0.420	0.004	1.20	ug/L	0.1600			50-150			U
PCB 77	ND	0.420	0.004	1.20	ug/L	0.08000			50-150			U
PCB 8	0.12	0.006	1.50	3.00	ug/L	0.1600		74.5	50-150			J
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.087*				*ug/L*	*0.1000*		*87.0*	*50-150*			
Surrogate: PCB 198	*0.035*				*ug/L*	*0.1200*		*28.9*	*50-150*			*S-GC*
LCS Dup (B18K002-BSD3)						Prepared: 03-Nov-2018 Analyzed: 20-Dec-2018						
PCB 101	ND	0.420	0.004	1.20	ug/L	0.1600			50-150		30	U
PCB 105	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 118	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 126	ND	0.420	0.004	1.20	ug/L	0.1600			50-150		30	U
PCB 128	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 138	ND	0.420	0.004	1.20	ug/L	0.2400			50-150		30	U
PCB 153	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 169	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 170	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	Q, U
PCB 18	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 180	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 187	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 28	ND	0.420	0.004	1.20	ug/L	0.1600			50-150		30	U
PCB 44	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 52	ND	0.420	0.004	1.20	ug/L	0.1600			50-150		30	U
PCB 66	ND	0.420	0.004	1.20	ug/L	0.1600			50-150		30	U
PCB 77	ND	0.420	0.004	1.20	ug/L	0.08000			50-150		30	U
PCB 8	0.13	0.006	1.50	3.00	ug/L	0.1600		79.7	50-150	6.67	30	J
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.085*				*ug/L*	*0.1000*		*85.0*	*50-150*			
Surrogate: PCB 198	*0.038*				*ug/L*	*0.1200*		*32.0*	*50-150*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
Duplicate (B18K002-DUP1)		**Source: 18J0403-12**			Prepared: 03-Nov-2018 Analyzed: 20-Dec-2018							
PCB 101	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 105	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 118	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 126	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 128	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 138	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 153	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 169	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 170	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 18	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 180	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 187	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 28	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 44	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 52	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 66	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 77	ND	0.420	0.004	1.20	ug/L		ND				30	U
PCB 8	ND	0.006	1.50	3.00	ug/L		ND				30	U
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.11*				*ug/L*	*0.1000*		*107*	*30-150*			
Surrogate: PCB 198	*0.058*				*ug/L*	*0.1200*		*48.6*	*30-150*			
Matrix Spike (B18K002-MS3)		**Source: 18J0403-12**			Prepared: 03-Nov-2018 Analyzed: 20-Dec-2018							
PCB 101	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150			U
PCB 105	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 118	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 126	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150			U
PCB 128	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 138	ND	0.840	0.008	2.40	ug/L	0.4800	ND		50-150			U
PCB 153	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
Matrix Spike (B18K002-MS3)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 20-Dec-2018						
PCB 169	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 170	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			Q, U
PCB 18	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 180	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 187	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 28	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150			U
PCB 44	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 52	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150			U
PCB 66	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150			U
PCB 77	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150			U
PCB 8	0.23	0.012	3.00	6.00	ug/L	0.3200	ND	72.5	50-150			J
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.16*				*ug/L*	*0.2000*		*80.6*	*50-150*			
Surrogate: PCB 198	*0.076*				*ug/L*	*0.2400*		*31.7*	*50-150*			
Matrix Spike Dup (B18K002-MSD3)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 20-Dec-2018						
PCB 101	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150	30		U
PCB 105	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 118	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 126	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150	30		U
PCB 128	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 138	ND	0.840	0.008	2.40	ug/L	0.4800	ND		50-150	30		U
PCB 153	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 169	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 170	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 18	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 180	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 187	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U
PCB 28	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150	30		U
PCB 44	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150	30		U

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Polychlorinated Biphenyls (as Congeners) by EPA Method 8082 - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K002 - EPA 3510C												
Matrix Spike Dup (B18K002-MSD3)		**Source: 18J0403-12**				Prepared: 03-Nov-2018 Analyzed: 20-Dec-2018						
PCB 52	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150		30	U
PCB 66	ND	0.840	0.008	2.40	ug/L	0.3200	ND		50-150		30	U
PCB 77	ND	0.840	0.008	2.40	ug/L	0.1600	ND		50-150		30	U
PCB 8	0.23	0.012	3.00	6.00	ug/L	0.3200	ND	73.2	50-150	0.906	30	J
Surrogate: 2,4,5,6 Tetrachloro-m-xylene	*0.18*				*ug/L*	*0.2000*		*88.1*	*50-150*			
Surrogate: PCB 198	*0.083*				*ug/L*	*0.2400*		*34.4*	*50-150*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Wet Chemistry - Quality Control

ERDC-EL-EP-C

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B18K003 - none												
Blank (B18K003-BLK1)						Prepared & Analyzed: 31-Oct-2018						
Total Suspended Solids	ND	1.00	2.00	5.00	mg/L							U
Blank (B18K003-BLK2)						Prepared & Analyzed: 31-Oct-2018						
Total Suspended Solids	ND	1.00	2.00	5.00	mg/L							U
Duplicate (B18K003-DUP1)		**Source: 18J0403-04**				Prepared & Analyzed: 31-Oct-2018						
Total Suspended Solids	45.0	1.00	2.00	5.00	mg/L		43.0			4.55	20	
Duplicate (B18K003-DUP2)		**Source: 18J0403-09**				Prepared & Analyzed: 31-Oct-2018						
Total Suspended Solids	19.5	0.500	1.00	2.50	mg/L		19.5			0.00	20	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1175682 - EPA 3510C												
BLK (WG1175682-1)						Prepared: 03-Nov-2018 Analyzed: 15-Nov-2018						
1,2,4-Trichlorobenzene	ND	0.096		0.5	ug/l				-			Ub
1,2-Dichlorobenzene	ND	0.068		0.5	ug/l				-			Ub
1,3-Dichlorobenzene	ND	0.078		0.5	ug/l				-			Ub
1,4-Dichlorobenzene	ND	0.083		0.5	ug/l				-			Ub
2,4-Dichlorophenol	ND	0.1		0.5	ug/l				-			Ub
2,4-Dimethylphenol	ND	0.241		2	ug/l				-			Ub
2,4-Dinitrophenol	ND	0.728		5	ug/l				-			Ub
2,4-Dinitrotoluene	ND	0.163		0.5	ug/l				-			Ub
2,6-Dinitrotoluene	ND	0.168		0.5	ug/l				-			Ub
2-Chloronaphthalene	ND	0.09		0.5	ug/l				-			Ub
2-Chlorophenol	ND	0.091		0.5	ug/l				-			Ub
2-Methylphenol	ND	0.104		0.5	ug/l				-			Ub
2-Nitrophenol	ND	0.115		0.5	ug/l				-			Ub
3,3'-Dichlorobenzidine	ND	0.193		0.5	ug/l				-			Ub
4,6-Dinitro-2-methylphenol	ND	0.51		2	ug/l				-			Ub
4-Bromophenyl-phenylether	ND	0.1		0.5	ug/l				-			Ub
4-Chloro-3-methylphenol	ND	0.103		0.5	ug/l				-			Ub
4-Chlorophenyl-phenylether	ND	0.079		0.5	ug/l				-			Ub
4-Methylphenol	Nd	0.113		0.5	ug/l				-			Ub
4-Nitrophenol	ND	0.59		2.5	ug/l				-			Ub
Azobenzene	ND	0.128		0.5	ug/l				-			Ub
Benzidine	ND	0.464		20	ug/l				-			Ub
bis(2-Chloroethoxy)methane	ND	0.085		0.5	ug/l				-			Ub
bis(2-Chloroethyl)ether	ND	0.093		0.5	ug/l				-			Ub
bis(2-chloroisopropyl)ether	ND	0.108		0.5	ug/l				-			Ub
bis(2-Ethylhexyl)phthalate	ND	0.081		0.5	ug/l				-			Ub
Butylbenzylphthalate	ND	0.085		0.5	ug/l				-			Ub
Diethylphthalate	ND	0.18		0.5	ug/l				-			Ub

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1175682 - EPA 3510C												
BLK (WG1175682-1)						Prepared: 03-Nov-2018 Analyzed: 15-Nov-2018						
Dimethylphthalate	ND	0.117		0.5	ug/l				-			Ub
Di-n-butylphthalate	ND	0.1		0.5	ug/l				-			Ub
Di-n-octylphthalate	ND	0.079		1	ug/l				-			Ub
Hexachlorobenzene	ND	0.122		0.5	ug/l				-			Ub
Hexachlorobutadiene	ND	0.086		0.5	ug/l				-			Ub
Hexachlorocyclopentadiene	ND	0.153		0.5	ug/l				-			Ub
Hexachloroethane	ND	0.102		0.5	ug/l				-			Ub
Isophorone	ND	0.126		0.5	ug/l				-			Ub
Nitrobenzene	ND	0.102		0.5	ug/l				-			Ub
N-Nitrosodimethylamine	ND	0.072		0.5	ug/l				-			Ub
N-Nitroso-di-n-propylamine	ND	0.123		0.5	ug/l				-			Ub
n-Nitrosodiphenylamine	ND	0.072		0.5	ug/l				-			Ub
Pentachlorophenol	ND	0.43		2	ug/l				-			Ub
Phenol	ND	0.051		0.5	ug/l				-			Ub
Surrogate: 2,4,6-Tribromophenol	*18.6*				*ug/l*			*93*	*15-115*			
Surrogate: 2-Fluorobiphenyl	*16.4*				*ug/l*			*82*	*30-130*			
Surrogate: 2-Fluorophenol	*11.8*				*ug/l*			*59*	*15-115*			
Surrogate: Nitrobenzene-d5	*16*				*ug/l*			*80*	*30-130*			
Surrogate: Phenol-d5	*10*				*ug/l*			*50*	*15-115*			
Surrogate: Terphenyl-d14	*20.5*				*ug/l*			*102*	*30-130*			
LCS (WG1175682-2)						Prepared: 03-Nov-2018 Analyzed: 15-Nov-2018						
1,2,4-Trichlorobenzene	5.95	0.096		0.5	ug/l	10		59	40-140			
1,2-Dichlorobenzene	5.5	0.068		0.5	ug/l	10		55	40-140			
1,3-Dichlorobenzene	5.14	0.078		0.5	ug/l	10		51	40-140			
1,4-Dichlorobenzene	5.28	0.083		0.5	ug/l	10		53	40-140			
2,4-Dichlorophenol	7.34	0.1		0.5	ug/l	10		73	40-140			
2,4-Dimethylphenol	5.38	0.241		2	ug/l	10		54	40-140			
2,4-Dinitrophenol	10.5	0.728		5	ug/l	10		105	40-140			
2,4-Dinitrotoluene	9.55	0.163		0.5	ug/l	10		96	40-140			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1175682 - EPA 3510C												
LCS (WG1175682-2)						Prepared: 03-Nov-2018 Analyzed: 15-Nov-2018						
2,6-Dinitrotoluene	8.7	0.168		0.5	ug/l	10		87	40-140			
2-Chloronaphthalene	7.23	0.09		0.5	ug/l	10		72	40-140			
2-Chlorophenol	6.56	0.091		0.5	ug/l	10		66	40-140			
2-Methylphenol	6.62	0.104		0.5	ug/l	10		66	40-140			
2-Nitrophenol	7.2	0.115		0.5	ug/l	10		72	40-140			
3,3'-Dichlorobenzidine	7.82	0.193		0.5	ug/l	10		78	40-140			
4,6-Dinitro-2-methylphenol	10.2	0.51		2	ug/l	10		102	40-140			
4-Bromophenyl-phenylether	8.54	0.1		0.5	ug/l	10		85	40-140			
4-Chloro-3-methylphenol	7.98	0.103		0.5	ug/l	10		80	40-140			
4-Chlorophenyl-phenylether	8.33	0.079		0.5	ug/l	10		83	40-140			
4-Methylphenol	6.68	0.113		0.5	ug/l	10		67	40-140			
4-Nitrophenol	6.87	0.59		2.5	ug/l	10		69	17-65			N
Azobenzene	8.43	0.128		0.5	ug/l	10		84	40-140			
Benzidine	2.03	0.464		20	ug/l	10		8.1	10-82			N
bis(2-Chloroethoxy)methane	7.44	0.085		0.5	ug/l	10		74	40-140			
bis(2-Chloroethyl)ether	6.88	0.093		0.5	ug/l	10		69	40-140			
bis(2-chloroisopropyl)ether	7.06	0.108		0.5	ug/l	10		71	40-140			
bis(2-Ethylhexyl)phthalate	9.93	0.081		0.5	ug/l	10		99	40-140			
Butylbenzylphthalate	9.81	0.085		0.5	ug/l	10		98	40-140			
Diethylphthalate	9.49	0.18		0.5	ug/l	10		95	40-140			
Dimethylphthalate	8.83	0.117		0.5	ug/l	10		88	40-140			
Di-n-butylphthalate	9.8	0.1		0.5	ug/l	10		98	40-140			
Di-n-octylphthalate	9.96	0.079		1	ug/l	10		100	40-140			
Hexachlorobenzene	8.6	0.122		0.5	ug/l	10		86	40-140			
Hexachlorobutadiene	5.2	0.086		0.5	ug/l	10		52	40-140			
Hexachlorocyclopentadiene	7.39	0.153		0.5	ug/l	10		74	10-109			
Hexachloroethane	4.72	0.102		0.5	ug/l	10		47	10-97			
Isophorone	7.72	0.126		0.5	ug/l	10		77	40-140			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1175682 - EPA 3510C												
LCS (WG1175682-2)						Prepared: 03-Nov-2018 Analyzed: 15-Nov-2018						
Nitrobenzene	6.97	0.102		0.5	ug/l	10		70	40-140			
N-Nitrosodimethylamine	5.7	0.072		0.5	ug/l	10		57	27-70			
N-Nitroso-di-n-propylamine	7.68	0.123		0.5	ug/l	10		77	40-140			
n-Nitrosodiphenylamine	9.1	0.072		0.5	ug/l	10		91	40-140			
Pentachlorophenol	11	0.43		2	ug/l	10		110	40-140			
Phenol	4.7	0.051		0.5	ug/l	10		47	18-54			
Surrogate: 2,4,6-Tribromophenol	*20*				*ug/l*			*100*	*15-115*			
Surrogate: 2-Fluorobiphenyl	*15*				*ug/l*			*75*	*30-130*			
Surrogate: 2-Fluorophenol	*10.9*				*ug/l*			*55*	*15-115*			
Surrogate: Nitrobenzene-d5	*14.8*				*ug/l*			*74*	*30-130*			
Surrogate: Phenol-d5	*9.27*				*ug/l*			*46*	*15-115*			
Surrogate: Terphenyl-d14	*19.8*				*ug/l*			*99*	*30-130*			
LCD (WG1175682-3)						Prepared: 03-Nov-2018 Analyzed: 15-Nov-2018						
1,2,4-Trichlorobenzene	6.6	0.096		0.5	ug/l	10		66	40-140	11	30	
1,2-Dichlorobenzene	6.1	0.068		0.5	ug/l	10		61	40-140	10	30	
1,3-Dichlorobenzene	5.62	0.078		0.5	ug/l	10		56	40-140	9	30	
1,4-Dichlorobenzene	5.79	0.083		0.5	ug/l	10		58	40-140	9	30	
2,4-Dichlorophenol	8.25	0.1		0.5	ug/l	10		82	40-140	12	30	
2,4-Dimethylphenol	6.28	0.241		2	ug/l	10		63	40-140	15	30	
2,4-Dinitrophenol	11.6	0.728		5	ug/l	10		116	40-140	10	30	
2,4-Dinitrotoluene	10.6	0.163		0.5	ug/l	10		106	40-140	10	30	
2,6-Dinitrotoluene	9.77	0.168		0.5	ug/l	10		98	40-140	12	30	
2-Chloronaphthalene	8.24	0.09		0.5	ug/l	10		82	40-140	13	30	
2-Chlorophenol	7.12	0.091		0.5	ug/l	10		71	40-140	7	30	
2-Methylphenol	7.23	0.104		0.5	ug/l	10		72	40-140	9	30	
2-Nitrophenol	7.91	0.115		0.5	ug/l	10		79	40-140	9	30	
3,3'-Dichlorobenzidine	8.42	0.193		0.5	ug/l	10		84	40-140	7	30	
4,6-Dinitro-2-methylphenol	11.2	0.51		2	ug/l	10		112	40-140	9	30	
4-Bromophenyl-phenylether	9.59	0.1		0.5	ug/l	10		96	40-140	12	30	

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1175682 - EPA 3510C												
LCD (WG1175682-3)						Prepared: 03-Nov-2018 Analyzed: 15-Nov-2018						
4-Chloro-3-methylphenol	9.12	0.103		0.5	ug/l	10		91	40-140	13	30	
4-Chlorophenyl-phenylether	9.24	0.079		0.5	ug/l	10		92	40-140	10	30	
4-Methylphenol	7.35	0.113		0.5	ug/l	10		73	40-140	9	30	
4-Nitrophenol	7.73	0.59		2.5	ug/l	10		77	17-65	11	30	N
Azobenzene	9.24	0.128		0.5	ug/l	10		92	40-140	9	30	
Benzidine	3.36	0.464		20	ug/l	10		13	10-82	46	30	*
bis(2-Chloroethoxy)methane	8.4	0.085		0.5	ug/l	10		84	40-140	13	30	
bis(2-Chloroethyl)ether	7.44	0.093		0.5	ug/l	10		74	40-140	7	30	
bis(2-chloroisopropyl)ether	7.61	0.108		0.5	ug/l	10		76	40-140	7	30	
bis(2-Ethylhexyl)phthalate	10.6	0.081		0.5	ug/l	10		106	40-140	7	30	
Butylbenzylphthalate	10.5	0.085		0.5	ug/l	10		105	40-140	7	30	
Diethylphthalate	10.4	0.18		0.5	ug/l	10		104	40-140	9	30	
Dimethylphthalate	9.78	0.117		0.5	ug/l	10		98	40-140	11	30	
Di-n-butylphthalate	10.5	0.1		0.5	ug/l	10		105	40-140	7	30	
Di-n-octylphthalate	10.7	0.079		1	ug/l	10		107	40-140	7	30	
Hexachlorobenzene	9.4	0.122		0.5	ug/l	10		94	40-140	9	30	
Hexachlorobutadiene	5.92	0.086		0.5	ug/l	10		59	40-140	13	30	
Hexachlorocyclopentadiene	8.68	0.153		0.5	ug/l	10		87	10-109	16	30	
Hexachloroethane	5.26	0.102		0.5	ug/l	10		52	10-97	10	30	
Isophorone	8.73	0.126		0.5	ug/l	10		87	40-140	12	30	
Nitrobenzene	7.7	0.102		0.5	ug/l	10		77	40-140	10	30	
N-Nitrosodimethylamine	6.16	0.072		0.5	ug/l	10		62	27-70	8	30	
N-Nitroso-di-n-propylamine	8.49	0.123		0.5	ug/l	10		85	40-140	10	30	
n-Nitrosodiphenylamine	9.8	0.072		0.5	ug/l	10		98	40-140	7	30	
Pentachlorophenol	11.8	0.43		2	ug/l	10		118	40-140	7	30	
Phenol	5.09	0.051		0.5	ug/l	10		51	18-54	8	30	
Surrogate: 2,4,6-Tribromophenol	*21.5*				*ug/l*			*107*	*15-115*			
Surrogate: 2-Fluorobiphenyl	*16.8*				*ug/l*			*84*	*30-130*			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Semivolatile Organics by GC-MS - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1175682 - EPA 3510C												
LCD (WG1175682-3)	Prepared: 03-Nov-2018 Analyzed: 15-Nov-2018											
Surrogate: 2-Fluorophenol	*11.1*				*ug/l*			*56*	*15-115*			
Surrogate: Nitrobenzene-d5	*15.8*				*ug/l*			*79*	*30-130*			
Surrogate: Phenol-d5	*9.75*				*ug/l*			*49*	*15-115*			
Surrogate: Terphenyl-d14	*20.6*				*ug/l*			*103*	*30-130*			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

TNRCC 1005 - Quality Control

Katahdin

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG240531 - TPH TCEQ 1005												
BLK (WG240531-1)						Prepared & Analyzed: 11-Nov-2018						
>C12-C28	ND								-			Uc
>C28-C35	ND	3900		5000	ug/L				-			Uc
C6-C12	ND	2000		5000	ug/L				-			Uc
C6-C35	ND	6900		10000	ug/L				-			Uc
Surrogate: 1-Chlorooctane	*76.5*				*%*			*76.5*	*70-130*			
Surrogate: O-TERPHENYL	*104.*				*%*			*104.*	*70-130*			
BS (WG240531-2)						Prepared & Analyzed: 11-Nov-2018						
>C12-C28	32900	3900		5000	ug/L	33300		98.8	70-125			
C6-C12	35400	2000		5000	ug/L	33300		106	75-125			
C6-C35	67400	6900		10000	ug/L	66700		101	70-125			
Surrogate: 1-Chlorooctane	*104.*				*%*			*104.*	*70-130*			
Surrogate: O-TERPHENYL	*103.*				*%*			*103.*	*70-130*			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
Blank (BBK0112-BLK1)					Prepared & Analyzed: 02-Nov-2018							
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L				-			Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L				-			Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L				-			Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L				-			Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L				-			Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L				-			Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L				-			Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L				-			Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L				-			Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L				-			Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L				-			Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L				-			Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L				-			Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L				-			Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L				-			Ua
1,4-Dioxane	ND	40.0		80.0	ug/L				-			Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L				-			Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L				-			Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L				-			Ua
Acetone	ND	7.00		10.0	ug/L				-			Ua
Benzene	ND	0.40		1.00	ug/L				-			Ua
Bromodichloromethane	ND	0.40		0.50	ug/L				-			Ua
Bromoform	ND	0.40		1.00	ug/L				-			Ua
Bromomethane	ND	0.80		1.00	ug/L				-			Ua
Carbon disulfide	ND	1.00		10.0	ug/L				-			Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L				-			Ua
Chlorobenzene	ND	0.40		1.00	ug/L				-			Ua
Chloroethane	ND	0.70		1.00	ug/L				-			Ua

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
Blank (BBK0112-BLK1)					Prepared & Analyzed: 02-Nov-2018							
Chloroform	ND	0.50		0.50	ug/L				-			Ua
Chloromethane	ND	0.95		1.00	ug/L				-			Ua
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L				-			Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L				-			Ua
Cyclohexane	ND	0.50		1.00	ug/L				-			Ua
Dibromochloromethane	ND	0.35		0.50	ug/L				-			Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L				-			Ua
Ethylbenzene	ND	0.40		1.00	ug/L				-			Ua
Isopropylbenzene	ND	0.50		1.00	ug/L				-			Ua
m+p-Xylenes	ND	0.60		2.00	ug/L				-			Ua
Methyl acetate	ND	1.00		4.00	ug/L				-			Ua
Methyl cyclohexane	ND	0.50		1.00	ug/L				-			Ua
Methylene chloride	ND	1.00		4.00	ug/L				-			Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L				-			Ua
o-Xylene	ND	0.40		1.00	ug/L				-			Ua
Styrene	ND	0.40		1.00	ug/L				-			Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L				-			Ua
Toluene	ND	0.50		1.00	ug/L				-			Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L				-			Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L				-			Ua
Trichloroethylene	ND	0.40		1.00	ug/L				-			Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L				-			Ua
Vinyl chloride	ND	0.50		0.50	ug/L				-			Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*58.6*				*ug/L*	*50.0*		*117*	*70-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*53.7*				*ug/L*	*50.0*		*107*	*75-120*			
Surrogate: Dibromofluoromethane (Surr)	*57.7*				*ug/L*	*50.0*		*115*	*70-130*			
Surrogate: Toluene-d8 (Surr)	*50.7*				*ug/L*	*50.0*		*101*	*70-130*			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
Blank (BBK0112-BLK2)					Prepared & Analyzed: 02-Nov-2018							
1,1,1-Trichloroethane	ND	0.60		1.00	ug/L				-			Ua
1,1,2,2-Tetrachloroethane	ND	0.30		0.40	ug/L				-			Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	5.00		10.0	ug/L				-			Ua
1,1,2-Trichloroethane	ND	0.50		1.00	ug/L				-			Ua
1,1-Dichloroethane	ND	0.60		1.00	ug/L				-			Ua
1,1-Dichloroethylene	ND	0.70		1.00	ug/L				-			Ua
1,2,3-Trichlorobenzene	ND	0.70		1.00	ug/L				-			Ua
1,2,4-Trichlorobenzene	ND	0.50		0.90	ug/L				-			Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.60		1.00	ug/L				-			Ua
1,2-Dibromoethane (EDB)	ND	0.40		1.00	ug/L				-			Ua
1,2-Dichlorobenzene	ND	0.40		0.50	ug/L				-			Ua
1,2-Dichloroethane	ND	0.70		1.00	ug/L				-			Ua
1,2-Dichloropropane	ND	0.40		0.50	ug/L				-			Ua
1,3-Dichlorobenzene	ND	0.30		0.90	ug/L				-			Ua
1,4-Dichlorobenzene	ND	0.40		1.00	ug/L				-			Ua
1,4-Dioxane	ND	40.0		80.0	ug/L				-			Ua
2-Butanone (MEK)	ND	3.00		10.0	ug/L				-			Ua
2-Hexanone (MBK)	ND	2.20		5.00	ug/L				-			Ua
4-Methyl-2-pentanone (MIBK)	ND	1.50		5.00	ug/L				-			Ua
Acetone	ND	7.00		10.0	ug/L				-			Ua
Benzene	ND	0.40		1.00	ug/L				-			Ua
Bromodichloromethane	ND	0.40		0.50	ug/L				-			Ua
Bromoform	ND	0.40		1.00	ug/L				-			Ua
Bromomethane	ND	0.80		1.00	ug/L				-			Ua
Carbon disulfide	ND	1.00		10.0	ug/L				-			Ua
Carbon tetrachloride	ND	0.50		1.00	ug/L				-			Ua
Chlorobenzene	ND	0.40		1.00	ug/L				-			Ua
Chloroethane	ND	0.70		1.00	ug/L				-			Ua

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
Blank (BBK0112-BLK2)					Prepared & Analyzed: 02-Nov-2018							
Chloroform	ND	0.50		0.50	ug/L				-			Ua
Chloromethane	ND	0.95		1.00	ug/L				-			Ua
cis-1,2-Dichloroethylene	ND	0.40		1.00	ug/L				-			Ua
cis-1,3-Dichloropropene	ND	0.30		1.00	ug/L				-			Ua
Cyclohexane	ND	0.50		1.00	ug/L				-			Ua
Dibromochloromethane	ND	0.35		0.50	ug/L				-			Ua
Dichlorodifluoromethane	ND	0.95		1.00	ug/L				-			Ua
Ethylbenzene	ND	0.40		1.00	ug/L				-			Ua
Isopropylbenzene	ND	0.50		1.00	ug/L				-			Ua
m+p-Xylenes	ND	0.60		2.00	ug/L				-			Ua
Methyl acetate	9.09	1.00		4.00	ug/L				-			
Methyl cyclohexane	ND	0.50		1.00	ug/L				-			Ua
Methylene chloride	ND	1.00		4.00	ug/L				-			Ua
Methyl-t-butyl ether (MTBE)	ND	0.60		1.00	ug/L				-			Ua
o-Xylene	ND	0.40		1.00	ug/L				-			Ua
Styrene	ND	0.40		1.00	ug/L				-			Ua
Tetrachloroethylene (PCE)	ND	0.40		1.00	ug/L				-			Ua
Toluene	ND	0.50		1.00	ug/L				-			Ua
trans-1,2-Dichloroethylene	ND	0.60		1.00	ug/L				-			Ua
trans-1,3-Dichloropropene	ND	0.30		1.00	ug/L				-			Ua
Trichloroethylene	ND	0.40		1.00	ug/L				-			Ua
Trichlorofluoromethane	ND	0.80		1.00	ug/L				-			Ua
Vinyl chloride	ND	0.50		0.50	ug/L				-			Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*57.6*				*ug/L*	*50.0*		*115*	*70-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*56.6*				*ug/L*	*50.0*		*113*	*75-120*			
Surrogate: Dibromofluoromethane (Surr)	*57.8*				*ug/L*	*50.0*		*116*	*70-130*			
Surrogate: Toluene-d8 (Surr)	*51.7*				*ug/L*	*50.0*		*103*	*70-130*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
LCS (BBK0112-BS1)						Prepared & Analyzed: 02-Nov-2018						
1,1,1-Trichloroethane	57.5				ug/L	50.0		115	65-130			
1,1,2,2-Tetrachloroethane	47.6				ug/L	50.0		95.2	65-130			
1,1,2-Trichloroethane	47.9				ug/L	50.0		95.8	75-125			
1,1-Dichloroethane	60.0				ug/L	50.0		120	70-135			
1,1-Dichloroethylene	56.8				ug/L	50.0		114	70-130			
1,2,3-Trichlorobenzene	46.3				ug/L	50.0		92.6	55-140			
1,2,4-Trichlorobenzene	47.5				ug/L	50.0		95.0	65-135			
1,2-Dibromo-3-chloropropane (DBCP)	46.3				ug/L	50.0		92.5	50-130			
1,2-Dibromoethane (EDB)	45.5				ug/L	50.0		91.0	80-120			
1,2-Dichlorobenzene	47.2				ug/L	50.0		94.4	70-120			
1,2-Dichloroethane	56.0				ug/L	50.0		112	70-130			
1,2-Dichloropropane	52.5				ug/L	50.0		105	75-125			
1,3-Dichlorobenzene	49.2				ug/L	50.0		98.3	75-125			
1,4-Dichlorobenzene	48.0				ug/L	50.0		96.1	75-125			
2-Butanone (MEK)	47.7				ug/L	50.0		95.3	30-150			
2-Hexanone (MBK)	41.6				ug/L	50.0		83.3	55-130			
4-Methyl-2-pentanone (MIBK)	55.0				ug/L	50.0		110	60-135			
Acetone	56.3				ug/L	50.0		113	40-140			
Benzene	53.2				ug/L	50.0		106	80-120			
Bromodichloromethane	53.5				ug/L	50.0		107	75-120			
Bromoform	45.3				ug/L	50.0		90.6	70-130			
Bromomethane	45.5				ug/L	50.0		91.0	30-145			
Carbon disulfide	61.5				ug/L	50.0		123	35-160			
Carbon tetrachloride	51.9				ug/L	50.0		104	65-140			
Chlorobenzene	48.2				ug/L	50.0		96.4	80-120			
Chloroethane	59.3				ug/L	50.0		119	60-135			
Chloroform	54.9				ug/L	50.0		110	65-135			
Chloromethane	54.7				ug/L	50.0		109	40-125			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
LCS (BBK0112-BS1)						Prepared & Analyzed: 02-Nov-2018						
cis-1,2-Dichloroethylene	54.6				ug/L	50.0		109	70-125			
cis-1,3-Dichloropropene	52.6				ug/L	50.0		105	70-130			
Dibromochloromethane	48.6				ug/L	50.0		97.2	60-135			
Dichlorodifluoromethane	43.5				ug/L	50.0		87.1	30-155			
Ethylbenzene	54.2				ug/L	50.0		108	75-125			
Isopropylbenzene	55.5				ug/L	50.0		111	75-125			
m+p-Xylenes	107				ug/L	100		107	75-130			
Methylene chloride	53.2				ug/L	50.0		106	55-140			
Methyl-t-butyl ether (MTBE)	51.0				ug/L	50.0		102	65-125			
o-Xylene	50.5				ug/L	50.0		101	80-120			
Styrene	53.1				ug/L	50.0		106	65-135			
Tetrachloroethylene (PCE)	61.6				ug/L	50.0		123	45-150			
Toluene	45.0				ug/L	50.0		90.0	75-120			
trans-1,2-Dichloroethylene	53.4				ug/L	50.0		107	60-140			
trans-1,3-Dichloropropene	42.9				ug/L	50.0		85.8	55-140			
Trichloroethylene	51.0				ug/L	50.0		102	70-125			
Trichlorofluoromethane	52.6				ug/L	50.0		105	60-145			
Vinyl chloride	57.5				ug/L	50.0		115	50-145			
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*53.1*				*ug/L*	*50.0*		*106*	*70-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*54.3*				*ug/L*	*50.0*		*109*	*75-120*			
Surrogate: Dibromofluoromethane (Surr)	*55.5*				*ug/L*	*50.0*		*111*	*70-130*			
Surrogate: Toluene-d8 (Surr)	*48.8*				*ug/L*	*50.0*		*97.6*	*70-130*			
LCS (BBK0112-BS2)						Prepared & Analyzed: 02-Nov-2018						
1,1,1-Trichloroethane	55.8				ug/L	50.0		112	65-130			
1,1,2,2-Tetrachloroethane	40.9				ug/L	50.0		81.9	65-130			
1,1,2-Trichloroethane	52.5				ug/L	50.0		105	75-125			
1,1-Dichloroethane	59.1				ug/L	50.0		118	70-135			
1,1-Dichloroethylene	54.7				ug/L	50.0		109	70-130			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
LCS (BBK0112-BS2)						Prepared & Analyzed: 02-Nov-2018						
1,2,3-Trichlorobenzene	46.4				ug/L	50.0		92.9	55-140			
1,2,4-Trichlorobenzene	47.4				ug/L	50.0		94.8	65-135			
1,2-Dibromo-3-chloropropane (DBCP)	40.4				ug/L	50.0		80.8	50-130			
1,2-Dibromoethane (EDB)	46.5				ug/L	50.0		92.9	80-120			
1,2-Dichlorobenzene	44.1				ug/L	50.0		88.2	70-120			
1,2-Dichloroethane	55.4				ug/L	50.0		111	70-130			
1,2-Dichloropropane	52.1				ug/L	50.0		104	75-125			
1,3-Dichlorobenzene	47.0				ug/L	50.0		93.9	75-125			
1,4-Dichlorobenzene	46.1				ug/L	50.0		92.2	75-125			
2-Butanone (MEK)	48.8				ug/L	50.0		97.7	30-150			
2-Hexanone (MBK)	48.7				ug/L	50.0		97.5	55-130			
4-Methyl-2-pentanone (MIBK)	53.2				ug/L	50.0		106	60-135			
Acetone	53.4				ug/L	50.0		107	40-140			
Benzene	51.9				ug/L	50.0		104	80-120			
Bromodichloromethane	53.4				ug/L	50.0		107	75-120			
Bromoform	44.3				ug/L	50.0		88.5	70-130			
Bromomethane	45.7				ug/L	50.0		91.5	30-145			
Carbon disulfide	59.8				ug/L	50.0		120	35-160			
Carbon tetrachloride	49.6				ug/L	50.0		99.2	65-140			
Chlorobenzene	46.8				ug/L	50.0		93.6	80-120			
Chloroethane	56.6				ug/L	50.0		113	60-135			
Chloroform	54.4				ug/L	50.0		109	65-135			
Chloromethane	54.2				ug/L	50.0		108	40-125			
cis-1,2-Dichloroethylene	53.9				ug/L	50.0		108	70-125			
cis-1,3-Dichloropropene	51.3				ug/L	50.0		103	70-130			
Dibromochloromethane	49.6				ug/L	50.0		99.1	60-135			
Dichlorodifluoromethane	40.1				ug/L	50.0		80.2	30-155			
Ethylbenzene	51.1				ug/L	50.0		102	75-125			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
LCS (BBK0112-BS2)						Prepared & Analyzed: 02-Nov-2018						
Isopropylbenzene	46.6				ug/L	50.0		93.1	75-125			
m+p-Xylenes	101				ug/L	100		101	75-130			
Methylene chloride	52.7				ug/L	50.0		105	55-140			
Methyl-t-butyl ether (MTBE)	51.6				ug/L	50.0		103	65-125			
o-Xylene	45.1				ug/L	50.0		90.2	80-120			
Styrene	47.7				ug/L	50.0		95.3	65-135			
Tetrachloroethylene (PCE)	63.2				ug/L	50.0		126	45-150			
Toluene	50.9				ug/L	50.0		102	75-120			
trans-1,2-Dichloroethylene	53.3				ug/L	50.0		107	60-140			
trans-1,3-Dichloropropene	50.2				ug/L	50.0		100	55-140			
Trichloroethylene	48.9				ug/L	50.0		97.9	70-125			
Trichlorofluoromethane	48.7				ug/L	50.0		97.4	60-145			
Vinyl chloride	55.5				ug/L	50.0		111	50-145			
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*54.5*				*ug/L*	*50.0*		*109*	*70-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*46.4*				*ug/L*	*50.0*		*92.8*	*75-120*			
Surrogate: Dibromofluoromethane (Surr)	*55.6*				*ug/L*	*50.0*		*111*	*70-130*			
Surrogate: Toluene-d8 (Surr)	*51.8*				*ug/L*	*50.0*		*104*	*70-130*			
Duplicate (BBK0112-DUP1)			**Source: 18K0055-04**			Prepared & Analyzed: 02-Nov-2018						
1,1,1-Trichloroethane	ND	3.00		5.00	ug/L		ND		-		30	Ua
1,1,2,2-Tetrachloroethane	ND	1.50		2.00	ug/L		ND		-		30	Ua
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	25.0		50.0	ug/L		ND		-		30	Ua
1,1,2-Trichloroethane	ND	2.50		5.00	ug/L		ND		-		30	Ua
1,1-Dichloroethane	ND	3.00		5.00	ug/L		ND		-		30	Ua
1,1-Dichloroethylene	ND	3.50		5.00	ug/L		ND		-		30	Ua
1,2,3-Trichlorobenzene	ND	3.50		5.00	ug/L		ND		-		30	Ua
1,2,4-Trichlorobenzene	ND	2.50		4.50	ug/L		ND		-		30	Ua
1,2-Dibromo-3-chloropropane (DBCP)	ND	3.00		5.00	ug/L		ND		-		30	Ua

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3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
Duplicate (BBK0112-DUP1)			**Source: 18K0055-04**			Prepared & Analyzed: 02-Nov-2018						
1,2-Dibromoethane (EDB)	ND	2.00		5.00	ug/L		ND		-		30	Ua
1,2-Dichlorobenzene	ND	2.00		2.50	ug/L		ND		-		30	Ua
1,2-Dichloroethane	ND	3.50		5.00	ug/L		ND		-		30	Ua
1,2-Dichloropropane	ND	2.00		2.50	ug/L		ND		-		30	Ua
1,3-Dichlorobenzene	ND	1.50		4.50	ug/L		ND		-		30	Ua
1,4-Dichlorobenzene	ND	2.00		5.00	ug/L		ND		-		30	Ua
1,4-Dioxane	ND	200		400	ug/L		ND		-		30	Ua
2-Butanone (MEK)	ND	15.0		50.0	ug/L		ND		-		30	Ua
2-Hexanone (MBK)	ND	11.0		25.0	ug/L		ND		-		30	Ua
4-Methyl-2-pentanone (MIBK)	ND	7.50		25.0	ug/L		ND		-		30	Ua
Acetone	153	35.0		50.0	ug/L		122		-	22.8	30	
Benzene	ND	2.00		5.00	ug/L		ND		-		30	Ua
Bromodichloromethane	5.18	2.00		2.50	ug/L		3.88		-	28.7	30	
Bromoform	ND	2.00		5.00	ug/L		ND		-		30	Ua
Bromomethane	ND	4.00		5.00	ug/L		ND		-		30	Ua
Carbon disulfide	ND	5.00		50.0	ug/L		ND		-		30	Ua
Carbon tetrachloride	ND	2.50		5.00	ug/L		ND		-		30	Ua
Chlorobenzene	ND	2.00		5.00	ug/L		ND		-		30	Ua
Chloroethane	ND	3.50		5.00	ug/L		ND		-		30	Ua
Chloroform	52.8	2.50		2.50	ug/L		42.6		-	21.3	30	
Chloromethane	ND	4.75		5.00	ug/L		ND		-		30	Ua
cis-1,2-Dichloroethylene	ND	2.00		5.00	ug/L		ND		-		30	Ua
cis-1,3-Dichloropropene	ND	1.50		5.00	ug/L		ND		-		30	Ua
Cyclohexane	ND	2.50		5.00	ug/L		ND		-		30	Ua
Dibromochloromethane	ND	1.75		2.50	ug/L		ND		-		30	Ua
Dichlorodifluoromethane	ND	4.75		5.00	ug/L		ND		-		30	Ua
Ethylbenzene	ND	2.00		5.00	ug/L		ND		-		30	Ua
Isopropylbenzene	ND	2.50		5.00	ug/L		ND		-		30	Ua

USACE ERDC-EP-C
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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
Duplicate (BBK0112-DUP1)			**Source: 18K0055-04**			Prepared & Analyzed: 02-Nov-2018						
m+p-Xylenes	ND	3.00		10.0	ug/L		ND		-		30	Ua
Methyl acetate	ND	5.00		20.0	ug/L		ND		-		30	Ua
Methyl cyclohexane	ND	2.50		5.00	ug/L		ND		-		30	Ua
Methylene chloride	ND	5.00		20.0	ug/L		ND		-		30	Ua
Methyl-t-butyl ether (MTBE)	ND	3.00		5.00	ug/L		ND		-		30	Ua
o-Xylene	ND	2.00		5.00	ug/L		ND		-		30	Ua
Styrene	ND	2.00		5.00	ug/L		ND		-		30	Ua
Tetrachloroethylene (PCE)	ND	2.00		5.00	ug/L		ND		-		30	Ua
Toluene	ND	2.50		5.00	ug/L		ND		-		30	Ua
trans-1,2-Dichloroethylene	ND	3.00		5.00	ug/L		ND		-		30	Ua
trans-1,3-Dichloropropene	ND	1.50		5.00	ug/L		ND		-		30	Ua
Trichloroethylene	ND	2.00		5.00	ug/L		ND		-		30	Ua
Trichlorofluoromethane	ND	4.00		5.00	ug/L		ND		-		30	Ua
Vinyl chloride	ND	2.50		2.50	ug/L		ND		-		30	Ua
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*286*				*ug/L*	*250*		*114*	*70-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*257*				*ug/L*	*250*		*103*	*75-120*			
Surrogate: Dibromofluoromethane (Surr)	*279*				*ug/L*	*250*		*111*	*70-130*			
Surrogate: Toluene-d8 (Surr)	*213*				*ug/L*	*250*		*85.0*	*70-130*			
Matrix Spike (BBK0112-MS1)			**Source: 18J0403-12**			Prepared & Analyzed: 02-Nov-2018						
1,1,1-Trichloroethane	49.5				ug/L	50.0	0.00	99.0	65-130			
1,1,2,2-Tetrachloroethane	44.8				ug/L	50.0	0.00	89.5	65-130			
1,1,2-Trichloroethane	47.3				ug/L	50.0	0.00	94.6	75-125			
1,1-Dichloroethane	52.3				ug/L	50.0	0.00	105	70-135			
1,1-Dichloroethylene	48.5				ug/L	50.0	0.00	97.0	70-130			
1,2,3-Trichlorobenzene	41.3				ug/L	50.0	0.00	82.6	55-140			
1,2,4-Trichlorobenzene	42.2				ug/L	50.0	0.00	84.5	65-135			
1,2-Dibromo-3-chloropropane (DBCP)	45.2				ug/L	50.0	0.00	90.4	50-130			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
Matrix Spike (BBK0112-MS1)		**Source: 18J0403-12**				Prepared & Analyzed: 02-Nov-2018						
1,2-Dibromoethane (EDB)	44.5				ug/L	50.0	0.00	89.0	80-120			
1,2-Dichlorobenzene	44.1				ug/L	50.0	0.00	88.1	70-120			
1,2-Dichloroethane	50.3				ug/L	50.0	0.00	101	70-130			
1,2-Dichloropropane	46.7				ug/L	50.0	0.00	93.4	75-125			
1,3-Dichlorobenzene	45.4				ug/L	50.0	0.00	90.8	75-125			
1,4-Dichlorobenzene	43.7				ug/L	50.0	0.00	87.3	75-125			
2-Butanone (MEK)	45.4				ug/L	50.0	0.00	90.8	30-150			
2-Hexanone (MBK)	50.2				ug/L	50.0	0.00	100	55-130			
4-Methyl-2-pentanone (MIBK)	53.0				ug/L	50.0	0.00	106	60-135			
Acetone	79.4				ug/L	50.0	27.4	104	40-140			
Benzene	46.5				ug/L	50.0	0.00	93.1	80-120			
Bromodichloromethane	47.8				ug/L	50.0	0.00	95.6	75-120			
Bromoform	41.9				ug/L	50.0	0.00	83.7	70-130			
Bromomethane	40.1				ug/L	50.0	0.00	80.1	30-145			
Carbon disulfide	52.5				ug/L	50.0	0.00	105	35-160			
Carbon tetrachloride	45.3				ug/L	50.0	0.00	90.6	65-140			
Chlorobenzene	42.7				ug/L	50.0	0.00	85.4	80-120			
Chloroethane	52.0				ug/L	50.0	0.00	104	60-135			
Chloroform	48.5				ug/L	50.0	0.18	96.7	65-135			
Chloromethane	49.6				ug/L	50.0	3.07	93.1	40-125			
cis-1,2-Dichloroethylene	47.2				ug/L	50.0	0.00	94.5	70-125			
cis-1,3-Dichloropropene	44.9				ug/L	50.0	0.00	89.8	70-130			
Dibromochloromethane	44.7				ug/L	50.0	0.00	89.4	60-135			
Dichlorodifluoromethane	35.2				ug/L	50.0	0.00	70.4	30-155			
Ethylbenzene	45.3				ug/L	50.0	0.00	90.5	75-125			
Isopropylbenzene	46.2				ug/L	50.0	0.00	92.4	75-125			
m+p-Xylenes	89.3				ug/L	100	0.00	89.3	75-130			
Methylene chloride	52.7				ug/L	50.0	6.15	93.1	55-140			

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Volatile Organic Compounds by GCMS - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0112 - SW5030B												
Matrix Spike (BBK0112-MS1)		**Source: 18J0403-12**				Prepared & Analyzed: 02-Nov-2018						
Methyl-t-butyl ether (MTBE)	46.2				ug/L	50.0	0.00	92.4	65-125			
o-Xylene	42.6				ug/L	50.0	0.00	85.1	80-120			
Styrene	44.0				ug/L	50.0	0.00	88.0	65-135			
Tetrachloroethylene (PCE)	58.1				ug/L	50.0	0.00	116	45-150			
Toluene	44.2				ug/L	50.0	0.00	88.3	75-120			
trans-1,2-Dichloroethylene	45.9				ug/L	50.0	0.00	91.8	60-140			
trans-1,3-Dichloropropene	44.3				ug/L	50.0	0.00	88.6	55-140			
Trichloroethylene	43.9				ug/L	50.0	0.00	87.9	70-125			
Trichlorofluoromethane	43.8				ug/L	50.0	0.00	87.5	60-145			
Vinyl chloride	51.4				ug/L	50.0	0.00	103	50-145			
Surrogate: 1,2-Dichloroethane-d4 (Surr)	*56.5*				*ug/L*	*50.0*		*113*	*70-120*			
Surrogate: 4-Bromofluorobenzene (Surr)	*50.2*				*ug/L*	*50.0*		*100*	*75-120*			
Surrogate: Dibromofluoromethane (Surr)	*55.5*				*ug/L*	*50.0*		*111*	*70-130*			
Surrogate: Toluene-d8 (Surr)	*51.0*				*ug/L*	*50.0*		*102*	*70-130*			

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Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

Wet Chemistry Analysis - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0178 - No Prep Wet Chem												
Blank (BBK0178-BLK1)						Prepared & Analyzed: 06-Nov-2018						
Cyanide	ND	10		10	ug/L				-			Ua
LCS (BBK0178-BS1)						Prepared & Analyzed: 06-Nov-2018						
Cyanide	240				ug/L	250		97.7	80-120			
LCS Dup (BBK0178-BSD1)						Prepared & Analyzed: 06-Nov-2018						
Cyanide	250				ug/L	250		101	80-120	3.54	20	
Matrix Spike (BBK0178-MS1)		**Source: 18J1232-01**				Prepared & Analyzed: 06-Nov-2018						
Cyanide	260	10		10	ug/L	250	ND	103	80-120			
Matrix Spike (BBK0178-MS2)		**Source: 18J0403-10**				Prepared & Analyzed: 06-Nov-2018						
Cyanide	240	10		10	ug/L	250	ND	97.0	80-120			
Matrix Spike Dup (BBK0178-MSD1)		**Source: 18J1232-01**				Prepared & Analyzed: 06-Nov-2018						
Cyanide	280	10		10	ug/L	250	ND	110	80-120	6.26	20	
Matrix Spike Dup (BBK0178-MSD2)		**Source: 18J0403-10**				Prepared & Analyzed: 06-Nov-2018						
Cyanide	270	10		10	ug/L	250	ND	109	80-120	11.5	20	
Batch BBK0283 - No Prep Wet Chem												
Blank (BBK0283-BLK1)						Prepared & Analyzed: 08-Nov-2018						
Cyanide	ND	10		10	ug/L				-			Ua
LCS (BBK0283-BS1)						Prepared & Analyzed: 08-Nov-2018						
Cyanide	230				ug/L	250		93.7	80-120			

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Wet Chemistry Analysis - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BBK0283 - No Prep Wet Chem												
LCS Dup (BBK0283-BSD1)						Prepared & Analyzed: 08-Nov-2018						
Cyanide	240				ug/L	250		96.4	80-120	2.82	20	
Matrix Spike (BBK0283-MS1)		**Source: 18J0403-11**				Prepared & Analyzed: 08-Nov-2018						
Cyanide	220	10		10	ug/L	250	ND	87.8	80-120			
Matrix Spike (BBK0283-MS2)		**Source: 18J0403-12**				Prepared & Analyzed: 08-Nov-2018						
Cyanide	210	10		10	ug/L	250	ND	83.3	80-120			
Matrix Spike Dup (BBK0283-MSD1)		**Source: 18J0403-11**				Prepared & Analyzed: 08-Nov-2018						
Cyanide	240	10		10	ug/L	250	ND	94.7	80-120	7.54	20	
Matrix Spike Dup (BBK0283-MSD2)		**Source: 18J0403-12**				Prepared & Analyzed: 08-Nov-2018						
Cyanide	210	10		10	ug/L	250	ND	85.6	80-120	2.70	20	

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PAHs by GC/MS SIM - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1175786 - EPA 3510C												
BLK (WG1175786-1)						Prepared: 04-Nov-2018 Analyzed: 20-Nov-2018						
Acenaphthene	ND	0.00161		0.01	ug/l				-			Ub
Acenaphthylene	ND	0.00177		0.01	ug/l				-			Ub
Anthracene	ND	0.00194		0.01	ug/l				-			Ub
Benz(a)anthracene	ND	0.00173		0.01	ug/l				-			Ub
Benzo(a)pyrene	ND	0.00084		0.01	ug/l				-			Ub
Benzo(b)fluoranthene	ND	0.00148		0.01	ug/l				-			Ub
Benzo(e)pyrene	ND	0.00127		0.01	ug/l				-			Ub
Benzo(g,h,i)perylene	ND	0.00131		0.01	ug/l				-			Ub
Benzo(k)fluoranthene	ND	0.00117		0.01	ug/l				-			Ub
Chrysene	ND	0.000936		0.01	ug/l				-			Ub
Dibenz(a,h)anthracene	ND	0.000685		0.01	ug/l				-			Ub
Fluoranthene	ND	0.00149		0.01	ug/l				-			Ub
Fluorene	ND	0.00173		0.01	ug/l				-			Ub
Indeno(1,2,3-cd)pyrene	0.00552	0.000533		0.01	ug/l				-			Jb
Naphthalene	ND	0.00177		0.01	ug/l				-			Ub
Phenanthrene	ND	0.00189		0.01	ug/l				-			Ub
Pyrene	ND	0.00152		0.01	ug/l				-			Ub
Surrogate: 2-Methylnaphthalene-d10	*0.362*				*ug/l*			*72*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*0.508*				*ug/l*			*102*	*30-130*			
Surrogate: Pyrene-d10	*0.467*				*ug/l*			*93*	*30-130*			
LCS (WG1175786-2)						Prepared: 04-Nov-2018 Analyzed: 20-Nov-2018						
Acenaphthene	0.359	0.00161		0.01	ug/l	0.5		72	40-140		30	
Acenaphthylene	0.378	0.00177		0.01	ug/l	0.5		76	40-140		30	
Anthracene	0.442	0.00194		0.01	ug/l	0.5		88	40-140		30	
Benz(a)anthracene	0.466	0.00173		0.01	ug/l	0.5		93	40-140		30	
Benzo(a)pyrene	0.467	0.00084		0.01	ug/l	0.5		93	40-140		30	
Benzo(b)fluoranthene	0.445	0.00148		0.01	ug/l	0.5		89	40-140		30	
Benzo(e)pyrene	0.475	0.00127		0.01	ug/l	0.5		95	40-140		30	

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Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1175786 - EPA 3510C												
LCS (WG1175786-2)						Prepared: 04-Nov-2018 Analyzed: 20-Nov-2018						
Benzo(g,h,i)perylene	0.451	0.00131		0.01	ug/l	0.5		90	40-140		30	
Benzo(k)fluoranthene	0.468	0.00117		0.01	ug/l	0.5		94	40-140		30	
Chrysene	0.431	0.000936		0.01	ug/l	0.5		86	40-140		30	
Dibenz(a,h)anthracene	0.468	0.000685		0.01	ug/l	0.5		94	40-140		30	
Fluoranthene	0.453	0.00149		0.01	ug/l	0.5		91	40-140		30	
Fluorene	0.386	0.00173		0.01	ug/l	0.5		77	40-140		30	
Indeno(1,2,3-cd)pyrene	0.461	0.000533		0.01	ug/l	0.5		92	40-140		30	
Naphthalene	0.346	0.00177		0.01	ug/l	0.5		69	40-140		30	
Phenanthrene	0.387	0.00189		0.01	ug/l	0.5		77	40-140		30	
Pyrene	0.392	0.00152		0.01	ug/l	0.5		78	40-140		30	
Surrogate: 2-Methylnaphthalene-d10	*0.349*				*ug/l*			*70*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*0.424*				*ug/l*			*85*	*30-130*			
Surrogate: Pyrene-d10	*0.413*				*ug/l*			*83*	*30-130*			
LCD (WG1175786-3)						Prepared: 04-Nov-2018 Analyzed: 20-Nov-2018						
Acenaphthene	0.334	0.00161		0.01	ug/l	0.5		67	40-140	7	30	
Acenaphthylene	0.349	0.00177		0.01	ug/l	0.5		70	40-140	8	30	
Anthracene	0.424	0.00194		0.01	ug/l	0.5		85	40-140	3	30	
Benz(a)anthracene	0.459	0.00173		0.01	ug/l	0.5		92	40-140	1	30	
Benzo(a)pyrene	0.462	0.00084		0.01	ug/l	0.5		92	40-140	1	30	
Benzo(b)fluoranthene	0.439	0.00148		0.01	ug/l	0.5		88	40-140	1	30	
Benzo(e)pyrene	0.476	0.00127		0.01	ug/l	0.5		95	40-140	0	30	
Benzo(g,h,i)perylene	0.448	0.00131		0.01	ug/l	0.5		90	40-140	0	30	
Benzo(k)fluoranthene	0.474	0.00117		0.01	ug/l	0.5		95	40-140	1	30	
Chrysene	0.43	0.000936		0.01	ug/l	0.5		86	40-140	0	30	
Dibenz(a,h)anthracene	0.463	0.000685		0.01	ug/l	0.5		93	40-140	1	30	
Fluoranthene	0.439	0.00149		0.01	ug/l	0.5		88	40-140	3	30	
Fluorene	0.362	0.00173		0.01	ug/l	0.5		72	40-140	7	30	
Indeno(1,2,3-cd)pyrene	0.453	0.000533		0.01	ug/l	0.5		91	40-140	1	30	

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PAHs by GC/MS SIM - Quality Control

Alpha

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1175786 - EPA 3510C												
LCD (WG1175786-3)						Prepared: 04-Nov-2018 Analyzed: 20-Nov-2018						
Naphthalene	0.319	0.00177		0.01	ug/l	0.5		64	40-140	8	30	
Phenanthrene	0.37	0.00189		0.01	ug/l	0.5		74	40-140	4	30	
Pyrene	0.388	0.00152		0.01	ug/l	0.5		78	40-140	0	30	
Surrogate: 2-Methylnaphthalene-d10	*0.332*				*ug/l*			*66*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*0.425*				*ug/l*			*85*	*30-130*			
Surrogate: Pyrene-d10	*0.408*				*ug/l*			*82*	*30-130*			
MS (WG1175786-4)			**Source: 18J0403-12**			Prepared: 04-Nov-2018 Analyzed: 21-Nov-2018						
Acenaphthene	0.352	0.00644		0.04	ug/l	0.5	0.173	36	40-140		30	N
Acenaphthylene	0.274	0.00708		0.04	ug/l	0.5	0.00564	55	40-140		30	
Anthracene	0.445	0.00776		0.04	ug/l	0.5	0.057	78	40-140		30	
Benz(a)anthracene	0.498	0.00692		0.04	ug/l	0.5	0.00655	100	40-140		30	
Benzo(a)pyrene	0.447	0.00336		0.04	ug/l	0.5	ND	89	40-140		30	
Benzo(b)fluoranthene	0.429	0.00592		0.04	ug/l	0.5	ND	86	40-140		30	
Benzo(e)pyrene	0.475	0.00508		0.04	ug/l	0.5	ND	95	40-140		30	
Benzo(g,h,i)perylene	0.447	0.00524		0.04	ug/l	0.5	ND	89	40-140		30	
Benzo(k)fluoranthene	0.446	0.00468		0.04	ug/l	0.5	ND	89	40-140		30	
Chrysene	0.42	0.00374		0.04	ug/l	0.5	0.00666	84	40-140		30	
Dibenz(a,h)anthracene	0.462	0.00274		0.04	ug/l	0.5	ND	92	40-140		30	
Fluoranthene	0.515	0.00596		0.04	ug/l	0.5	0.103	82	40-140		30	
Fluorene	0.378	0.00692		0.04	ug/l	0.5	0.117	52	40-140		30	
Indeno(1,2,3-cd)pyrene	0.484	0.00213		0.04	ug/l	0.5	0.0055	97	40-140		30	
Naphthalene	0.209	0.00708		0.04	ug/l	0.5	0.0106	40	40-140		30	
Phenanthrene	0.41	0.00756		0.04	ug/l	0.5	0.144	53	40-140		30	
Pyrene	0.449	0.00608		0.04	ug/l	0.5	0.0743	75	40-140		30	
Surrogate: 2-Methylnaphthalene-d10	*0.278*				*ug/l*			*56*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*0.431*				*ug/l*			*86*	*30-130*			
Surrogate: Pyrene-d10	*0.434*				*ug/l*			*87*	*30-130*			

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Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch WG1175786 - EPA 3510C												
MSD (WG1175786-5)						Prepared: 04-Nov-2018 Analyzed: 21-Nov-2018						
Acenaphthene	0.338	0.00537		0.0333	ug/l	0.5	0.173	40	40-140	4	30	
Acenaphthylene	0.258	0.0059		0.0333	ug/l	0.5	0.00564	62	40-140	6	30	
Anthracene	0.385	0.00647		0.0333	ug/l	0.5	0.057	79	40-140	14	30	
Benz(a)anthracene	0.425	0.00577		0.0333	ug/l	0.5	0.00655	102	40-140	16	30	
Benzo(a)pyrene	0.388	0.0028		0.0333	ug/l	0.5	ND	93	40-140	14	30	
Benzo(b)fluoranthene	0.366	0.00493		0.0333	ug/l	0.5	ND	88	40-140	16	30	
Benzo(e)pyrene	0.41	0.00423		0.0333	ug/l	0.5	ND	98	40-140	15	30	
Benzo(g,h,i)perylene	0.381	0.00437		0.0333	ug/l	0.5	ND	91	40-140	16	30	
Benzo(k)fluoranthene	0.396	0.0039		0.0333	ug/l	0.5	ND	95	40-140	12	30	
Chrysene	0.373	0.00312		0.0333	ug/l	0.5	0.00666	90	40-140	12	30	
Dibenz(a,h)anthracene	0.392	0.00228		0.0333	ug/l	0.5	ND	94	40-140	16	30	
Fluoranthene	0.444	0.00497		0.0333	ug/l	0.5	0.103	82	40-140	15	30	
Fluorene	0.344	0.00577		0.0333	ug/l	0.5	0.117	54	40-140	9	30	
Indeno(1,2,3-cd)pyrene	0.381	0.00178		0.0333	ug/l	0.5	0.0055	91	40-140	24	30	
Naphthalene	0.206	0.0059		0.0333	ug/l	0.5	0.0106	47	40-140	1	30	
Phenanthrene	0.36	0.0063		0.0333	ug/l	0.5	0.144	52	40-140	13	30	
Pyrene	0.386	0.00507		0.0333	ug/l	0.5	0.0743	75	40-140	15	30	
Surrogate: 2-Methylnaphthalene-d10	*0.222*				*ug/l*			*53*	*30-130*			
Surrogate: Benzo(b)fluoranthene-d12	*0.367*				*ug/l*			*88*	*30-130*			
Surrogate: Pyrene-d10	*0.36*				*ug/l*			*86*	*30-130*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5841831 - NA												
Blank (5841831-BLK)					Prepared: 14-Nov-2018 Analyzed: 17-Nov-2018							
1,2,3,4,6,7,8-Hepta CDD	ND	1.52		50	pg/L				-			Ud
1,2,3,4,6,7,8-Hepta CDF	ND	1.16		50	pg/L				-			Ud
1,2,3,4,7,8,9-Hepta CDF	ND	1.15		50	pg/L				-			Ud
1,2,3,4,7,8-Hexa CDD	ND	1.28		50	pg/L				-			Ud
1,2,3,4,7,8-Hexa CDF	ND	1.14		50	pg/L				-			Ud
1,2,3,6,7,8-Hexa CDD	ND	1.3		50	pg/L				-			Ud
1,2,3,6,7,8-Hexa CDF	ND	1.22		50	pg/L				-			Ud
1,2,3,7,8,9-Hexa CDD	ND	1.31		50	pg/L				-			Ud
1,2,3,7,8,9-Hexa CDF	ND	1.18		50	pg/L				-			Ud
1,2,3,7,8-Penta CDD	ND	1.37		50	pg/L				-			Ud
1,2,3,7,8-Penta CDF	ND	1.08		50	pg/L				-			Ud
2,3,4,6,7,8-Hexa CDF	ND	1.1		50	pg/L				-			Ud
2,3,4,7,8-Penta CDF	ND	0.982		50	pg/L				-			Ud
2,3,7,8-Tetra CDD	ND	1.26		10	pg/L				-			Ud
2,3,7,8-Tetra CDF	ND	0.632		10	pg/L				-			Ud
Octa CDD	ND	2.9		100	pg/L				-			Ud
Octa CDF	ND	2.24		100	pg/L				-			Ud
Total Hepta CDD	ND	1.52		50	pg/L				-			Ud
Total Hepta CDF	ND	1.16		50	pg/L				-			Ud
Total Hexa CDD	ND	1.31		50	pg/L				-			Ud
Total Hexa CDF	ND	1.16		50	pg/L				-			Ud
Total Penta CDD	ND	1.37		50	pg/L				-			Ud
Total Penta CDF	ND	1.03		50	pg/L				-			Ud
Total Tetra CDD	ND	1.26		10	pg/L				-			Ud
Total Tetra CDF	ND	0.632		10	pg/L				-			Ud
Surrogate: 37CL4 2378 Tetra CDD	*1380*				*pg/L*	*2000*		*69*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1520*				*pg/L*	*2000*		*76*	*23-140*			

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5841831 - NA												
Blank (5841831-BLK)						Prepared: 14-Nov-2018 Analyzed: 17-Nov-2018						
Surrogate: C13-1234678 HeptaCDF	*1540*				*pg/L*	*2000*		*77*	*28-143*			
Surrogate: C13-123478 HexaCDD	*1640*				*pg/L*	*2000*		*82*	*32-141*			
Surrogate: C13-123478 HexaCDF	*1560*				*pg/L*	*2000*		*78*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1440*				*pg/L*	*2000*		*72*	*28-143*			
Surrogate: C13-123678 HexaCDD	*1800*				*pg/L*	*2000*		*90*	*28-130*			
Surrogate: C13-123678 HexaCDF	*1720*				*pg/L*	*2000*		*86*	*26-123*			
Surrogate: C13-12378 PentaCDD	*1560*				*pg/L*	*2000*		*78*	*25-181*			
Surrogate: C13-12378 PentaCDF	*1300*				*pg/L*	*2000*		*65*	*24-185*			
Surrogate: C13-123789 HexaCDF	*1540*				*pg/L*	*2000*		*77*	*28-136*			
Surrogate: C13-234678 HexaCDF	*1560*				*pg/L*	*2000*		*78*	*29-147*			
Surrogate: C13-23478 PentaCDF	*1580*				*pg/L*	*2000*		*79*	*21-178*			
Surrogate: C13-2378 TetraCDD	*1360*				*pg/L*	*2000*		*68*	*24-164*			
Surrogate: C13-2378 TetraCDF	*1580*				*pg/L*	*2000*		*79*	*24-169*			
Surrogate: C13-OCDD	*3040*				*pg/L*	*4000*		*76*	*17-157*			
LCS (5841831-LCS)						Prepared: 14-Nov-2018 Analyzed: 18-Nov-2018						
1,2,3,4,6,7,8-Hepta CDD	95	1.41		50	pg/L	100		95	70-140			
1,2,3,4,6,7,8-Hepta CDF	94	1.08		50	pg/L	100		94	82-122			
1,2,3,4,7,8,9-Hepta CDF	97	1.07		50	pg/L	100		97	78-138			
1,2,3,4,7,8-Hexa CDD	87	0.923		50	pg/L	100		87	70-164			
1,2,3,4,7,8-Hexa CDF	98	1.22		50	pg/L	100		98	72-134			
1,2,3,6,7,8-Hexa CDD	96	0.94		50	pg/L	100		96	76-134			
1,2,3,6,7,8-Hexa CDF	95	1.31		50	pg/L	100		95	84-130			
1,2,3,7,8,9-Hexa CDD	98	0.947		50	pg/L	100		98	64-162			
1,2,3,7,8,9-Hexa CDF	100	1.27		50	pg/L	100		100	78-130			
1,2,3,7,8-Penta CDD	99	1.46		50	pg/L	100		99	25-181			

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ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5841831 - NA												
LCS (5841831-LCS)						Prepared: 14-Nov-2018 Analyzed: 18-Nov-2018						
1,2,3,7,8-Penta CDF	97	1.2		50	pg/L	100		97	80-134			
2,3,4,6,7,8-Hexa CDF	99	1.18		50	pg/L	100		99	70-156			
2,3,4,7,8-Penta CDF	91	1.09		50	pg/L	100		91	68-160			
2,3,7,8-Tetra CDD	88	1.28		10	pg/L	100		88	67-158			
2,3,7,8-Tetra CDF	87	1.22		10	pg/L	100		87	75-158			
Octa CDD	97	1.95		100	pg/L	100		97	78-144			
Octa CDF	96	1.31		100	pg/L	100		96	63-170			
Surrogate: 37CL4 2378 Tetra CDD	*1280*				*pg/L*	*2000*		*64*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1580*				*pg/L*	*2000*		*79*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*1620*				*pg/L*	*2000*		*81*	*28-143*			
Surrogate: C13-123478 HexaCDD	*1640*				*pg/L*	*2000*		*82*	*32-141*			
Surrogate: C13-123478 HexaCDF	*1660*				*pg/L*	*2000*		*83*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1560*				*pg/L*	*2000*		*78*	*28-143*			
Surrogate: C13-123678 HexaCDD	*2020*				*pg/L*	*2000*		*101*	*28-130*			
Surrogate: C13-123678 HexaCDF	*1840*				*pg/L*	*2000*		*92*	*26-123*			
Surrogate: C13-12378 PentaCDD	*1540*				*pg/L*	*2000*		*77*	*25-181*			
Surrogate: C13-12378 PentaCDF	*1280*				*pg/L*	*2000*		*64*	*24-185*			
Surrogate: C13-123789 HexaCDF	*1600*				*pg/L*	*2000*		*80*	*28-136*			
Surrogate: C13-234678 HexaCDF	*1680*				*pg/L*	*2000*		*84*	*29-147*			
Surrogate: C13-23478 PentaCDF	*1600*				*pg/L*	*2000*		*80*	*21-178*			
Surrogate: C13-2378 TetraCDD	*1380*				*pg/L*	*2000*		*69*	*24-164*			
Surrogate: C13-2378 TetraCDF	*1560*				*pg/L*	*2000*		*78*	*24-169*			
Surrogate: C13-OCDD	*3320*				*pg/L*	*4000*		*83*	*17-157*			
Matrix Spike (5841831-MS)			**Source: 18J0403-12**			Prepared: 14-Nov-2018 Analyzed: 18-Nov-2018						
1,2,3,4,6,7,8-Hepta CDD	99.1	1.58		50	pg/L	100	1.14	98	70-140			

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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5841831 - NA												
Matrix Spike (5841831-MS)		**Source: 18J0403-12**				Prepared: 14-Nov-2018 Analyzed: 18-Nov-2018						
1,2,3,4,6,7,8-Hepta CDF	94.4	1.29		50	pg/L	100	1.36	93	82-122			
1,2,3,4,7,8,9-Hepta CDF	96.4	1.28		50	pg/L	100	1.35	95	78-138			
1,2,3,4,7,8-Hexa CDD	88.1	1.29		50	pg/L	100	1.11	87	70-164			
1,2,3,4,7,8-Hexa CDF	95.7	1.07		50	pg/L	100	0.732	95	72-134			
1,2,3,6,7,8-Hexa CDD	105	1.31		50	pg/L	100	1.13	104	76-134			
1,2,3,6,7,8-Hexa CDF	106	1.15		50	pg/L	100	0.786	105	84-130			
1,2,3,7,8,9-Hexa CDD	96.1	1.32		50	pg/L	100	1.14	95	64-162			
1,2,3,7,8,9-Hexa CDF	95.8	1.11		50	pg/L	100	0.76	95	78-130			
1,2,3,7,8-Penta CDD	100	1.31		50	pg/L	100	1.04	99	25-181			
1,2,3,7,8-Penta CDF	100	1.37		50	pg/L	100	1.19	99	80-134			
2,3,4,6,7,8-Hexa CDF	104	1.03		50	pg/L	100	0.707	103	70-156			
2,3,4,7,8-Penta CDF	92.1	1.25		50	pg/L	100	1.08	91	68-160			
2,3,7,8-Tetra CDD	96.5	1.19		10	pg/L	100	2.54	94	67-158			
2,3,7,8-Tetra CDF	97.7	1.19		10	pg/L	100	5.74	92	75-158			
Octa CDD	99	2.02		100	pg/L	100	4.16	95	78-144			
Octa CDF	96	1.88		100	pg/L	100	1.35	95	63-170			
Surrogate: 37CL4 2378 Tetra CDD	*1460*				*pg/L*	*2000*		*73*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1460*				*pg/L*	*2000*		*73*	*23-140*			
Surrogate: C13-1234678 HeptaCDF	*1540*				*pg/L*	*2000*		*77*	*28-143*			
Surrogate: C13-123478 HexaCDD	*1700*				*pg/L*	*2000*		*85*	*32-141*			
Surrogate: C13-123478 HexaCDF	*1660*				*pg/L*	*2000*		*83*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1480*				*pg/L*	*2000*		*74*	*28-143*			
Surrogate: C13-123678 HexaCDD	*1900*				*pg/L*	*2000*		*95*	*28-130*			
Surrogate: C13-123678 HexaCDF	*1740*				*pg/L*	*2000*		*87*	*26-123*			
Surrogate: C13-12378 PentaCDD	*1680*				*pg/L*	*2000*		*84*	*25-181*			
Surrogate: C13-12378 PentaCDF	*1320*				*pg/L*	*2000*		*66*	*24-185*			

USACE ERDC-EP-C
3909 Halls Ferry Road
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ERDC -- Vicksburg (EL)
ERDC, 3909 Halls Ferry Road
Vicksburg MS, 39180

Project: Houston Ship Channel-North of Morgan's Point

Project Manager: Cheryl Montgomery

Reported:
23-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5841831 - NA												
Matrix Spike (5841831-MS)		**Source: 18J0403-12**				Prepared: 14-Nov-2018 Analyzed: 18-Nov-2018						
Surrogate: C13-123789 HexaCDF	*1640*				*pg/L*	*2000*		*82*	*28-136*			
Surrogate: C13-234678 HexaCDF	*1580*				*pg/L*	*2000*		*79*	*29-147*			
Surrogate: C13-23478 PentaCDF	*1680*				*pg/L*	*2000*		*84*	*21-178*			
Surrogate: C13-2378 TetraCDD	*1460*				*pg/L*	*2000*		*73*	*24-164*			
Surrogate: C13-2378 TetraCDF	*1660*				*pg/L*	*2000*		*83*	*24-169*			
Surrogate: C13-OCDD	*3200*				*pg/L*	*4000*		*80*	*17-157*			
Matrix Spike Dup (5841831-MS Dup)		**Source: 18J0403-12**				Prepared: 14-Nov-2018 Analyzed: 18-Nov-2018						
1,2,3,4,6,7,8-Hepta CDD	98.1	1.49		50	pg/L	100	1.14	97	70-140	1.0	25	
1,2,3,4,6,7,8-Hepta CDF	92.4	1.13		50	pg/L	100	1.36	91	82-122	2.2	25	
1,2,3,4,7,8,9-Hepta CDF	96.4	1.12		50	pg/L	100	1.35	95	78-138	0	25	
1,2,3,4,7,8-Hexa CDD	88.1	1.01		50	pg/L	100	1.11	87	70-164	0	25	
1,2,3,4,7,8-Hexa CDF	99.7	1.16		50	pg/L	100	0.732	99	72-134	4.1	25	
1,2,3,6,7,8-Hexa CDD	105	1.03		50	pg/L	100	1.13	104	76-134	0	25	
1,2,3,6,7,8-Hexa CDF	99.8	1.25		50	pg/L	100	0.786	99	84-130	5.9	25	
1,2,3,7,8,9-Hexa CDD	96.1	1.04		50	pg/L	100	1.14	95	64-162	0	25	
1,2,3,7,8,9-Hexa CDF	98.8	1.21		50	pg/L	100	0.76	98	78-130	3.1	25	
1,2,3,7,8-Penta CDD	106	1.33		50	pg/L	100	1.04	105	25-181	5.9	25	
1,2,3,7,8-Penta CDF	98.2	1.23		50	pg/L	100	1.19	97	80-134	2.0	25	
2,3,4,6,7,8-Hexa CDF	98.7	1.13		50	pg/L	100	0.707	98	70-156	5.0	25	
2,3,4,7,8-Penta CDF	94.1	1.12		50	pg/L	100	1.08	93	68-160	2.2	25	
2,3,7,8-Tetra CDD	92.5	1.07		10	pg/L	100	2.54	90	67-158	4.3	25	
2,3,7,8-Tetra CDF	93.7	1.27		10	pg/L	100	5.74	88	75-158	4.4	25	
Octa CDD	100	1.65		100	pg/L	100	4.16	96	78-144	0	25	
Octa CDF	97	1.32		100	pg/L	100	1.35	96	63-170	0	25	
Surrogate: 37CL4 2378 Tetra CDD	*1440*				*pg/L*	*2000*		*72*	*35-197*			
Surrogate: C13-1234678 HeptaCDD	*1460*				*pg/L*	*2000*		*73*	*23-140*			

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Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

EPA 1613B m - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5841831 - NA												
Matrix Spike Dup (5841831-MS Dup)		**Source: 18J0403-12**				Prepared: 14-Nov-2018 Analyzed: 18-Nov-2018						
Surrogate: C13-1234678 HeptaCDF	*1560*				*pg/L*	*2000*		*78*	*28-143*			
Surrogate: C13-123478 HexaCDD	*1640*				*pg/L*	*2000*		*82*	*32-141*			
Surrogate: C13-123478 HexaCDF	*1620*				*pg/L*	*2000*		*81*	*26-152*			
Surrogate: C13-1234789 HeptaCDF	*1500*				*pg/L*	*2000*		*75*	*28-143*			
Surrogate: C13-123678 HexaCDD	*1940*				*pg/L*	*2000*		*97*	*28-130*			
Surrogate: C13-123678 HexaCDF	*1800*				*pg/L*	*2000*		*90*	*26-123*			
Surrogate: C13-12378 PentaCDD	*1560*				*pg/L*	*2000*		*78*	*25-181*			
Surrogate: C13-12378 PentaCDF	*1360*				*pg/L*	*2000*		*68*	*24-185*			
Surrogate: C13-123789 HexaCDF	*1620*				*pg/L*	*2000*		*81*	*28-136*			
Surrogate: C13-234678 HexaCDF	*1600*				*pg/L*	*2000*		*80*	*29-147*			
Surrogate: C13-23478 PentaCDF	*1620*				*pg/L*	*2000*		*81*	*21-178*			
Surrogate: C13-2378 TetraCDD	*1520*				*pg/L*	*2000*		*76*	*24-164*			
Surrogate: C13-2378 TetraCDF	*1760*				*pg/L*	*2000*		*88*	*24-169*			
Surrogate: C13-OCDD	*3200*				*pg/L*	*4000*		*80*	*17-157*			

USACE ERDC-EP-C
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

ERDC -- Vicksburg (EL)	Project: Houston Ship Channel-North of Morgan's Point	
ERDC, 3909 Halls Ferry Road		**Reported:**
Vicksburg MS, 39180	Project Manager: Cheryl Montgomery	23-May-2019

EPA M8290A / M1613 - Quality Control

MAXXAM ANALYTICS, Mississauga

Analyte	Result	MDL	DL	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5847385 - NA												
Blank (5847385-BLK)						Prepared: 14-Nov-2018 Analyzed: 19-Nov-2018						
2,3,7,8-Tetra CDF	ND	0.95		10	pg/L				-			Ud
Surrogate: C13-2378 TetraCDF	*74*				*pg/L*	*100*		*74*	*40-135*			

ERDC SAMPLE RECEIPT CHECKLIST

Client: ERDC-Vicksburg (EL)				Work Order: 18J0403
Project: Houston Ship Channel ECIP				Date/Time Received 10/29/18
Shipping Company: N/A	North of Morgan's Point			
Suspected Hazard Information	**Yes**	**No**	**NA**	**Comments:**
Shipped as DOT Hazardous?		X		
Samples identified as Foreign Material?		X		
Sample Receipt Criteria	**Yes**	**No**	**NA**	**Comments:**
1. Shipping containers received intact and sealed?			X	
2. Chain of Custody documents included with shipment?			X	
3. COC form is properly signed in relinquished/received sections?			X	
4. Samples requiring chemical preservation at proper pH?	X			
5. Samples requiring cold preservation within 0-5°C?	X			
6. Samples IDs on COC match IDs on containers?	X			
7. Date and time of COC match date and time on containers?	X			
8. Number of containers received match number indicated on COC?	X			
9. Samples received within holding time?	X			
10. Aqueous samples found to have visible solids?	X			

Additional Comments:

elutriates created by EPC 10/28/18 - 10/29/18
filtered and preserved in-house

Checklist preformed by:	Kelli Hartman
Time/Date Completed:	10/29/18

18J0403

CHAIN OF CUSTODY RECORD
USACE ERDC Laboratories, 3909 Halls Ferry Road, Vicksburg, MS 39180

Page _____

Houston Ship Channel North of Morgan's Point	Sampling Company:	ERDC:	EL, CEERD-EP-R		EL, CEERD-EP-R
	POC:	Project Manager:	Cheryl Montgomery		Dan Farrar
	Address:	Address:	696 Virginia Road Concord, MA 01742		3909 Halls Ferry Road Bldg 6009 Vicksburg, MS 39180
	Email:	Email:	cheryl.montgomery@usace.army.mil		daniel.farrar@erdc.dren.mil
	Phone:	Phone:	W: 978-318-8644 C: 781-530-8317		W: 601-634-2118 M: 601-529-8042

Additional Notes:

								1 10L HDPE Cubitainer, Pre-filtered time: 48 hours					Hold	2 40 ml Clear VOA w/ HCL non-filtered Hold Time: 7 days	2 1L HDPE Cubitainer, non-filtered Hold Time: 48 hours			3 40 ml Clear VOA w/ HCL non-filtered Hold time: 7 days	125 ml HDPE pre-filtered Hold Time: 24 HOURS	Terra Core Kit Hold Time: 14 days		1 4 oz clear glass jar, Hold Time: 14 days
																				Sediment		
	Sample Name	Date	Time	Depth	Media	# of containers	Station	DOC	Dissolved Ammonia	Dissolved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/ Furans, OC Pests, PAH/PCP, PCBs, SVOC	TPH high-level	TOC	Total Hg and Se	TSS	VOC	Cr III and VI	VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ MeOH)	TPH
1	HSCNew-NMP-01-EL	10/29/18	0600					x	x	x	x	x	x	x	x	x	x	x	x			
2	HSCNew-NMP-02-EL	10/29/19	0600					x	x	x	x	x	x	x	x	x	x	x	x			
3	HSCNew-NMP-03-EL	10/29/20	0600					x	x	x	x	x	x	x	x	x	x	x	x			
4	HSCNew-NMP-04-EL	10/29/21	0730					x	x	x	x	x	x	x	x	x	x	x	x			
5	HSCNew-NMP-05-EL	10/29/22	0730					x	x	x	x	x	x	x	x	x	x	x	x			
6	HSCNew-NMP-06-EL	10/29/23	0730					x	x	x	x	x	x	x	x	x	x	x	x			
7	HSCNew-NMP-07-EL	10/29/24	0900					x	x	x	x	x	x	x	x	x	x	x	x			
8	HSCNew-NMP-08-EL	10/29/25	0900					x	x	x	x	x	x	x	x	x	x	x	x			
9	HSCNew-NMP-09-EL	10/29/26	0900					x	x	x	x	x	x	x	x	x	x	x	x			
10	HSCNew-NMP-10-EL	10/29/27	1030					x	x	x	x	x	x	x	x	x	x	x	x			
11	HSCNew-NMP-11-EL	10/29/28	1030					x	x	x	x	x	x	x	x	x	x	x	x			
12	HSCNew-NMP-03-DUP-EL	10/29/29	1030					x	x	x	x	x	x	x	x	x	x	x	x			
13																						
14																						
15																						
Total																						

1. I hereby transfer the sample containers to ERDC. Samples have been properly labeled and kept on ice or refrigerated.

Signature _____ Date _____

2. I accept these samples for transfer to ERDC.

Signature of ERDC Representative Eric Hawk Date 10/29/18

Temperature of Cooler _____

Items for Project Manager Review

LabNumber	Analysis	Analyte	Exception
			Data included from: W:\TransferIn\18J0403 TRANSFER 27 Dec 2018 1123.mdb
			Data included from: W:\TransferIn\18J0403 TRANSFER 28 Dec 2018 1428.mdb
			Data included from: W:\TransferIn\18J0403 TRANSFER 28 Dec 2018 1430.mdb
			Data included from: W:\TransferIn\18J0403 TRANSFER 28 Dec 2018 1543.mdb
			Data included from: W:\TransferIn\18J0403 TRANSFER 28 Dec 2018 1544.mdb

U.S. Army Corps of Engineers

US Army Corps of Engineers®
Engineer Research and Development Center

Sampling, Chemical Analysis, and Bioassessment in Accordance with CWA Section 404

Houston Ship Channel Expansion Channel Improvement Project, North of Morgan's Point Houston Ship Channel, Texas

(Part 5 of 6: Appendix 7, Tier III Biological Testing Report)

Cheryl R. Montgomery, Ph.D.
Brooke N. Stevens, Ph.D.
E. Michelle Bourne, M.S.
US Army Corps of Engineers
Engineer Research and Development Center
Environmental Laboratory
Vicksburg, MS

FINAL

14 June 2023*

*Supersedes all previous versions. Only coversheet revised; no change to content.

Appendix 7: Tier III Biological Testing of HSC ECIP NMP

TIER III BIOLOGICAL TESTING OF HOUSTON SHIP CHANNEL EXPANSION CHANNEL IMPROVEMENT PROJECT (HSC ECIP) (NORTH OF MORGAN'S POINT) SEDIMENTS

Prepared for:

USACE, Galveston District (SWG)
2000 Fort Point Road
Galveston, TX 77550

Prepared by:

Department of the Army
US Army Engineer Research and Development Center
Environmental Laboratory
3909 Halls Ferry Rd, EP-R
Vicksburg, MS 39180

Alan J. Kennedy, Nicolas L. Melby, J. Daniel Farrar

Draft Submitted: 1 April 2019
Final Submitted: 5 June 2019

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FIGURES

1 INTRODUCTION

In this 404 evaluation, a modified elutriate test (MET), otherwise known as an effluent elutriate test (EET), was conducted according to guidance (Appendix B of the Upland Testing Manual 2003). In 404 evaluations (40 CFR Section 230 Subpart G); it is recommended (but not required) that a multi-species testing approach be used (USEPA/USACE 1998) to assess potential effects of the dredged material placed into open water. The receiving system for the discharge was identified as marine/estuarine. Therefore, standard acute (96 hour) toxicity tests described in the Inland Testing Manual (USEPA/USACE 1998) that employ the fish *Menidia beryllina* and the mysid shrimp *Americamysis bahia* were used to assess the EETs.

2 METHODS

2.1 Sediment Compositing

Discrete sediments from each representative sample composite were combined in equal volumes and homogenized in a 7 gal high density polyethylene (HDPE) bucket (e.g., HSCNEW-NMP-06A, 06-B, 06A&C combined in equal volume to create HSCNEW-NMP-06) on 9 October 2018 (up to 3 days after collection depending on the sampling site). A total of 6 gallons of each composite was generated. Homogenization was performed with a 0.43 hp Lightnin™ homogenizer (Rochester, New York) with stainless steel (SS) dual impeller (7'' diameter). Mixing was conducted for a minimum of 2 minutes or until uniform consistency was achieved. The 7 gallon HDPE buckets were pre-cleaned prior to homogenization with soap, water, isopropyl alcohol, and rinsed with reverse osmosis water. Props and shafts of the mixer and other tools utilized in the mixing were also cleaned following the same procedure between sites. The composited sediments were left in the 7 gallon bucket and placed in cold storage. Additional information on sample nomenclature and compositing can be found in Table 1 and Appendix A. Sediment Compositing Log.

Table 1. Summary of test materials.

Table summarizes the nomenclature for sediment composites and site water (SW) used in the biological testing evaluation.

Location	Matrix
HSC-NMP-1	Sediment
HSC-NMP-1	Water
HSC-NMP-2	Sediment
HSC-NMP-2	Water
HSC-NMP-3	Sediment
HSC-NMP-3	Water
HSC-NMP-4	Sediment
HSC-NMP-4	Water
HSC-NMP-5	Sediment
HSC-NMP-5	Water
HSC-NMP-6	Sediment
HSC-NMP-6	Water
HSC-NMP-7	Sediment
HSC-NMP-7	Water
HSC-NMP-8	Sediment
HSC-NMP-8	Water
HSC-NMP-9	Sediment
HSC-NMP-9	Water
HSC-NMP-10	Sediment
HSC-NMP-10	Water
HSC-NMP-11	Sediment
HSC-NMP-11	Water

2.2 Biological Testing

Bioassays were conducted by the ERDC Environmental Laboratory (ERDC-EL, Vicksburg, MS) in basic accordance with standard guidance (USEPA 2002; USEPA/USACE 1998; RIA USEPA/USACE, 2003; HSC NMP SAP, 2018). The aquatic toxicity testing facility at the ERDC-EL consists of three laboratories containing five (5) temperature and humidity controlled environmental rooms (Darwin, St. Louis, MO, USA) and four (4) temperature controlled water baths. Elutriate testing was conducted in the environmental rooms. Relevant equipment for processing samples and fulfilling all requirements of laboratory bioassays (e.g., pH meters, DO meters, temperature probes, ammonia probes, refractometers, centrifuges, etc.) were available. Bioassays were conducted to assess the potential for biological effects of dredged material released into the water column during DM discharge (elutriate toxicity tests), using two taxonomically and functionally dissimilar species. Elutriate toxicity tests employed the mysid shrimp *A. bahia* and the fish *M. beryllina*.

2.2.1 Elutriate Bioassays

Modified elutriates were prepared by the ERDC-EL Environmental Chemistry Branch according to guidance (Upland Testing Manual 2003, Appendix B). Briefly, 150 g/L sediment (dry weight, calculated from sediment wet-dry ratios in Appendix B. Sediment Wet-Dry Ratios) was be added to site-collected water at sufficient total volume to accommodate analytical chemistry and biological test requirements. The sediment-water slurry was agitated via aeration to maintain the suspension for 60 minutes, followed by 24 hours settling. The resulting sample was the 100% (undiluted) elutriate used in chemical and biological analysis. Each sediment elutriate composite was prepared using a separate site-water associated with that sampling location (Table 1). The supernatant was siphoned and used for testing. This supernatant was defined as the 100% elutriate. Elutriate bioassays were conducted for 96-hours using the 100% elutriate; where toxicity was expected due to elevated ammonia concentrations, additional 50% and 10% elutriate concentrations were added. All concentrations, including the control and reference waters, were replicated five times. The standard test organisms *A. bahia* (formerly *Mysidopsis bahia)* and *M. beryllina* and were used in survival tests in basic accordance with dredged material evaluation guidance (USEPA/USACE 1991, 1998, 2003). All elutriate toxicity tests were conducted at 20 ± 1 °C in temperature and humidity controlled environmental rooms (Darwin, St. Louis, MO, USA).

Other than the reference sediment, all of the site waters collected for elutriate preparation had low salinities (≈ 0 to 22 ppt) that were outside the tolerance ranges of the standard test organisms (25 to 30 ppt; USEPA / USACE, 1998). The salinity of each site water was individually adjusted to approximately 30 ppt by incrementally adding ≈ 151 to 570 g/19L Crystal Sea® Marinemix prior to elutriate preparation. The salinity adjusted site waters were then used to prepare the elutriate test waters, as described above.

2.2.2 Elutriate toxicity bioassay: *Americamysis bahia* (4-day old)

The mysid shrimp *A. bahia* was exposed to the sediment elutriate water at 4-days old (specified range: 1 to 5 days with no more than a 24-h range in age; USEPA/USACE 1998). Shrimp were shipped overnight from Aquatic Biosystems (ABS, Fort Collins, CO, USA), immediately observed for potential shipment impacts and fed brine shrimp (*Artemia*) upon receipt. Mysid shrimp were held for 72-hours (received at the appropriate age to be 4-day old) prior to testing for acclimation and observation. The control water and dilution water was reconstituted seawater (30 ppt) prepared using Crystal Sea® Marinemix. Each test concentration included five (5) replicate, 1 L glass beakers containing 400 mL test media and ten (10) *A. bahia* each. The larger beaker size and two daily feeding rations were used to avoid aggressive interactions and potential for cannibalism during the exposure. Test acceptability criteria included water parameters (temperature, pH, salinity, dissolved oxygen) within the specified range (USEPA/USACE 1991, 1998), at least ninety (90%) survival in the performance control and sensitivity to a reference toxicant (e.g., KCl) within acceptable control chart ranges (± two (2) S.D. from the mean). The ninety six (96) hour tests were conducted from 29 October to 2 November 2018, according to USEPA/USACE (1998). The measurement endpoint was survival.

2.2.3 Elutriate toxicity bioassay: *Menidia beryllina*

The inland silverside *M. beryllina* was exposed to the sediment elutriate water at twelve (12) days old (specified range: 1 to 14 days with no more than a 24-h range in age; USEPA/USACE 1998). Fish were shipped overnight from Aquatic Biosystems (ABS, Fort Collins, CO, USA) immediately observed for potential shipment impacts and fed brine shrimp (*Artemia*) upon receipt. The *M. beryllina* were held for 72-hours (received at 9 days old) prior to testing for acclimation and observation. The control water and dilution water was reconstituted seawater (30 ppt) prepared using Crystal Sea® Marinemix. Each test concentration included five (5) replicate, 600 mL glass beakers containing 400 mL test media and ten (10) *M. beryllina* each. Fish were fed at 24-h and 72-h to maintain health. Test acceptability criteria included water parameters (temperature, pH, salinity, dissolved oxygen) within the specified range (USEPA/USACE 1991, 1998), at least ninety (90%) survival in the performance control and sensitivity to a reference toxicant (e.g., KCl) within acceptable control chart ranges (± two (2) S.D. from the mean). The ninety six (96) hour tests were conducted from 29 October to 2 November, according to USEPA/USACE (1998). The measurement endpoint was survival.

2.2.4 Reference toxicity tests for elutriate bioassays

Reference toxicant tests were conducted on each batch of test organisms to assess test organism sensitivity relative to historic information recorded in-house laboratory control charts. The selected reference toxicant was potassium chloride (KCl). Reagent grade KCl was weighed and completely dissolved into the appropriate reconstituted waters for each test species (described above). Five concentrations (3 replicates each) were prepared (100, 50, 25, 12.5, 6.25%) with the previously described number of organisms in each replicate. The 100% concentration used was 2.0 g/L for *M. beryllina* and 1.0 g/L

for *A. bahia*. The endpoint measured was survival after a 48- or 96-hour exposure. The median effects endpoints generated in the reference toxicity tests were compared to historic information recorded in ERDC or vendor control charts (± two (2) S.D. from the mean).

2.2.5 Water Quality Parameters

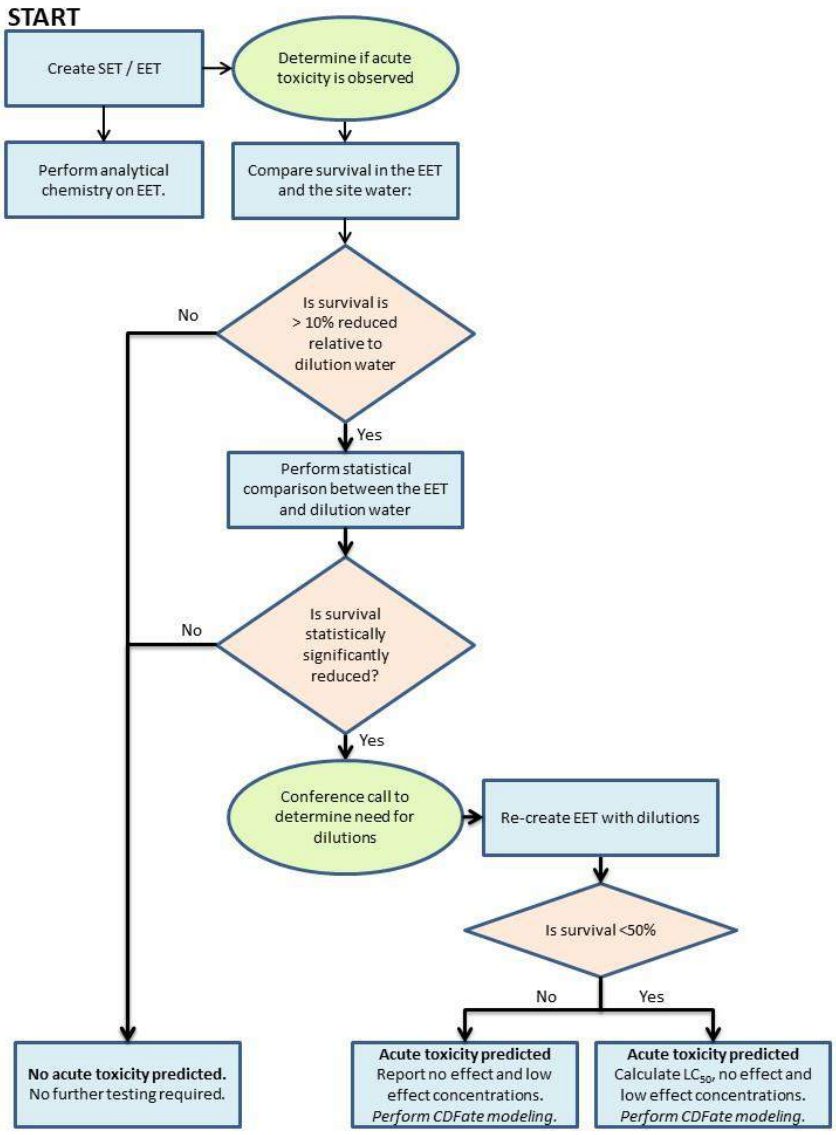
Water quality during bioassay testing was measured using either a Yellow Springs Instruments (YSI) Model 556 multiprobe system (Yellow Springs, OH) or a Thermo Scientific Orion Star™ A329 (Thermo Orion Electron Corp., Beverly, MA) for temperature, salinity, pH, and Dissolved Oxygen (D.O.). Total ammonia-N and pH was measured using a 720A ion-selective electrode (ISE) meter (Thermo Orion Electron Corp., Beverly, MA) equipped with a 95-12 ammonia-sensitive electrode and a 9107BN automatic temperature compensating pH triode (Thermo Orion Electron Corp., Beverly, MA). Total overlying water ammonia-N during bioassays was also measured using LeMotte titration kits (Chestertown, MD, USA). Note that both ammonia measurement methods determined ammonia as total ammonia-nitrogen (-N). Total ammonia and un-ionized ammonia were calculated based on molecular mass and measured pH, temperature and salinity in the test water (see EPA 1989), specifically using the following equation:

Un-ionized ammonia = [(17*NH_3)] / [(14*(1+10^((0.09018+(2729.92/(pH+273.15)) +((0.1552 - (0.0003142 * Temperature)) * ((19.9273 * salinity) / (1000 - (1.2005109 * salinity)))))-pH)))]

2.3 Statistical Analysis

The process by which elutriates were tested is summarized in Figure 1. Statistical analysis was performed when survival in the undiluted (100%) elutriate water was reduced by more than 10% relative to the dilution water control, as specified by guidance (USEPA / USACE 1998, 2003). Statistical analyses are conducted using Toxcalc® statistical software (Version 5.0, Tidepool Scientific Software, McKinleyville, CA). Data normality was determined by the Shapiro-Wilk's Test and homogeneity of variance by Bartlett's Test. If survival was not reduced by at least 10% relative to the dilution water, no statistics were performed. If at least a 10% reduction was observed, initially a two sample t-test was performed to compare the undiluted (100%) elutriate to the dilution water control. If that was statistically significant, then treatment differences (dilution water, 10%, 50% and 100% elutriates) were performed by one way ANOVA and Dunnett's Method (one-tailed analysis); the Bonferroni t-test was performed in the case of uneven replicates. If normality could not be achieved, Steel's Many-One Rank test (one-tailed analysis) was used. If applicable, the lethal median concentration producing 50% mortality (LC50) in elutriate or reference toxicity test dilutions is determined by the Spearman–Karber method using Toxcalc® (version 5.0, Tidepool Scientific Software, McKinleyville, CA).

Figure 1. Elutriate testing decision flowchart.



3 RESULTS

Elutriate toxicity tests were conducted during the week of 29 October 2018. The elutriates were prepared from project sediments within 3 weeks of compositing (9 October 2018) at the initiation of the bioassays. All elutriate toxicity testing used a freshly prepared elutriate (aged <24-h).

3.1 Elutriate bioassay: *Americamysis bahia* (96-h method)

Water quality parameters (Appendix D. Elutriate bioassay water quality parameters) were within the acceptability ranges specified by testing guidance (US EPA / US ACE 1991, 1998, 2003). Survival in the laboratory performance control (96%) met the ≥ 90% requirement (Table 2). The LC50 value for the KCl reference toxicity test conducted on 29 October 2018 was 0.61 (0.55 – 0.69) g/L. This value was within two standard deviations around the mean LC50 values from ERDC control chart data (0.40 – 0.82 g/L). This indicates that the test organisms were within the historic sensitivity range.

Survival was at least 86% (range: 86 – 100%) in all eleven site waters (Table 2). Survival in the undiluted (100%) elutriates ranged from 25 to 94% (Table 2). Survival was both reduced by at least 10% and statistically significantly different (by one-tailed t-test) for NMP-1, -4, -7, and -8. There was no acute toxicity observed in the other elutriates.

For elutriates in which significant mortality was observed, multiple treatment comparisons using Dunnett's test were performed to determine NOEC and LOEC values, which are summarized in Table 3. Mortality was only high enough in NMP-1 and NMP-7 to calculate LC50 values; the LC50 values for NMP-1 and NMP-7 were 89 and 79%, respectively.

Total ammonia-N concentrations in the undiluted elutriates ranged from 1.4 to 20.7 mg/L and calculated un-ionized concentrations (0.08 to 1.11 mg/L). The ammonia-N and un-ionized ammonia concentrations and comparison to known toxicity thresholds (Kennedy et al 2015, Melby et al 2018) are summarized in Table 4. Since some of the ammonia levels were well above concentrations that are known to cause acute effects to this organism, there is a strong line of evidence that ammonia was high enough to cause mortality in all of the elutriates where acute toxicity was observed (NMP-1, -4, -7, and -8).

The *A. bahia* elutriate bioassay did not indicate acute toxicity for the 7 of the 11 tested sediment elutriates (NMP-2, -3, -5, -6, -9, -10, and -11). Statistically significant acute toxicity was determined for NMP-1, -4, -7, -8.

3.2 Elutriate bioassay: *Menidia beryllina*

Water quality parameters (Appendix D. Elutriate bioassay water quality parameters) were within the acceptability ranges specified by testing guidance (US EPA / US ACE 1991, 1998, 2003). Survival in the laboratory performance control (98%) met the ≥ 90% requirement (Table 2). The LC50 value for the KCl reference toxicity test conducted on 29 October 2018 was 1.46 (1.34 – 1.59) g/L. This value was within two standard deviations around the mean LC50 values from ERDC control chart data (1.07 – 1.52 g/L). This indicates that the test organisms were within the historic sensitivity range.

Survival was at least 94% (range: 94 – 100%) in all eleven site waters (Table 2). Survival in the undiluted (100%) elutriates ranged from 0 to 100%. Survival was both reduced by at least 10% and statistically significantly different (by one-tailed t-test) for NMP-1, -4, -6, -7, -8, -10, and -11. There was no acute toxicity observed in the other elutriates.

For elutriates in which significant mortality was observed, multiple treatment comparisons using Dunnett's test were performed to determine NOEC and LOEC values, which are summarized in Table 3. Mortality was only high enough in NMP-1, - 6, and -7 to calculate LC50 values; the LC50 values for NMP-1, - 6, and -7 were 88, 95 and 59%, respectively.

Total ammonia-N concentrations in the undiluted elutriates ranged from 1.29 to 23.5 mg/L and calculated un-ionized concentrations (0.08 to 1.11 mg/L). The ammonia concentrations and comparison to known toxicity thresholds (Kennedy et al 2015, Melby et al 2018) are summarized in Table 4. Since some of the ammonia levels were well above concentrations that are known to cause acute effects to this organism, there is a strong line of evidence that ammonia was high enough to cause mortality in all of the elutriates where acute toxicity was observed (NMP-1, -4, -6, -7, -8, -11).

The *M. beryllina* elutriate bioassay did not indicate acute toxicity for the 5 of the 11 tested elutriates (NMP-2, -3, -5, -9). Statistically significant acute toxicity was determined for NMP-1, -4, -6, -7, -8, -10 and -11.

3.3 Ammonia Toxicity Background

Ammonia is an important contaminant to consider in toxicity bioassays, especially when employing fish species (USEPA 1989, 1999, 2009) or embryo development tests (Kennedy et al. 2015). The unionized fraction of ammonia, which is dependent on water temperature, pH and to a lesser extent salinity, is often most responsible for causing toxicity in elutriate testing (Kennedy et al., 2015).

Based on LC50 ranges for *A. bahia* (0.23 – 1.7 mg/L UIA) at similar temperatures and pH values taken from the literature (Miller et al 1990; Boardman et al., 2004; Kennedy et al 2015) and a NOEC value reported in Melby et al (2018) of 0.5 mg/L un-ionized ammonia, the un-ionized concentrations in the NMP-1, -4, and -7 elutriates were sufficiently high to cause toxicity. The NMP-5, -6, -8, -10, and -11 elutriates had elevated ammonia which may have caused some mortality.

Based on LC50 ranges for *M. beryllina* (0.75 – 1.94 mg/L UIA) taken from the literature (Boardman et al 2004, Miller et al 1990, Li 1997, Kennedy et al 2015) and NOEC values reported in Melby et al (2018) of 0.6 mg/L un-ionized ammonia, the un-ionized concentrations in the NMP-1, -4, and -7 elutriates were sufficiently high to cause toxicity. The NMP-5, -6, -8, -10 and -11 elutriates had elevated ammonia which may have caused some mortality.
in all of the elutriates in which acute toxicity was observed were high enough to cause mortality to the test organisms based on literature reported values for ammonia toxicity (Melby et al., 2018). Therefore, there is a line of evidence that ammonia was an important determinant of the toxicity observed in both test organisms.

Table 2. Elutriate toxicity results.

Percent survival data presented as means and one standard deviation. Indication of 10% reduction and statistical significance between the 100% elutriate and control/dilution by t-test is provided (yes/no). Statistical significance in multiple comparisons is indicated by an asterisk and boldface.

Sediment Elutriate	Treatment	96-h *Americamysis* (%)	Reduced > 10%?	Stat Sig?	96-h *Menidia* (%)	Reduced > 10%?	Stat Sig?
Control	NA	96 ± 9	--	--	98 ± 4	--	
HSC-NMP-1	Site water	91 ± 6	--	--	100 ± 0	--	
	10%	92 ± 4	No	--	96 ± 5	No	--
	50%	86 ± 11	No	--	96 ± 9	No	--
	100%	**40 ± 22***	**Yes**	**Yes**	**38 ± 22***	**Yes**	**Yes**
HSC-NMP-2	Site water	100 ± 0	No	--	94 ± 5	No	--
	10%	100 ± 0	No	--	98 ± 4	No	--
	50%	94 ± 5	No	--	100 ± 0	No	--
	100%	94 ± 9	No	--	94 ± 9	No	--
HSC-NMP-3	Site water	96 ± 5	--	--	100 ± 0	--	--
	100%	94 ± 9	No	--	100 ± 0	No	--
HSC-NMP-4	Site water	92 ± 8	--	--	96 ± 5	--	--
	10%	98 ± 4	No	--	98 ± 4	No	--
	50%	90 ± 7	No	--	92 ± 8	No	--
	100%	**64 ± 15***	**Yes**	**Yes**	**60 ± 19***	**Yes**	**Yes**
HSC-NMP-5	Site water	96 ± 9	--	--	100 ± 0	No	--
	10%	98 ± 4	No	--	90 ± 10	No	--
	50%	86 ± 15	No	--	96 ± 9	No	--
	100%	88 ± 4	No	--	96 ± 5	No	--
HSC-NMP-6	Site water	86 ± 5	--	--	96 ± 5	No	--
	10%	94 ± 9	No	--	90 ± 12	No	--
	50%	100 ± 0	No	--	90 ± 7	No	--
	100%	90 ± 7	No	--	**46 ± 5***	**Yes**	**Yes**
HSC-NMP-7	Site water	86 ± 11	--	--	100 ± 0	--	
	10%	100 ± 0	No	--	98 ± 4	No	--

Sediment Elutriate	Treatment	96-h *Americamysis* (%)	Reduced > 10%?	Stat Sig?	96-h *Menidia* (%)	Reduced > 10%?	Stat Sig?
	50%	96 ± 5	No	--	**82 ± 4***	**Yes**	**Yes**
	100%	**25 ± 16***	**Yes**	**Yes**	**0 ± 0***	**Yes**	**Yes**
HSC-NMP-8	Site water	94 ± 5	--	--	98 ± 4	No	--
	10%	98 ± 4	No	--	94 ± 5	No	--
	50%	92 ± 8	No	--	98 ± 4	No	--
	100%	**70 ± 10***	**Yes**	**Yes**	**60 ± 16***	**Yes**	**Yes**
HSC-NMP-9	Site water	94 ± 13	--	--	96 ± 5	No	--
	10%	92 ± 8	No	--	94 ± 5	No	--
	50%	90 ± 7	No	--	90 ± 12	No	--
	100%	94 ± 5	No	--	98 ± 4	No	--
HSC-NMP-10	Site water	94 ± 5	--	--	100 ± 0	No	--
	10%	96 ± 5	No	--	94 ± 5	No	--
	50%	94 ± 5	No	--	100 ± 0	No	--
	100%	88 ± 13	No	--	**71 ± 12***	**Yes**	**Yes**
HSC-NMP-11	Site water	86 ± 11	--	--	100 ± 0	No	--
	10%	96 ± 5	No	--	94 ± 8	No	--
	50%	100 ± 0	No	--	98 ± 4	No	--
	100%	84 ± 9	Yes	Yes	**54 ± 9***	**Yes**	**Yes**

Table 3. Summary of toxicity reference values.

Sample	Endpoint	96-h *Americamysis bahia*	96-h *Menidia beryllina*
HSC-NMP-1	NOEC	50	50
	LOEC	100	100
	LC50	89 (75 – 105)	88 (77 – 100)
HSC-NMP-2	NOEC	100	100
	LOEC	NA (1)	NA (1)
	LC50	NA (1)	NA (1)
HSC-NMP-3	NOEC	100	100
	LOEC	NA (1)	NA (1)
	LC50	NA (1)	NA (1)
HSC-NMP-4	NOEC	50	50
	LOEC	100	100
	LC50	NA (1)	NA (1)
HSC-NMP-5	NOEC	100	100
	LOEC	NA (1)	NA (1)
	LC50	NA (1)	NA (1)
HSC-NMP-6	NOEC	100	50
	LOEC	NA (1)	100
	LC50	NA (1)	95 (78 – 117)
HSC-NMP-7	NOEC	50	10
	LOEC	100	50
	LC50	79 (73 – 86)	59 (52 – 66)
HSC-NMP-8	NOEC	50	50
	LOEC	100	100
	LC50	NA (1)	NA (1)
HSC-NMP-9	NOEC	100	100
	LOEC	NA (1)	NA (1)
	LC50	NA (1)	NA (1)
HSC-NMP-10	NOEC	100	50
	LOEC	NA (1)	100
	LC50	NA (1)	NA (1)
HSC-NMP-11	NOEC	100	50
	LOEC	NA (1)	100
	LC50	NA (1)	NA (1)

Footnotes:
(1) NA = not applicable due to no observed toxicity; LOEC = lowest observed effect concentration; NOEC = no observed effect concentration; LC50 = median lethal concentration

Table 4. Ammonia concentrations in elutriates.

Data are presented relative to toxicity reference values for *Americamysis bahia* (A) and *Menidia beryllia* (B).

A.

Control	Total Ammonia-N, averaged (mg/L)	Initial Un-ionized Ammonia (mg/L)	Final Un-ionized Ammonia (mg/L)	Significant Toxicity?	Un-ionized Ammonia Threshold (mg/L)	Un-ionized Ammonia Threshold Exceeded?
0	<0.5	<0.03	<0.03	--	0.5	No
HSC-NMP-1						
0	0.56	<0.03	0.02	No	0.5	No
10	2.15	0.08	0.07	No	0.5	No
50	9.77	0.52	0.44	No	0.5	Yes
100	18.75	0.92	1.03	Yes	0.5	Yes
HSC-NMP-2						
0	0.57	<0.03	0.02	No	0.5	No
10	0.74	0.03	<0.03	No	0.5	No
50	3.38	0.16	0.13	No	0.5	No
100	7.22	0.44	0.28	No	0.5	No
HSC-NMP-3						
0	<0.5	<0.03	<0.03	No	0.5	No
100	1.38	0.08	0.05	No	0.5	No
HSC-NMP-4						
0	<0.5	<0.03	<0.03	No	0.5	No
10	1.53	0.06	0.06	No	0.5	No
50	6.60	0.34	0.21	No	0.5	No
100	12.55	0.65	0.46	Yes	0.5	Yes
HSC-NMP-5						
0	1.17	<0.03	0.04	No	0.5	No
10	1.21	0.05	0.04	No	0.5	No
50	4.98	0.27	0.18	No	0.5	No
100	9.81	0.53	0.38	No	0.5	Yes

Control	Total Ammonia-N, averaged (mg/L)	Initial Un-ionized Ammonia (mg/L)	Final Un-ionized Ammonia (mg/L)	Significant Toxicity?	Un-ionized Ammonia Threshold (mg/L)	Un-ionized Ammonia Threshold Exceeded?
HSC-NMP-6						
0	<0.5	<0.03	<0.03	No	0.5	No
10	1.37	0.05	0.05	No	0.5	No
50	4.82	0.21	0.18	No	0.5	No
100	10.63	0.52	0.42	No	0.5	Yes
HSC-NMP-7						
0	<0.5	<0.03	<0.03	No	0.5	No
10	2.27	0.09	0.06	No	0.5	No
50	9.68	0.49	0.32	No	0.5	No
100	20.65	1.11	0.86	Yes	0.5	Yes
HSC-NMP-8						
0	<0.5	<0.03	<0.03	No	0.5	No
10	1.48	0.05	0.05	No	0.5	No
50	5.42	0.29	0.14	No	0.5	No
100	10.15	0.62	0.29	Yes	0.5	Yes
HSC-NMP-9						
0	<0.5	<0.03	<0.03	No	0.5	No
10	0.97	0.03	0.03	No	0.5	No
50	3.43	0.16	0.12	No	0.5	No
100	7.89	0.44	0.30	No	0.5	No
HSC-NMP-10						
0	<0.5	<0.03	<0.03	No	0.5	No
10	1.31	0.05	0.04	No	0.5	No
50	6.03	0.30	0.19	No	0.5	No
100	11.50	0.62	0.42	No	0.5	Yes
HSC-NMP-11						
0	<0.5	<0.03	<0.03	No	0.5	No
10	1.31	0.05	0.04	No	0.5	No

Control	Total Ammonia-N, averaged (mg/L)	Initial Un-ionized Ammonia (mg/L)	Final Un-ionized Ammonia (mg/L)	Significant Toxicity?	Un-ionized Ammonia Threshold (mg/L)	Un-ionized Ammonia Threshold Exceeded?
50	5.80	0.30	0.20	No	0.5	No
100	11.70	0.65	0.47	No	0.5	Yes

B.

Control	Total Ammonia-N, averaged	Initial Un-ionized Ammonia (mg/L)	Final Un-ionized Ammonia (mg/L)	Significant Toxicity?	Un-ionized Ammonia Threshold (mg/L)	Un-ionized Ammonia Threshold Exceeded?
0	<0.5	<0.03	<0.03			
HSC-NMP-1						
0	<0.5	<0.03	<0.03	No	0.6	No
10	1.76	0.08	0.07	No	0.6	No
50	8.67	0.52	0.46	No	0.6	No
100	16.75	0.92	1.06	Yes	0.6	Yes
HSC-NMP-2						
0	<0.5	<0.03	<0.03	No	0.6	No
10	0.70	0.03	0.03	No	0.6	No
50	3.17	0.19	0.14	No	0.6	No
100	6.81	0.44	0.36	No	0.6	No
HSC-NMP-3						
0	<0.5	<0.03	<0.03	No	0.6	No
100	1.29	0.08	0.04	No	0.6	No
HSC-NMP-4						
0	<0.5	<0.03	<0.03	No	0.6	No
10	1.30	0.06	0.05	No	0.6	No
50	6.45	0.34	0.30	No	0.6	No
100	12.95	0.65	0.80	Yes	0.6	Yes
HSC-NMP-5						
0	<0.5	<0.03	<0.03	No	0.6	No
10	1.00	0.05	0.03	No	0.6	No

Control	Total Ammonia-N, averaged	Initial Un-ionized Ammonia (mg/L)	Final Un-ionized Ammonia (mg/L)	Significant Toxicity?	Un-ionized Ammonia Threshold (mg/L)	Un-ionized Ammonia Threshold Exceeded?
50	4.51	0.28	0.13	No	0.6	No
100	9.42	0.50	0.34	No	0.6	No
HSC-NMP-6						
0	<0.5	<0.03	<0.03	No	0.6	No
10	1.04	0.05	0.04	No	0.6	No
50	4.26	0.21	0.23	No	0.6	No
100	10.48	0.52	0.65	Yes	0.6	Yes
HSC-NMP-7						
0	<0.5	<0.03	<0.03	No	0.6	No
10	1.87	0.09	0.04	No	0.6	No
50	9.13	0.49	0.30	Yes	0.6	No
100	23.50	1.11		Yes	0.6	Yes
HSC-NMP-8						
0	<0.5	<0.03	<0.03	No	0.6	No
10	1.08	0.05	0.03	No	0.6	No
50	5.06	0.29	0.13	No	0.6	No
100	10.62	0.62	0.39	Yes	0.6	Yes
HSC-NMP-9						
0	<0.5	<0.03	<0.03	No	0.6	No
10	0.80	0.03	0.02	No	0.6	No
50	3.16	0.16	0.10	No	0.6	No
100	7.90	0.44	0.28	No	0.6	No
HSC-NMP-10						
0	<0.5	<0.03	<0.03	No	0.6	No
10	1.14	0.05	0.04	No	0.6	No
50	5.52	0.30	0.24	No	0.6	No
100	11.24	0.62	0.65	Yes	0.6	Yes
HSC-NMP-11						

Control	Total Ammonia-N, averaged	Initial Un-ionized Ammonia (mg/L)	Final Un-ionized Ammonia (mg/L)	Significant Toxicity?	Un-ionized Ammonia Threshold (mg/L)	Un-ionized Ammonia Threshold Exceeded?
0	<0.5	<0.03	<0.03	No	0.6	No
10	1.18	0.05	0.03	No	0.6	No
50	5.34	0.30	0.17	No	0.6	No
100	11.31	0.65	0.45	Yes	0.6	Yes

Ammonia values represent the mean between test initiation and termination. Un-ionized ammonia calculated from the measured pH, temperature and salinity in test water.

4 References

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5 Appendices

5.1 Appendix A. Sediment Compositing Log

ERDC Datasheet

Houston Ship Channel Section 103
Sediment Composite Log

Composite ID:	HSCNCH-Nmp-08-[illegible]	Total Volume Composited:	6 gal
Technician(s):	SDF, JB		
Date:	10-2-18	Time Started:	0720
Storage Location:	6017 Cold Storage	Time Completed:	0800
Photos Taken? (Y/N)	Y	Bulk Ammonia Sample? (Y/N)	N

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNCH-Nmp-08-[illegible]	2	black/red clayi strong PAH odor
" 2of3 CHA	2	
" 3of3 CHA	2	

ERDC Datasheet

Houston Ship Channel Section 103
Sediment Composite Log

Composite ID: HSCNEW-NMP-07 Comp	Total Volume Composited: 6 gallon
Technician(s): JMB	
Date: 10-9-13	Time Started: 8:40
Storage Location: 6017 Cold Room	Time Completed: 9:02
Photos Taken? (Y/N) Y	Bulk Ammonia Sample? (Y/N) N

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew-NMP-07A	2	clay with sand, Black, mild hydrocarbon smell
HSCNew-NMP-07A	2	clay with sand " " "
HHCNew NMP 07A	2	clay with sand " " "

ERDC Datasheet

Houston Ship Channel Section 103
Sediment Composite Log

Composite ID: HSCNew-Nmp-11-Comp	Total Volume Composited: 6 gal.
Technician(s): MB, RB, JDF	
Date: 10-9-16	Time Started:
Storage Location: 5017 Cold Storage	Time Completed: 08:58
Photos Taken? (Y/N) Y	Bulk Ammonia Sample? (Y/N) N

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew-Nmp-11-Comp	A 2	Red/black clay, some sand; Petroleum odor
11 20ft	A2C 2	
11 30ft	C 2	

ERDC Datasheet

Houston Ship Channel Section 103
Sediment Composite Log

Composite ID: HSCNew-NMP-09Comp	Total Volume Composited: 6 gallons
Technician(s): JL, SN	
Date: 10-9-18	Time Started: 0830
Storage Location: 6017 Cold room	Time Completed: 9:40
Photos Taken? (Y/N)	Bulk Ammonia Sample? (Y/N) N

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew NMP - 09A	2 gallons	
HSCNew - NMP - 09B	2 gallon	
HSCNew - NMP - 09C	2 gallon	

ERDC Datasheet

Houston Ship Channel Section 103
Sediment Composite Log

Composite ID: HSCNew - NMP - 10 Comp	Total Volume Composited: 6 gallon
Technician(s): MB, DM, JMB, DF	
Date: 10-9-18	Time Started: 0850
Storage Location: 6017 Cold room	Time Completed: 0940
Photos Taken? (Y/N)	Bulk Ammonia Sample? (Y/N) N

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew - NMP - 10A + 10C	2 gallons	
HSCNew - NMP - 10C	2 gallons	
HSCNew - NMP - 10C	2 gallon	

ERDC Datasheet

Houston Ship Channel Section 103
Sediment Composite Log

Composite ID: HSCNew-NMP-01-01 Comp	Total Volume Composited: 6 gallons
Technician(s): MJ, SN, TB, JL	
Date: 10-9-19	Time Started: 10:15
Storage Location: 6017 Cold room	Time Completed: 10:29
Photos Taken? (Y/N) Y	Bulk Ammonia Sample? (Y/N)

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew-NMP-01A 1/3	2	black sandy clay loam
HSCNew-NMP-01A 2/3	2	" " " "
HSCNew-NMP-01A 3/3	2	" " " "

ERDC Datasheet

Houston Ship Channel Section 103
Sediment Composite Log

Composite ID: HSCNew-NMP-05 Comp	Total Volume Composited: 6 gallons
Technician(s):	
Date: 10-9-18	Time Started: 10:15
Storage Location: 6017 Cold room	Time Completed: 10:45
Photos Taken? (Y/N)	Bulk Ammonia Sample? (Y/N)

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew-NMP-05A 1/3	2	Sand, black clay and red clay
HSCNew-NMP-05B 1/3	2	" " " "
HSCNew-NMP-05C 1/3	2	" " " "

ERDC Datasheet

Houston Ship Channel Section 103
Sediment Composite Log

Composite ID: HSC New - NMP - 02 Comp	Total Volume Composited: 6 gallons
Technician(s):	
Date: 10-9-19	Time Started: 1224
Storage Location:	Time Completed:
Photos Taken? (Y/N)	Bulk Ammonia Sample? (Y/N)

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew-NMP-02A	2 gallons	
HSCNew-NMP 02C	2 gallons	
HSCNew_NMP 02A+C	2 gallons	

ERDC Datasheet

Houston Ship Channel Section 103
Sediment Composite Log

Composite ID: HSCNew_NMP-04 Comp	Total Volume Composited: 3 MB
Technician(s):	
Date: 10-9-19	Time Started: 1229
Storage Location: 617	Time Completed:
Photos Taken? (Y/N)	Bulk Ammonia Sample? (Y/N)

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew-NMP-04A	2	
HSCNew-NMP 04 C	2	
HSCNew NMP 04 A+C	2	

ERDC Datasheet

Houston Ship Channel Section 103
Sediment Composite Log

Composite ID: HSCNew-NMP-06 Comp	Total Volume Composited: 6 gallons
Technician(s):	
Date: 10-9-13	Time Started: 10:46
Storage Location: 6017 Cold room	Time Completed: 11:14
Photos Taken? (Y/N)	Bulk Ammonia Sample? (Y/N)

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew-NMP-06 A	2	red, black clay ; hydrocarbon smell
HSCNew-NMP-06 C	2	" " "
HSCNew-NMP-06 A1C	2	" " "

ERDC Datasheet

Houston Ship Channel Improvement
Sediment Composite Log

Composite ID: HSCNew-NMP-03 Comp	Total Volume Composited: 6 gallons
Technician(s): JL, MJ, TD, SA	
Date: 10-9-18	Time Started: 10:37
Storage Location: 617	Time Completed: 11:09
Photos Taken? (Y/N)	Bulk Ammonia Sample? (Y/N)

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew-NMP-03A	2	Silty Clay
HSCNew-NMP-03C	2	"
HSCNew-NMP-03A&C	2	"

ERDC Datasheet

Houston Ship Channel Improvement
Sediment Composite Log

Composite ID: HSCNew-NMP-03 Dup Comp		Total Volume Composited: 6 gallons	
Technician(s): JMB			
Date: 10-9-19		Time Started: 10:37	
Storage Location: 6017 Cold room		Time Completed: 11:09	
Photos Taken? (Y/N) Y		Bulk Ammonia Sample? (Y/N)	

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew-NMP-03 Dup A	2	white and red clay
HSCNew-NMP-03 Dup C	2	Sandy with white clay hydrocarbon smell
HSCNew-NMP-03 Dup A+C	2	Sandy with white clay hydrocarbon smell

ERDC Datasheet

Houston Ship Channel Improvement
Sediment Composite Log

Composite ID:	HSCNcw-nmp-04-Comp	Total Volume Composited:	6 gallon
Technician(s):	DF		
Date:	10-5-18	Time Started:	
Storage Location:	6017; Cold Storage	Time Completed:	13:03
Photos Taken? (Y/N)	Y	Bulk Ammonia Sample? (Y/N)	N

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNcw-nmp-04A	2	red clay; silty clay, hydrocarbon odor
LC C	2	
A2C	2	

ERDC Datasheet

Houston Ship Channel Improvement
Sediment Composite Log

Composite ID: HSC New -Nmp-02-Comp	Total Volume Composited: 6 gal.
Technician(s): DF	
Date: 10-9-18	Time Started:
Storage Location: 601B; Cold Storage	Time Completed:
Photos Taken? (Y/N) Y	Bulk Ammonia Sample? (Y/N) N

Discreet Sediment ID added to Composite	Volume Added (gallons)	Sediment Description
HSCNew-Nmp-02C	2	red clay; bleeding silty/silt; blue/grey clay
HSCNew-Nmp-02 A+C	2	hydrocarbon odor
HSCNew-Nmp-02-A	2	

5.2 Appendix B. Sediment Wet-Dry Ratios

Sample Name	Pan #	Pan Weight (g)	Pan+sediment wet weight (g)	Pan+sediment dry weight (g)	Wet Weight (g)	Dry Weight (g)	% Dry	Dry/Wet Ratio	Mean % Moisture	Mean % Dry	Mean Dry/Wet Ratio
NMP-01	1	1.32	2.6	1.966	1.28	0.646	50.5%	0.505	50.7%	49.3%	0.493
	2	1.315	2.419	1.865	1.104	0.55	49.8%	0.498			
	3	1.316	2.425	1.845	1.109	0.529	47.7%	0.477			
NMP-02	4	1.315	2.892	2.575	1.577	1.26	79.9%	0.799	21.0%	79.0%	0.790
	5	1.319	2.362	2.136	1.043	0.817	78.3%	0.783			
	6	1.32	2.657	2.375	1.337	1.055	78.9%	0.789			
NMP-03	7	1.317	2.481	2.288	1.164	0.971	83.4%	0.834	17.8%	82.2%	0.822
	8	1.33	2.581	2.357	1.251	1.027	82.1%	0.821			
	9	1.323	2.592	2.351	1.269	1.028	81.0%	0.810			
NMP-03-DUP	10	1.317	2.541	2.268	1.224	0.951	77.7%	0.777	22.1%	77.9%	0.779
	11	1.323	2.581	2.313	1.258	0.99	78.7%	0.787			
	12	1.326	2.6	2.31	1.274	0.984	77.2%	0.772			
NMP-04	13	1.325	2.841	2.276	1.516	0.951	62.7%	0.627	36.6%	63.4%	0.634
	14	1.327	2.657	2.155	1.33	0.828	62.3%	0.623			
	15	1.324	2.611	2.164	1.287	0.84	65.3%	0.653			
NMP-05	16	1.319	2.895	2.386	1.576	1.067	67.7%	0.677	41.6%	58.4%	0.584

Sample Name	Pan #	Pan Weight (g)	Pan+sediment wet weight (g)	Pan+sediment dry weight (g)	Wet Weight (g)	Dry Weight (g)	% Dry	Dry/Wet Ratio	Mean % Moisture	Mean % Dry	Mean Dry/Wet Ratio
	17	1.318	2.583	1.991	1.265	0.673	53.2%	0.532			
	18	1.323	2.617	2.026	1.294	0.703	54.3%	0.543			
NMP-06	19	1.323	2.766	2.31	1.443	0.987	68.4%	0.684	34.3%	65.7%	0.657
	20	1.318	2.838	2.336	1.52	1.018	67.0%	0.670			
	21	1.329	2.726	2.19	1.397	0.861	61.6%	0.616			
NMP-07	22	1.317	2.884	2.383	1.567	1.066	68.0%	0.680	31.8%	68.2%	0.682
	23	1.316	2.835	2.356	1.519	1.04	68.5%	0.685			
	24	1.32	2.662	2.233	1.342	0.913	68.0%	0.680			
NMP-08	25	1.323	2.559	2.156	1.236	0.833	67.4%	0.674	31.9%	68.1%	0.681
	26	1.332	2.5	2.137	1.168	0.805	68.9%	0.689			
	27	1.325	2.66	2.233	1.335	0.908	68.0%	0.680			
NMP-09	28	1.323	2.792	2.268	1.469	0.945	64.3%	0.643	35.3%	64.7%	0.647
	29	1.325	2.515	2.125	1.19	0.8	67.2%	0.672			
	30	1.322	2.712	2.191	1.39	0.869	62.5%	0.625			
NMP-10	31	1.322	2.735	2.255	1.413	0.933	66.0%	0.660	32.7%	67.3%	0.673
	32	1.319	2.865	2.361	1.546	1.042	67.4%	0.674			
	33	1.316	2.661	2.238	1.345	0.922	68.6%	0.686			

Sample Name	Pan #	Pan Weight (g)	Pan+sediment wet weight (g)	Pan+sediment dry weight (g)	Wet Weight (g)	Dry Weight (g)	% Dry	Dry/Wet Ratio	Mean % Moisture	Mean % Dry	Mean Dry/Wet Ratio
NMP-11	34	1.316	2.665	2.318	1.349	1.002	74.3%	0.743	25.0%	75.0%	0.750
	35	1.322	2.543	2.25	1.221	0.928	76.0%	0.760			
	36	1.314	2.779	2.409	1.465	1.095	74.7%	0.747			

5.3 Appendix C. Reference Toxicity Test Statistics for Elutriate Exposures

5.3.1 Americamysis bahia (96-h)

Acute Fish Test-48 Hr Survival

Start Date:	29-Oct-18		Test ID:	1		Sample ID:	KCl						
End Date:			Lab ID:			Sample Type:							
Sample Da			Protocol:	EPAA 91-EPA Acute		Test Species:	MY-Mysidopsis bahia						
Comments													

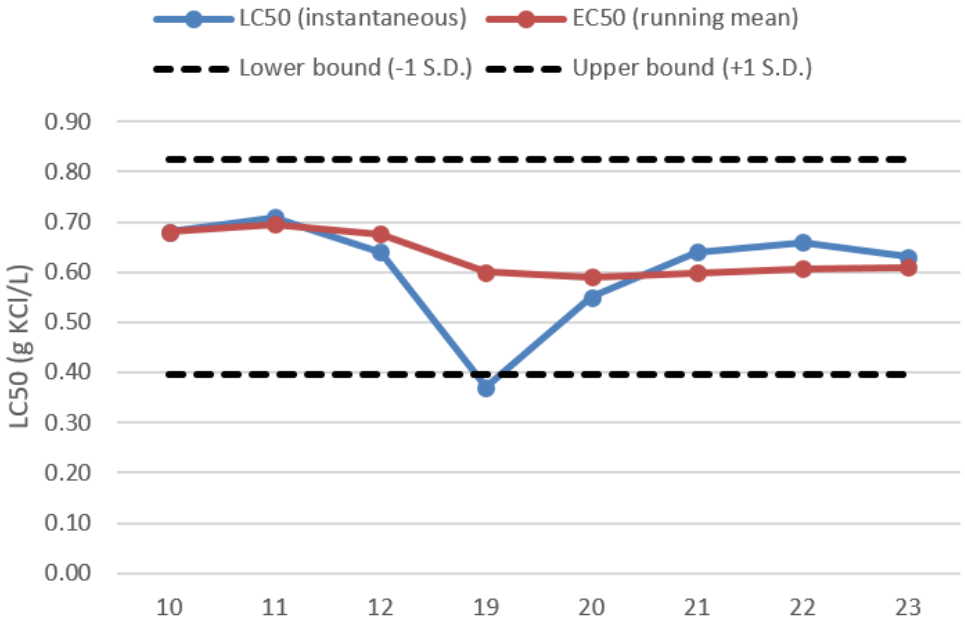
Conc-gm/L	1	2	3
Control	1.0000	1.0000	1.0000
0.0625	1.0000	1.0000	1.0000
0.125	1.0000	0.8000	1.0000
0.25	1.0000	1.0000	1.0000
0.5	0.9000	0.8000	0.9000
1	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Number	Total
Conc-gm/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	3	0	30
0.0625	1.0000	1.0000	1.4186	1.4120	1.4317	0.800	3	0	33
0.125	0.9333	0.9333	1.3104	1.1071	1.4120	13.432	3	2	30
0.25	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	3	0	30
0.5	0.8667	0.8667	1.2017	1.1071	1.2490	6.817	3	4	30
1	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	3	30	30

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.807836	0.835	-1.4381	3.796089
Equality of variance cannot be confirmed				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	0.6156	0.5529	0.6854
5.0%	0.6547	0.5934	0.7224
10.0%	0.6675	0.5857	0.7608
20.0%	0.6704	0.6331	0.7099
Auto-0.0%	0.6156	0.5529	0.6854



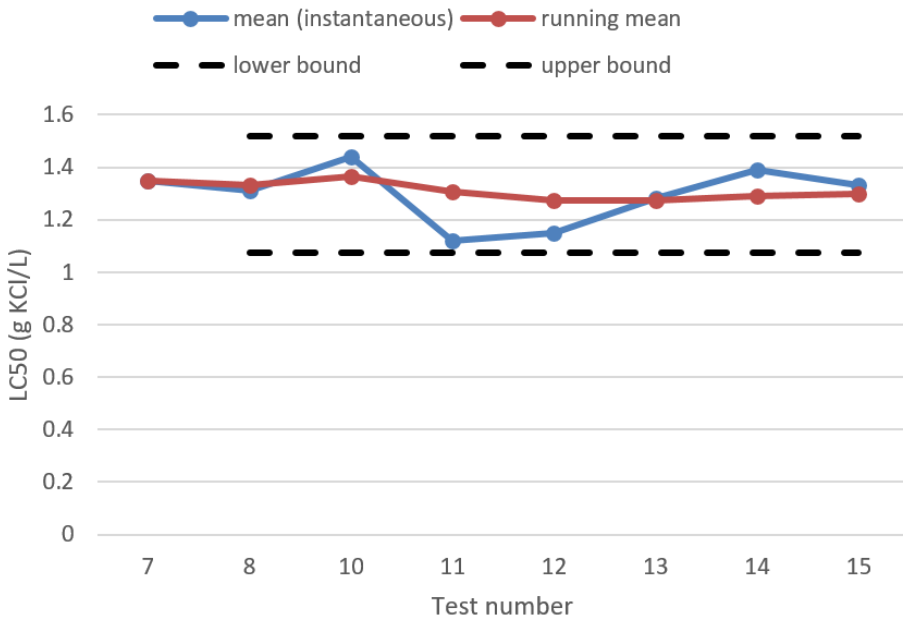
5.3.2 Menidia beryllina

Acute Fish Test-96 Hr Survival												
Start Date:	10/29/2018		Test ID:	1		Sample ID:	KCl				
End Date:	11/2/2018		Lab ID:			Sample Type:					
Sample Da			Protocol:	EPAA 91-EPA Acute		Test Species:	MB-Menidia beryllina				
Comments											
Conc-gm/L	**1**	**2**	**3**								
Control	1.0000	1.0000	1.0000								
0.125	1.0000	1.0000	1.0000								
0.25	1.0000	0.6000	0.9000								
0.5	0.9000	1.0000	1.0000								
1	0.9091	0.8000	1.0000								
2	0.3000	0.1000	0.1000								

			Transform: Arcsin Square Root							Number	Total
Conc-gm/L	**Mean**	**N-Mean**	**Mean**	**Min**	**Max**	**CV%**	**N**			**Resp**	**Number**
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	3			0	30
0.125	1.0000	1.0000	1.4145	1.4120	1.4195	0.304	3			0	31
0.25	0.8333	0.8333	1.1824	0.8861	1.4120	22.770	3			5	30
0.5	0.9667	0.9667	1.3577	1.2490	1.4120	6.930	3			1	30
1	0.9030	0.9030	1.2612	1.1071	1.4120	12.088	3			3	31
2	0.1667	0.1667	0.4077	0.3218	0.5796	36.519	3			25	30

Auxiliary Tests	**Statistic**	**Critical**	**Skew**	**Kurt**
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.947157	0.858	-0.39923	1.184292
Equality of variance cannot be confirmed				

Trimmed Spearman-Karber			
Trim Level	**EC50**	**95% CL**	
0.0%			
5.0%			
10.0%			
20.0%	1.4602	1.3427	1.5879
Auto-16.7%	1.4602	1.3427	1.5879



5.4 Appendix D. Elutriate bioassay water quality parameters

Table E1. Water quality parameters for 96-hour *Americamysis bahia* bioassay. Means and one standard deviation from the mean are indicated, with the minimum and maximum range of the data provided in parentheses.

Sediment Elutriate	Conc.	Temperature (° C)	Salinity (‰)	pH (SU)	Dissolved oxygen (mg/L)
Control	N/A	20.7 ± 0.2 (20.6 - 21.1)	30.3 ± 0.2 (30.1 - 30.5)	7.80 ± 0.07 (7.73 - 7.91)	6.5 ± 0.5 (6.2 - 7.4)
HSC-NMP-1	0%	20.3 ± 0.6 (19.7 - 21.4)	30.8 ± 0.8 (30.0 - 31.7)	7.86 ± 0.07 (7.75 - 7.95)	6.6 ± 0.7 (5.9 - 7.8)
	10%	20.8 ± 0.5 (20.3 - 21.6)	30.2 ± 0.2 (30.1 - 30.6)	7.86 ± 0.06 (7.78 - 7.94)	6.5 ± 0.7 (6.0 - 7.6)
	50%	20.7 ± 0.4 (20.2 - 21.3)	30.1 ± 0.3 (29.8 - 30.5)	7.99 ± 0.05 (7.91 - 8.02)	6.7 ± 0.6 (6.1 - 7.6)
	100%	20.3 ± 0.7 (19.6 - 21.2)	29.5 ± 0.3 (29.3 - 30.1)	8.05 ± 0.08 (7.93 - 8.13)	6.6 ± 0.7 (6.0 - 7.8)
HSC-NMP-2	0%	20.9 ± 0.9 (19.3 - 21.7)	29.9 ± 0.2 (29.7 - 30.1)	7.92 ± 0.05 (7.84 - 7.98)	6.2 ± 0.9 (5.5 - 7.8)
	10%	21.0 ± 0.4 (20.3 - 21.4)	30.5 ± 0.3 (30.1 - 30.9)	7.87 ± 0.04 (7.83 - 7.93)	6.4 ± 0.7 (6.0 - 7.6)
	50%	20.9 ± 0.5 (20.2 - 21.4)	29.9 ± 0.3 (29.6 - 30.4)	7.93 ± 0.05 (7.90 - 8.02)	6.4 ± 0.7 (5.9 - 7.6)
	100%	20.6 ± 0.6 (19.6 - 21.1)	29.6 ± 0.4 (29.2 - 30.2)	8.01 ± 0.04 (7.97 - 8.08)	6.5 ± 0.7 (6.0 - 7.7)
HSC-NMP-3	0%	20.2 ± 0.5 (19.3 - 20.6)	29.5 ± 0.5 (29.1 - 30.3)	7.92 ± 0.07 (7.87 - 8.04)	6.7 ± 0.7 (6.2 – 8.0)
	100%	20.1 ± 0.3 (19.6 - 20.3)	30.4 ± 0.6 (29.9 - 31.2)	7.97 ± 0.07 (7.92 - 8.10)	6.7 ± 0.6 (6.1 - 7.7)
HSC-NMP-4	0%	20.0 ± 0.3 (19.5 - 20.3)	30.5 ± 0.4 (30.2 - 31.1)	7.93 ± 0.04 (7.88 - 7.99)	6.6 ± 0.6 (6.2 - 7.6)
	10%	20.2 ± 0.2 (20.0 - 20.4)	30.5 ± 0.4 (30.2 - 31.2)	7.85 ± 0.07 (7.77 - 7.93)	6.5 ± 0.6 (6.0 - 7.5)
	50%	20.0 ± 0.4 (19.6 - 20.4)	30.2 ± 0.3 (29.8 - 30.6)	7.92 ± 0.04 (7.89 - 7.98)	6.6 ± 0.5 (6.2 - 7.5)
	100%	19.8 ± 0.4 (19.4 - 20.4)	30.5 ± 0.6 (29.7 - 31.2)	7.97 ± 0.03 (7.92 – 8.00)	6.5 ± 0.3 (6.2 – 7.0)
HSC-NMP-5	0%	19.9 ± 0.6 (19.2 - 20.5)	30.2 ± 0.3 (29.9 - 30.5)	7.93 ± 0.03 (7.90 - 7.97)	6.5 ± 1.0 (5.5 - 8.1)
	10%	20.2 ± 0.5 (19.3 - 20.6)	30.6 ± 0.4 (30.2 - 31.1)	7.86 ± 0.04 (7.84 - 7.94)	6.6 ± 0.7 (6.1 - 7.8)
	50%	20.1 ± 0.4 (19.5 - 20.3)	30.3 ± 0.2 (30.1 - 30.7)	7.95 ± 0.05 (7.91 - 8.04)	6.6 ± 0.7 (6.2 - 7.8)
	100%	19.9 ± 0.3 (19.5 - 20.2)	30.3 ± 0.3 (29.9 - 30.6)	7.99 ± 0.04 (7.94 - 8.04)	6.6 ± 0.6 (6.1 - 7.7)

Sediment Elutriate	Conc.	Temperature (° C)	Salinity (‰)	pH (SU)	Dissolved oxygen (mg/L)
HSC-NMP-6	0%	19.9 ± 0.4 (19.4 - 20.4)	30.2 ± 0.3 (29.8 - 30.4)	7.96 ± 0.02 (7.93 - 7.99)	6.8 ± 1 (6.0 - 8.5)
	10%	20.3 ± 0.4 (19.6 - 20.7)	30.6 ± 0.3 (30.3 - 31.2)	7.85 ± 0.05 (7.82 - 7.93)	6.6 ± 0.4 (6.2 - 7.3)
	50%	20.2 ± 0.4 (19.6 - 20.5)	31.9 ± 0.3 (31.5 - 32.3)	7.92 ± 0.03 (7.90 - 7.97)	6.6 ± 0.4 (6.3 - 7.3)
	100%	20 ± 0.4 (19.6 - 20.5)	33.0 ± 0.2 (32.9 - 33.4)	7.97 ± 0.03 (7.92 – 8.00)	6.4 ± 0.7 (5.8 - 7.6)
HSC-NMP-7	0%	19.8 ± 0.5 (19.0 - 20.5)	29.9 ± 0.6 (29.5 - 30.8)	7.95 ± 0.05 (7.87 - 8.01)	6.8 ± 0.8 (6.0 - 8.2)
	10%	19.7 ± 0.5 (19.0 - 20.5)	30.4 ± 0.5 (30.0 - 31.2)	7.89 ± 0.08 (7.82 - 8.02)	6.6 ± 0.6 (6.0 - 7.5)
	50%	19.7 ± 0.5 (19.0 - 20.3)	30.2 ± 0.6 (29.7 - 31.2)	7.95 ± 0.03 (7.93 – 8.00)	6.7 ± 0.5 (6.3 - 7.6)
	100%	19.7 ± 0.5 (19.0 - 20.3)	30.1 ± 0.3 (29.8 - 30.5)	7.98 ± 0.11 (7.79 - 8.05)	6.6 ± 0.6 (6.2 - 7.6)
HSC-NMP-8	0%	19.5 ± 0.3 (19.0 - 19.9)	30.0 ± 0.6 (29.5 - 30.8)	7.95 ± 0.05 (7.91 - 8.04)	6.9 ± 0.9 (6.3 - 8.5)
	10%	19.7 ± 0.5 (19.0 - 20.3)	30.6 ± 0.7 (30.1 - 31.8)	7.83 ± 0.05 (7.79 - 7.92)	6.7 ± 0.5 (6.2 - 7.6)
	50%	19.7 ± 0.4 (19.0 - 20.1)	30.4 ± 0.7 (29.9 - 31.4)	7.90 ± 0.06 (7.85 – 8.00)	6.7 ± 0.5 (6.2 - 7.6)
	100%	19.6 ± 0.3 (19.0 - 19.9)	30.4 ± 0.8 (29.6 - 31.3)	7.96 ± 0.06 (7.89 - 8.06)	6.7 ± 0.5 (6.2 - 7.5)
HSC-NMP-9	0%	20.2 ± 0.4 (19.5 - 20.6)	29.8 ± 0.3 (29.6 - 30.2)	7.96 ± 0.03 (7.93 – 8.00)	6.5 ± 0.8 (5.9 - 7.9)
	10%	20.4 ± 0.3 (20.0 - 20.7)	30.4 ± 0.2 (30.1 - 30.7)	7.85 ± 0.04 (7.82 - 7.91)	6.5 ± 0.6 (6.0 - 7.5)
	50%	20.3 ± 0.2 (19.9 - 20.5)	30.1 ± 0.2 (29.9 - 30.5)	7.91 ± 0.07 (7.81 – 8.00)	6.4 ± 0.8 (5.3 - 7.6)
	100%	19.9 ± 0.3 (19.6 - 20.2)	30.0 ± 0.3 (29.6 - 30.4)	8.00 ± 0.03 (7.97 - 8.05)	6.6 ± 0.7 (6.2 - 7.8)
HSC-NMP-10	0%	19.9 ± 0.3 (19.4 - 20.2)	29.7 ± 0.2 (29.5 – 30.0)	7.95 ± 0.04 (7.92 - 8.02)	6.5 ± 0.9 (5.8 - 7.9)
	10%	20.0 ± 0.4 (19.4 - 20.4)	30.5 ± 0.3 (30.2 - 30.9)	7.86 ± 0.05 (7.81 - 7.93)	6.7 ± 0.5 (6.2 - 7.5)
	50%	20.0 ± 0.4 (19.4 - 20.4)	30.3 ± 0.3 (30.1 - 30.8)	7.91 ± 0.05 (7.87 - 7.99)	6.5 ± 0.7 (6.0 - 7.6)
	100%	19.9 ± 0.3 (19.5 - 20.2)	30.2 ± 0.2 (30.1 - 30.5)	7.98 ± 0.04 (7.95 - 8.04)	6.5 ± 0.8 (5.7 - 7.7)
HSC-NMP-11	0%	20.0 ± 0.5 (19.3 - 20.5)	30.3 ± 0.3 (30.0 - 30.6)	7.93 ± 0.04 (7.90 - 8.01)	6.7 ± 1.1 (6.0 - 8.5)
	10%	20.2 ± 0.4 (19.6 - 20.6)	30.5 ± 0.4 (30.1 - 30.9)	7.85 ± 0.05 (7.81 - 7.94)	6.5 ± 0.5 (6.2 - 7.4)

Sediment Elutriate	Conc.	Temperature (° C)	Salinity (‰)	pH (SU)	Dissolved oxygen (mg/L)
	50%	20.3 ± 0.3 (19.7 - 20.6)	30.0 ± 0.6 (29.0 - 30.7)	7.93 ± 0.05 (7.90 - 8.02)	6.4 ± 0.6 (6.0 - 7.5)
	100%	20.1 ± 0.3 (19.7 - 20.4)	30.1 ± 0.4 (29.7 - 30.6)	7.99 ± 0.03 (7.96 - 8.04)	6.6 ± 0.5 (6.2 - 7.4)

Table E3. Water quality parameters for 96-hour *Menidia beryllina* bioassay.
Means and one standard deviation from the mean are indicated, with the minimum and maximum range of the data provided in parentheses.

Sediment Elutriate	Conc.	Temperature (° C)	Salinity (‰)	pH (SU)	Dissolved oxygen (mg/L)
Control	N/A	20.8 ± 0.1 (20.7 - 20.9)	30.4 ± 0.2 (30.2 - 30.7)	7.77 ± 0.08 (7.71 - 7.90)	6.3 ± 0.7 (5.7 - 7.5)
HSC-NMP-1	0%	19.7 ± 0.4 (19.2 - 20.2)	30.5 ± 0.5 (30.0 - 31.2)	7.90 ± 0.10 (7.82 - 8.05)	6.7 ± 0.6 (6.2 - 7.8)
	10%	20.0 ± 0.3 (19.7 - 20.3)	30.5 ± 0.4 (30.1 – 31.0)	7.87 ± 0.10 (7.79 - 8.01)	6.6 ± 0.6 (6.2 - 7.6)
	50%	19.9 ± 0.3 (19.5 - 20.3)	30.1 ± 0.2 (29.8 - 30.4)	8.02 ± 0.10 (7.94 - 8.20)	6.5 ± 0.7 (6.0 - 7.6)
	100%	19.8 ± 0.3 (19.5 - 20.2)	29.9 ± 0.4 (29.3 - 30.4)	8.07 ± 0.12 (7.99 - 8.28)	6.6 ± 0.7 (6.1 - 7.8)
HSC-NMP-2	0%	20.2 ± 0.5 (19.3 - 20.7)	30.0 ± 0.1 (29.9 - 30.2)	7.94 ± 0.11 (7.85 - 8.10)	6.5 ± 0.7 (6.0 - 7.8)
	10%	20.4 ± 0.2 (20.2 - 20.7)	30.2 ± 0.5 (29.3 - 30.7)	7.85 ± 0.10 (7.76 - 7.98)	6.5 ± 0.6 (5.9 - 7.6)
	50%	20.5 ± 0.3 (20.2 - 20.9)	29.9 ± 0.2 (29.7 - 30.2)	7.95 ± 0.10 (7.84 - 8.09)	6.5 ± 0.6 (6.2 - 7.6)
	100%	20.5 ± 0.6 (19.6 - 21.1)	29.4 ± 0.1 (29.2 - 29.5)	8.02 ± 0.10 (7.93 - 8.18)	6.5 ± 0.7 (6.0 - 7.7)
HSC-NMP-3	0%	20.1 ± 0.6 (19.3 - 20.6)	29.6 ± 0.3 (29.1 - 29.8)	7.93 ± 0.06 (7.89 - 8.04)	6.5 ± 0.9 (5.8 – 8.0)
	100%	20.2 ± 0.4 (19.6 - 20.5)	30.3 ± 0.3 (29.9 - 30.6)	7.97 ± 0.07 (7.92 - 8.10)	6.4 ± 0.7 (5.9 - 7.7)
HSC-NMP-4	0%	19.9 ± 0.2 (19.5 - 20.1)	30.3 ± 0.1 (30.2 - 30.5)	7.96 ± 0.10 (7.89 - 8.12)	6.5 ± 0.7 (6.0 - 7.8)
	10%	20.1 ± 0.3 (19.8 - 20.4)	30.3 ± 0.1 (30.2 - 30.4)	7.90 ± 0.09 (7.80 - 7.98)	6.4 ± 0.6 (5.9 - 7.5)
	50%	20.1 ± 0.2 (19.9 - 20.5)	30.0 ± 0.7 (28.8 - 30.5)	7.95 ± 0.10 (7.88 - 8.11)	6.4 ± 0.6 (5.9 - 7.5)
	100%	20.1 ± 0.3 (19.7 - 20.5)	29.8 ± 0.1 (29.7 – 30.0)	8.00 ± 0.12 (7.88 - 8.20)	6.1 ± 0.6 (5.7 – 7.0)
HSC-NMP-5	0%	19.6 ± 0.3 (19.2 - 19.9)	30.5 ± 0.3 (30.0 - 30.9)	7.92 ± 0.03 (7.88 - 7.97)	6.6 ± 0.9 (5.8 - 8.1)
	10%	19.9 ± 0.4 (19.4 - 20.5)	30.7 ± 0.4 (30.2 - 31.1)	7.82 ± 0.07 (7.77 - 7.94)	6.6 ± 0.7 (6.0 - 7.8)
	50%	20.0 ± 0.4 (19.8 - 20.8)	30.7 ± 0.4 (30.1 – 31.0)	7.91 ± 0.08 (7.83 - 8.04)	6.5 ± 0.8 (5.7 - 7.8)
	100%	19.9 ± 0.2 (19.7 - 20.1)	30.2 ± 0.3 (29.9 - 30.6)	7.96 ± 0.04 (7.93 - 8.01)	6.3 ± 0.7 (5.9 - 7.7)
HSC-NMP-6	0%	20.1 ± 0.4 (19.4 - 20.4)	30.0 ± 0.1 (29.8 - 30.2)	7.98 ± 0.10 (7.90 - 8.14)	6.7 ± 1.0 (5.9 - 8.5)
	10%	20.2 ± 0.3 (19.8 - 20.7)	30.6 ± 0.1 (30.5 - 30.8)	7.89 ± 0.08 (7.81 – 8.00)	6.6 ± 0.5 (6.0 - 7.3)

Sediment Elutriate	Conc.	Temperature (° C)	Salinity (‰)	pH (SU)	Dissolved oxygen (mg/L)
	50%	20.1 ± 0.4 (19.6 - 20.5)	32.1 ± 0.5 (31.5 - 32.5)	7.92 ± 0.14 (7.75 - 8.12)	6.6 ± 0.4 (6.2 - 7.3)
	100%	20.3 ± 0.4 (19.8 - 20.8)	33.1 ± 0.2 (32.9 - 33.3)	7.97 ± 0.13 (7.83 - 8.18)	6.5 ± 0.6 (6.0 - 7.6)
HSC-NMP-7	0%	19.7 ± 0.3 (19.3 – 20.0)	30.2 ± 0.4 (29.5 - 30.5)	7.90 ± 0.08 (7.77 - 7.98)	6.7 ± 0.8 (6.1 - 8.2)
	10%	20.1 ± 0.3 (19.7 - 20.5)	30.4 ± 0.1 (30.2 - 30.6)	7.85 ± 0.06 (7.80 - 7.92)	6.4 ± 0.7 (5.9 - 7.5)
	50%	20.0 ± 0.2 (19.8 - 20.3)	30.2 ± 0.1 (30.0 - 30.4)	7.96 ± 0.04 (7.92 – 8.00)	6.3 ± 0.7 (6.0 - 7.6)
	100%	20.0 ± 0.3 (19.8 - 20.4)	30.0 ± 0.1 (29.8 - 30.1)	8.00 ± 0.04 (7.95 - 8.04)	6.5 ± 0.7 (5.9 - 7.6)
HSC-NMP-8	0%	19.9 ± 0.4 (19.4 - 20.3)	29.6 ± 0.2 (29.5 - 29.9)	7.93 ± 0.06 (7.89 - 8.04)	6.3 ± 1.2 (5.5 - 8.5)
	10%	20.1 ± 0.3 (19.7 - 20.4)	30.3 ± 0.2 (30.1 - 30.5)	7.82 ± 0.06 (7.77 - 7.92)	6.4 ± 0.7 (5.9 - 7.6)
	50%	20.1 ± 0.3 (19.7 - 20.4)	30.1 ± 0.1 (29.9 - 30.3)	7.91 ± 0.05 (7.88 – 8.00)	6.4 ± 0.7 (5.9 - 7.6)
	100%	20.0 ± 0.3 (19.7 - 20.4)	29.7 ± 0.1 (29.6 - 29.9)	7.99 ± 0.04 (7.95 - 8.06)	6.4 ± 0.6 (6.0 - 7.5)
HSC-NMP-9	0%	19.7 ± 0.2 (19.5 – 20.0)	30.0 ± 0.3 (29.6 - 30.2)	7.94 ± 0.04 (7.9 – 8.00)	6.7 ± 0.8 (5.8 - 7.9)
	10%	20.1 ± 0.4 (19.7 - 20.7)	30.3 ± 0.2 (30.1 - 30.6)	7.81 ± 0.06 (7.77 - 7.91)	6.4 ± 0.6 (6.0 - 7.5)
	50%	20.1 ± 0.4 (19.7 - 20.6)	30.1 ± 0.2 (29.9 - 30.4)	7.90 ± 0.06 (7.87 – 8.00)	6.4 ± 0.6 (6.0 - 7.6)
	100%	19.8 ± 0.2 (19.6 – 20.0)	29.8 ± 0.2 (29.6 - 30.1)	7.98 ± 0.04 (7.95 - 8.05)	6.4 ± 0.8 (5.8 - 7.8)
HSC-NMP-10	0%	20.0 ± 0.6 (19.0 - 20.6)	30.0 ± 0.4 (29.5 - 30.4)	7.98 ± 0.09 (7.91 - 8.13)	6.5 ± 0.9 (5.8 - 7.9)
	10%	20.3 ± 0.3 (19.8 - 20.6)	30.7 ± 0.3 (30.2 - 30.9)	7.86 ± 0.08 (7.79 - 7.96)	6.5 ± 0.6 (5.8 - 7.5)
	50%	20.2 ± 0.3 (19.7 - 20.5)	30.7 ± 0.4 (30.1 – 31.0)	7.92 ± 0.10 (7.84 - 8.07)	6.5 ± 0.7 (5.8 - 7.6)
	100%	20.1 ± 0.4 (19.6 - 20.5)	30.6 ± 0.3 (30.1 - 30.9)	7.99 ± 0.11 (7.89 - 8.16)	6.6 ± 0.7 (5.9 - 7.7)
HSC-NMP-11	0%	20.0 ± 0.5 (19.3 - 20.6)	30.4 ± 0.2 (30.0 - 30.6)	7.92 ± 0.06 (7.85 - 8.01)	6.8 ± 1.0 (6.2 - 8.5)
	10%	20.4 ± 0.4 (19.9 - 20.7)	30.3 ± 0.1 (30.1 - 30.4)	7.83 ± 0.07 (7.77 - 7.94)	6.5 ± 0.5 (6.2 - 7.4)
	50%	20.3 ± 0.3 (19.9 - 20.7)	30.1 ± 0.1 (30.0 - 30.3)	7.91 ± 0.07 (7.84 - 8.02)	6.5 ± 0.6 (5.9 - 7.5)
	100%	20.3 ± 0.3 (20.0 - 20.6)	29.8 ± 0.1 (29.7 - 30.1)	7.98 ± 0.05 (7.92 - 8.04)	6.4 ± 0.6 (5.9 - 7.4)

5.5 Appendix E. Statistical Analyses for Elutriate Toxicity Tests

5.5.1 Americamysis bahia (96h)

Acute Fish Test-96 Hr Survival												
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP1			
End Date:	11/2/2018		Lab ID:				Sample Type:					
Sample Dat			Protocol:	EPAA 91-EPA Acute			Test Species:		MY-Mysidopsis bahia			
Comments:												

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
100	0.1000	0.7000	0.3000	0.4000	0.5000

			Transform: Arcsin Square Root						1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5				
*100	0.4000	0.4167	0.6725	0.3218	0.9912	36.881	5	5.360	1.860	0.2354	

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.911669		0.781		-0.491595	0.701406
F-Test indicates equal variances (p = 0.27)	3.309589		23.1545			

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences	0.145712	0.152982	1.150939	0.040055	6.8E-04	1, 8

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018	Test ID:	1	Sample ID:	NMP1		
End Date:	11/2/2018	Lab ID:		Sample Type:			
Sample Dat		Protocol:	EPAA 91-EPA Acute	Test Species:	MY-Mysidopsis bahia		
Comments:							

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
10	0.9000	0.9000	0.9091	0.9000	1.0000
50	0.9000	0.9000	0.8000	0.7000	1.0000
100	0.1000	0.7000	0.3000	0.4000	0.5000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5			
10	0.9218	0.9602	1.2862	1.2490	1.4195	5.814	5	0.615	2.230	0.2352
50	0.8600	0.8958	1.2017	0.9912	1.4120	13.288	5	1.416	2.230	0.2352
*100	0.4000	0.4167	0.6725	0.3218	0.9912	36.881	5	6.434	2.230	0.2352

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.960224	0.868	-0.363038	0.89109
Bartlett's Test indicates equal variances (p = 0.19)	4.702851	11.34487		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.71068	2	0.145536	0.152797	0.479437	0.0278	2.9E-05	3, 16

Acute Fish Test-96 Hr Survival												
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP1			
End Date:	11/2/2018		Lab ID:				Sample Type:					
Sample Dat			Protocol:	EPAA 91-EPA Acute			Test Species:		MY-Mysidopsis bahia			
Comments:												

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
10	0.9000	0.9000	0.9091	0.9000	1.0000
50	0.9000	0.9000	0.8000	0.7000	1.0000
100	0.1000	0.7000	0.3000	0.4000	0.5000

			Transform: Arcsin Square Root					Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5	2	50
10	0.9218	0.9602	1.2862	1.2490	1.4195	5.814	5	4	52
50	0.8600	0.8958	1.2017	0.9912	1.4120	13.288	5	7	50
100	0.4000	0.4167	0.6725	0.3218	0.9912	36.881	5	30	50

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.960224	0.868	-0.363038	0.89109
Bartlett's Test indicates equal variances (p = 0.19)	4.702851	11.34487		

Trimmed Spearman-Karber			
Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%			
Auto-41.7%	88.644	74.932	104.864

Acute Fish Test-96 Hr Survival												
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP4			
End Date:	11/2/2018		Lab ID:				Sample Type:					
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MY-Mysidopsis bahia			
Comments												

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
100	0.8000	0.4000	0.7000	0.6000	0.7000

			Transform: Arcsin Square Root					Rank	1-Tailed			
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical			
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5					
*100	0.6400	0.6667	0.9321	0.6847	1.1071	17.043	5	15.50	19.00			

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.764059	0.781	-1.17766	0.43893
F-Test indicates equal variances (p = 0.77)	1.357439	23.1545		
Hypothesis Test (1-tail, 0.05)				
Wilcoxon Two-Sample Test indicates significant differences				

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018	Test ID:	1	Sample ID:	NMP4
End Date:	11/2/2018	Lab ID:		Sample Type:	
Sample Da		Protocol:	EPAA 91-EPA Acute	Test Species:	MY-Mysidopsis bahia
Comments					

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	0.9000
50	0.9000	0.9000	0.9000	0.8000	1.0000
100	0.8000	0.4000	0.7000	0.6000	0.7000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5			
10	0.9800	1.0208	1.3794	1.2490	1.4120	5.284	5	-0.364	2.230	0.1739
50	0.9000	0.9375	1.2533	1.1071	1.4120	8.613	5	1.254	2.230	0.1739
*100	0.6400	0.6667	0.9321	0.6847	1.1071	17.043	5	5.374	2.230	0.1739

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.87	0.868	-0.97935	0.734932
Bartlett's Test indicates equal variances (p = 0.53)	2.203017	11.34487		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.71068	2	0.099576	0.104544	0.21048	0.015196	1.0E-04	3, 16

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018	Test ID:	1	Sample ID:	NMP7
End Date:	11/2/2018	Lab ID:		Sample Type:	
Sample Da		Protocol:	EPAA 91-EPA Acute	Test Species:	MY-Mysidopsis bahia
Comments					

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
100	0.4000	0.3000	0.2000	0.0000	0.3636

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5			
*100	0.2527	0.2633	0.5068	0.1588	0.6847	41.818	5	7.491	1.860	0.2096

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.808395		0.781		-1.37801	1.054302
F-Test indicates equal variances (p = 0.41)	2.416462		23.1545			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences	0.125752	0.132026	1.781804	0.031754	7.0E-05	1, 8

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018	Test ID:	1	Sample ID:	NMP7
End Date:	11/2/2018	Lab ID:		Sample Type:	
Sample Da		Protocol:	EPAA 91-EPA Acute	Test Species:	MY-Mysidopsis bahia
Comments					

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000
50	0.9000	0.9000	1.0000	1.0000	1.0000
100	0.4000	0.3000	0.2000	0.0000	0.3636

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5		
10	1.0000	1.0417	1.4174	1.4120	1.4317	0.606	5	34.00	17.00
50	0.9600	1.0000	1.3483	1.2490	1.4195	6.725	5	28.00	17.00
*100	0.2527	0.2633	0.5068	0.1588	0.6847	41.818	5	15.00	17.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.849324	0.868	-1.5143	2.764851
Bartlett's Test indicates unequal variances (p = 2.39E-04)	19.28577	11.34487		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	50	100	70.71068	2

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018	Test ID:	1	Sample ID:	NMP7
End Date:	11/2/2018	Lab ID:		Sample Type:	
Sample Da		Protocol:	EPAA 91-EPA Acute	Test Species:	MY-Mysidopsis bahia
Comments					

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000
50	0.9000	0.9000	1.0000	1.0000	1.0000
100	0.4000	0.3000	0.2000	0.0000	0.3636

			Transform: Arcsin Square Root					Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5	2	50
10	1.0000	1.0417	1.4174	1.4120	1.4317	0.606	5	0	54
50	0.9600	1.0000	1.3483	1.2490	1.4195	6.725	5	2	51
100	0.2527	0.2633	0.5068	0.1588	0.6847	41.818	5	38	51

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.849324	0.868	-1.5143	2.764851
Bartlett's Test indicates unequal variances (p = 2.39E-04)	19.28577	11.34487		

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%			
Auto-26.0%	79.385	73.295	85.982

Acute Fish Test-96 Hr Survival													
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP8				
End Date:	11/2/2018		Lab ID:				Sample Type:						
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MY-Mysidopsis bahia				
Comments													

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
100	0.8000	0.8000	0.6000	0.7000	0.6000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5			
*100	0.7000	0.7292	0.9955	0.8861	1.1071	11.106	5	4.529	1.860	0.1460

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.837438	0.781	-1.16487	0.538173
F-Test indicates equal variances (p = 0.69)	1.520668	23.1545		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences	0.080382	0.084392	0.315988	0.015406	0.001927	1, 8

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP8			
End Date:	11/2/2018		Lab ID:				Sample Type:					
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MY-Mysidopsis bahia			
Comments												

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
10	0.9000	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	0.9000	0.8000	0.9000
100	0.8000	0.8000	0.6000	0.7000	0.6000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5			
10	0.9800	1.0208	1.3794	1.2490	1.4120	5.284	5	-0.391	2.230	0.1620
50	0.9200	0.9583	1.2859	1.1071	1.4120	10.026	5	0.898	2.230	0.1620
*100	0.7000	0.7292	0.9955	0.8861	1.1071	11.106	5	4.895	2.230	0.1620

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.907531	0.868	-0.86509	-0.01526
Bartlett's Test indicates equal variances (p = 0.69)	1.485858	11.34487		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.71068	2	0.091242	0.095794	0.154949	0.013186	2.6E-04	3, 16

Acute Fish Test-96 Hr Survival												
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP11			
End Date:	11/2/2018		Lab ID:				Sample Type:					
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MY-Mysidopsis bahia			
Comments												

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
100	0.8000	1.0000	0.8000	0.8000	0.8000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5			
*100	0.8400	0.8750	1.1681	1.1071	1.4120	11.672	5	2.121	1.860	0.1603

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.90066		0.781		0	1.40625
F-Test indicates equal variances (p = 1.00)	1		23.1545			

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences	0.090133	0.094629	0.08365	0.018589	0.066688	1, 8

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018	Test ID:	1	Sample ID:	NMP11		
End Date:	11/2/2018	Lab ID:		Sample Type:			
Sample Da		Protocol:	EPAA 91-EPA Acute	Test Species:	MY-Mysidopsis bahia		
Comments							

Conc-%	1	2	3	4	5
Control	1.0000	0.8000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	0.9000	0.9000
50	1.0000	1.0000	1.0000	1.0000	1.0000
100	0.8000	1.0000	0.8000	0.8000	0.8000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Control	0.9600	1.0000	1.3510	1.1071	1.4120	10.092	5		
10	0.9600	1.0000	1.3468	1.2490	1.4120	6.628	5	26.00	17.00
50	1.0000	1.0417	1.4120	1.4120	1.4120	0.000	5	30.00	17.00
100	0.8400	0.8750	1.1681	1.1071	1.4120	11.672	5	20.00	17.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.907738	0.868	-0.06556	2.398115
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1

5.5.2 Menidia beryllina (96h)

Acute Fish Test-96 Hr Survival													
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP1				
End Date:	11/2/2018		Lab ID:				Sample Type:						
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MB-Menidia beryllina				
Comments													
Conc-%	**1**	**2**	**3**	**4**	**5**								
Control	1.0000	1.0000	1.0000	1.0000	0.9000								
100	0.4000	0.4000	0.1000	0.3000	0.7000								

			Transform: Arcsin Square Root						1-Tailed			
Conc-%	**Mean**	**N-Mean**	**Mean**	**Min**	**Max**	**CV%**	**N**	**t-Stat**	**Critical**	**MSD**		
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5					
*100	0.3800	0.3878	0.6524	0.3218	0.9912	36.873	5	6.468	1.860	0.2090		

Auxiliary Tests	**Statistic**		**Critical**		**Skew**	**Kurt**
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.838782		0.781		0.009785	2.704292
F-Test indicates equal variances (p = 0.04)	10.89392		23.1545			

Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences	0.115758	0.120103	1.321413	0.031589	1.9E-04	1, 8

Acute Fish Test-96 Hr Survival													
Start Date:	10/29/2018		Test ID:	1			Sample ID:	NMP1					
End Date:	11/2/2018		Lab ID:				Sample Type:						
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:	MB-Menidia beryllina					
Comments													

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
10	1.0000	0.9091	1.0000	0.9000	1.0000
50	1.0000	1.0000	1.0000	1.0000	0.8000
100	0.4000	0.4000	0.1000	0.3000	0.7000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5		
10	0.9618	0.9814	1.3499	1.2490	1.4120	6.312	5	25.50	17.00
50	0.9600	0.9796	1.3510	1.1071	1.4120	10.092	5	27.00	17.00
*100	0.3800	0.3878	0.6524	0.3218	0.9912	36.873	5	15.00	17.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.837015	0.868	-0.32365	2.473952
Bartlett's Test indicates equal variances (p = 0.09)	6.43982	11.34487		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	50	100	70.71068	2

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018	Test ID:	1	Sample ID:	NMP810
End Date:	11/2/2018	Lab ID:		Sample Type:	
Sample Da		Protocol:	EPAA 91-EPA Acute	Test Species:	MB-Menidia beryllina
Comments					

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
10	1.0000	0.9091	1.0000	0.9000	1.0000
50	1.0000	1.0000	1.0000	1.0000	0.8000
100	0.4000	0.4000	0.1000	0.3000	0.7000

			Transform: Arcsin Square Root					Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	1	50
10	0.9618	0.9814	1.3499	1.2490	1.4120	6.312	5	2	51
50	0.9600	0.9796	1.3510	1.1071	1.4120	10.092	5	2	50
100	0.3800	0.3878	0.6524	0.3218	0.9912	36.873	5	31	50

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.837015	0.868	-0.32365	2.473952
Bartlett's Test indicates equal variances (p = 0.09)	6.43982	11.34487		

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%			
Auto-38.8%	87.682	76.909	99.963

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP4			
End Date:	11/2/2018		Lab ID:				Sample Type:					
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MB-Menidia beryllina			
Comments												

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
100	0.3000	0.7000	0.6000	0.6000	0.8000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5			
*100	0.6000	0.6122	0.8900	0.5796	1.1071	22.027	5	5.232	1.860	0.1739

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.874663		0.781		-1.06083	2.531802
F-Test indicates equal variances (p = 0.08)	7.23571		23.1545			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences	0.091442	0.094875	0.598786	0.021873	7.9E-04	1, 8

Acute Fish Test-96 Hr Survival												
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP4			
End Date:	11/2/2018		Lab ID:				Sample Type:					
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MB-Menidia beryllina			
Comments												

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
10	1.0000	1.0000	1.0000	1.0000	0.9000
50	1.0000	0.8889	0.8000	1.0000	0.9000
100	0.3000	0.7000	0.6000	0.6000	0.8000

			Transform: Arcsin Square Root						1-Tailed	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5			
10	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	0.000	2.230	0.1813
50	0.9178	0.9365	1.2822	1.1071	1.4120	10.174	5	1.196	2.230	0.1813
*100	0.6000	0.6122	0.8900	0.5796	1.1071	22.027	5	6.021	2.230	0.1813

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.915215		0.868		-0.85373	1.578781
Bartlett's Test indicates equal variances (p = 0.17)	5.053465		11.34487			

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.71068	2	0.096376	0.099993	0.271564	0.016519	3.8E-05	3, 16

Acute Fish Test-96 Hr Survival												
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP6			
End Date:	11/2/2018		Lab ID:				Sample Type:					
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MB-Menidia beryllina			
Comments												

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
100	0.5000	0.5000	0.4000	0.5000	0.4000

			Transform: Arcsin Square Root					Rank	1-Tailed			
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical			
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5					
*100	0.4600	0.4694	0.7451	0.6847	0.7854	7.401	5	15.00	19.00			

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.697195	0.781	-1.42614	0.854689
F-Test indicates equal variances (p = 0.60)	1.746821	23.1545		
Hypothesis Test (1-tail, 0.05)				
Wilcoxon Two-Sample Test indicates significant differences				

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018	Test ID:	1	Sample ID:	NMP6
End Date:	11/2/2018	Lab ID:		Sample Type:	
Sample Da		Protocol:	EPAA 91-EPA Acute	Test Species:	MB-Menidia beryllina
Comments					

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
10	0.9000	1.0000	0.7000	0.9000	1.0000
50	0.8000	1.0000	0.9000	0.9000	0.9000
100	0.5000	0.5000	0.4000	0.5000	0.4000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5			
10	0.9000	0.9184	1.2627	0.9912	1.4120	13.643	5	1.657	2.230	0.1572
50	0.9000	0.9184	1.2533	1.1071	1.4120	8.613	5	1.790	2.230	0.1572
*100	0.4600	0.4694	0.7451	0.6847	0.7854	7.401	5	8.999	2.230	0.1572

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.908241		0.868		-0.8089	1.643597
Bartlett's Test indicates equal variances (p = 0.15)	5.250422		11.34487			

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.71068	2	0.080468	0.083489	0.39917	0.01242	5.3E-07	3, 16

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018	Test ID:	1	Sample ID:	NMP6
End Date:	11/2/2018	Lab ID:		Sample Type:	
Sample Da		Protocol:	EPAA 91-EPA Acute	Test Species:	MB-Menidia beryllina
Comments					

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
10	0.9000	1.0000	0.7000	0.9000	1.0000
50	0.8000	1.0000	0.9000	0.9000	0.9000
100	0.5000	0.5000	0.4000	0.5000	0.4000

			Transform: Arcsin Square Root					Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	1	50
10	0.9000	0.9184	1.2627	0.9912	1.4120	13.643	5	5	50
50	0.9000	0.9184	1.2533	1.1071	1.4120	8.613	5	5	50
100	0.4600	0.4694	0.7451	0.6847	0.7854	7.401	5	27	50

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.908241	0.868	-0.8089	1.643597
Bartlett's Test indicates equal variances (p = 0.15)	5.250422	11.34487		

Trimmed Spearman-Karber			
Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%			
Auto-46.9%	95.384	77.842	116.879

Acute Fish Test-96 Hr Survival													
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP7				
End Date:	11/2/2018		Lab ID:				Sample Type:						
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MB-Menidia beryllina				
Comments													

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
10	1.0000	0.9000	1.0000	1.0000	1.0000
50	0.8182	0.8000	0.8000	0.9000	0.8000
100	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5		
10	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	27.50	18.00
*50	0.8236	0.8404	1.1402	1.1071	1.2490	5.411	5	15.50	18.00
100	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	5		

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.826411	0.835	-0.92563	0.957313
Bartlett's Test indicates equal variances (p = 0.94)	0.12811	9.21034		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	10	50	22.36068	10

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018	Test ID:	1	Sample ID:	NMP7		
End Date:	11/2/2018	Lab ID:		Sample Type:			
Sample Da		Protocol:	EPAA 91-EPA Acute	Test Species:	MB-Menidia beryllina		
Comments							

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
10	1.0000	0.9000	1.0000	1.0000	1.0000
50	0.8182	0.8000	0.8000	0.9000	0.8000
100	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	1	50
10	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5	1	50
50	0.8236	0.8404	1.1402	1.1071	1.2490	5.411	5	9	51
100	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	5	50	50

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.826411	0.835	-0.92563	0.957313
Bartlett's Test indicates equal variances (p = 0.94)	0.12811	9.21034		

Trimmed Spearman-Karber			
Trim Level	EC50	95% CL	
0.0%	58.837	52.283	66.213
5.0%	62.235	54.100	71.593
10.0%	64.855	53.768	78.228
20.0%	66.204	62.954	69.623
Auto-0.0%	58.837	52.283	66.213

Acute Fish Test-96 Hr Survival													
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP8				
End Date:	11/2/2018		Lab ID:				Sample Type:						
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MB-Menidia beryllina				
Comments													

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
100	0.5000	0.4000	0.7000	0.8000	0.6000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5			
*100	0.6000	0.6122	0.8909	0.6847	1.1071	18.654	5	6.020	1.860	0.1509

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.943179		0.781		-0.07033	0.257991
F-Test indicates equal variances (p = 0.14)	5.199646		23.1545			

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences	0.076477	0.079348	0.596635	0.016466	3.2E-04	1, 8

Acute Fish Test-96 Hr Survival

Start Date:	10/29/2018	Test ID:	1	Sample ID:	NMP8		
End Date:	11/2/2018	Lab ID:		Sample Type:			
Sample Da		Protocol:	EPAA 91-EPA Acute	Test Species:	MB-Menidia beryllina		
Comments							

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
10	0.9000	0.9000	0.9000	1.0000	1.0000
50	1.0000	1.0000	0.9000	1.0000	1.0000
100	0.5000	0.4000	0.7000	0.8000	0.6000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5			
10	0.9400	0.9592	1.3142	1.2490	1.4120	6.792	5	0.958	2.230	0.1518
50	0.9800	1.0000	1.3809	1.2490	1.4195	5.343	5	-0.022	2.230	0.1518
*100	0.6000	0.6122	0.8909	0.6847	1.1071	18.654	5	7.176	2.230	0.1518

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.945174	0.868	-0.12156	0.298277
Bartlett's Test indicates equal variances (p = 0.29)	3.770134	11.34487		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.71068	2	0.077045	0.079937	0.277781	0.011586	3.7E-06	3, 16

Acute Fish Test-96 Hr Survival													
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP810				
End Date:	11/2/2018		Lab ID:				Sample Type:						
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MB-Menidia beryllina				
Comments													

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
100	0.7000	0.8000	0.8000	0.5000	0.7273

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5			
*100	0.7055	0.7199	1.0024	0.7854	1.1071	13.151	5	5.596	1.860	0.1253

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.821652		0.781		-1.37129	1.56812
F-Test indicates equal variances (p = 0.28)	3.271878		23.1545			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences	0.060779	0.063061	0.355296	0.011346	5.1E-04	1, 8

Acute Fish Test-96 Hr Survival													
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP10				
End Date:	11/2/2018		Lab ID:				Sample Type:						
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MB-Menidia beryllina				
Comments													

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
10	0.9000	0.9000	1.0000	1.0000	0.9000
50	1.0000	1.0000	1.0000	1.0000	1.0000
100	0.7000	0.8000	0.8000	0.5000	0.7273

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5		
10	0.9400	0.9592	1.3142	1.2490	1.4120	6.792	5	22.50	17.00
50	1.0000	1.0204	1.4103	1.4033	1.4120	0.275	5	28.00	17.00
*100	0.7055	0.7199	1.0024	0.7854	1.1071	13.151	5	15.00	17.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.902922	0.868	-1.00983	1.64015
Bartlett's Test indicates unequal variances (p = 1.15E-04)	20.8151	11.34487		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	50	100	70.71068	2

Acute Fish Test-96 Hr Survival												
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP810			
End Date:	11/2/2018		Lab ID:				Sample Type:					
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MB-Menidia beryllina			
Comments												

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
100	0.6000	0.4000	0.6000	0.6000	0.5000

			Transform: Arcsin Square Root					Rank	1-Tailed			
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical			
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5					
*100	0.5400	0.5510	0.8257	0.6847	0.8861	10.906	5	15.00	19.00			

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.744375	0.781	-1.29095	0.143195
F-Test indicates equal variances (p = 0.69)	1.526583	23.1545		
Hypothesis Test (1-tail, 0.05)				
Wilcoxon Two-Sample Test indicates significant differences				

Acute Fish Test-96 Hr Survival												
Start Date:	10/29/2018		Test ID:	1			Sample ID:		NMP11			
End Date:	11/2/2018		Lab ID:				Sample Type:					
Sample Da			Protocol:	EPAA 91-EPA Acute			Test Species:		MB-Menidia beryllina			
Comments												

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	0.9000
10	1.0000	1.0000	1.0000	0.9000	0.8182
50	1.0000	1.0000	1.0000	1.0000	0.9000
100	0.6000	0.4000	0.6000	0.6000	0.5000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
Control	0.9800	1.0000	1.3794	1.2490	1.4120	5.284	5		
10	0.9436	0.9629	1.3231	1.1303	1.4120	9.736	5	24.50	17.00
50	0.9800	1.0000	1.3777	1.2490	1.4120	5.227	5	25.50	17.00
*100	0.5400	0.5510	0.8257	0.6847	0.8861	10.906	5	15.00	17.00

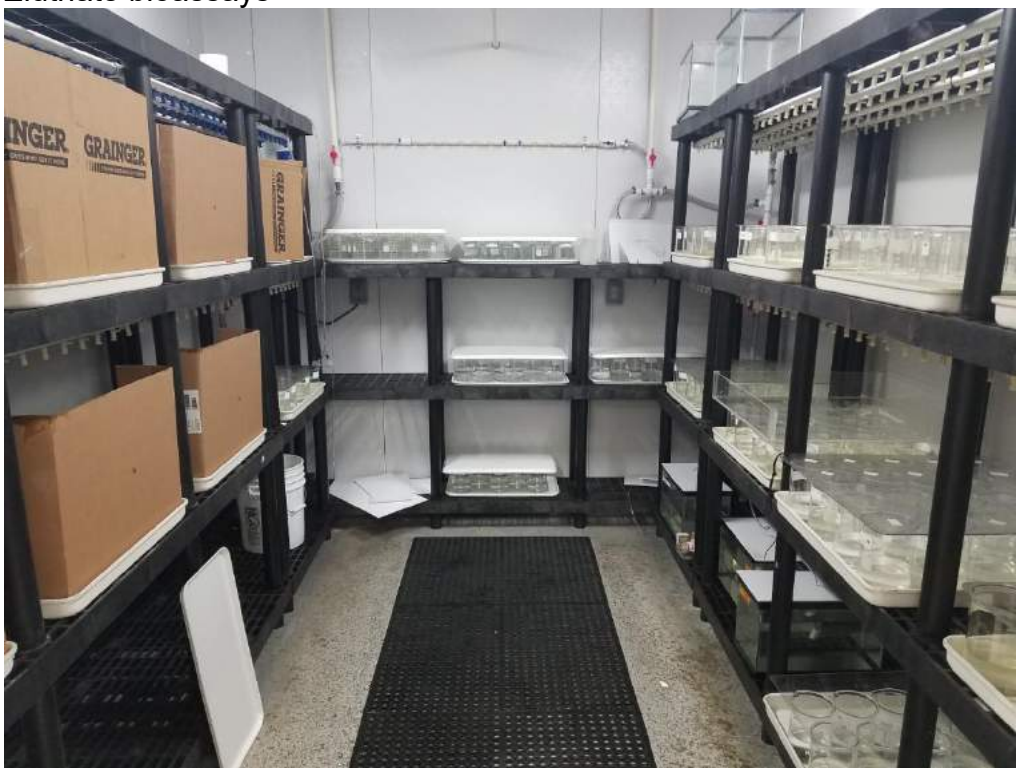
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.821144	0.868	-1.07553	-0.10824
Bartlett's Test indicates equal variances (p = 0.63)	1.743436	11.34487		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	50	100	70.71068	2

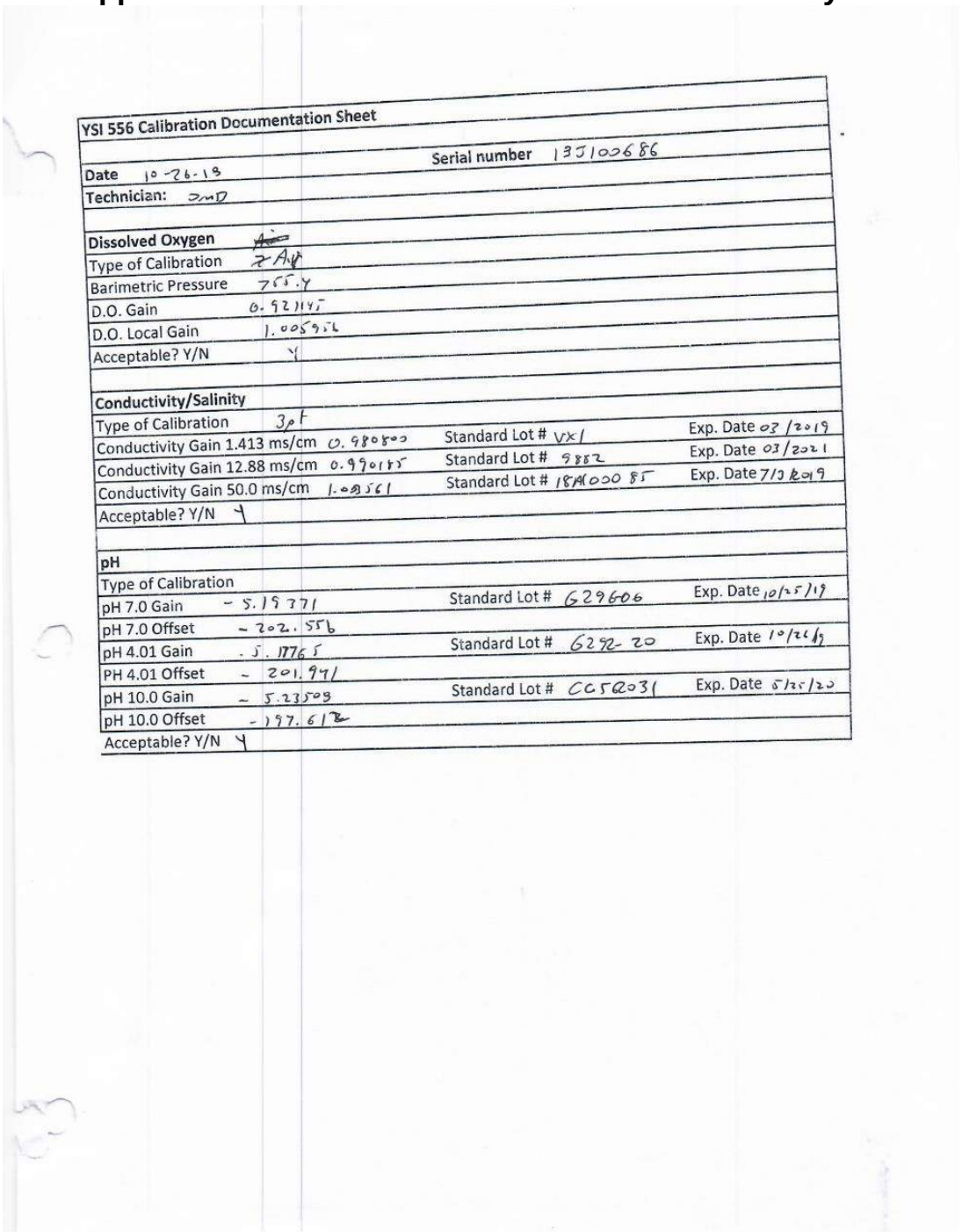
5.6 Appendix F. Laboratory Photographs

5.6.1 Elutriate preparation

5.6.2 Elutriate bioassays



5.7 Appendix G. Raw Data Sheets for Elutriate Bioassays



YSI 556 Calibration Documentation Sheet			
Date 10-26-13	Serial number 13J100686		
Technician: JmD			
Dissolved Oxygen			
Type of Calibration	~~Air~~ ZA&W		
Barimetric Pressure	755.4		
D.O. Gain	0.921145		
D.O. Local Gain	1.005956		
Acceptable? Y/N	Y		
Conductivity/Salinity			
Type of Calibration	3pt		
Conductivity Gain 1.413 ms/cm	0.980800	Standard Lot # VX1	Exp. Date 03/2019
Conductivity Gain 12.88 ms/cm	0.990185	Standard Lot # 9882	Exp. Date 03/2021
Conductivity Gain 50.0 ms/cm	1.008561	Standard Lot # 18A000085	Exp. Date 7/1/2019
Acceptable? Y/N	Y		
pH			
Type of Calibration			
pH 7.0 Gain	-5.19371	Standard Lot # G29606	Exp. Date 10/25/19
pH 7.0 Offset	-202.556		
pH 4.01 Gain	.5.11765	Standard Lot # 6292-20	Exp. Date 10/26/19
PH 4.01 Offset	-201.941		
pH 10.0 Gain	-5.23503	Standard Lot # CC5Q031	Exp. Date 5/25/20
pH 10.0 Offset	-197.612		
Acceptable? Y/N	Y		

YSI 556 Calibration Documentation Sheet			
Date 10.30.18		# 06J2418AG	
Technician: TB			
Dissolved Oxygen			
Type of Calibration Air			
Barimetric Pressure 760.7			
D.O. Gain 1035.173			
D.O. Local Gain 0.999080			
Acceptable? Y/N Yes			
Conductivity/Salinity			
Type of Calibration 3pt			
Conductivity Gain 1.413 ms/cm 0.989172	Standard Lot # V81	Exp. Date 03/2019	
Conductivity Gain 12.88 ms/cm 0.991160	Standard Lot # 9882	Exp. Date 03/2021	
Conductivity Gain 50.0 ms/cm 0.997560	Standard Lot # 18A100085	Exp. Date 7/13/2019	
Acceptable? Y/N Yes			
pH			
Type of Calibration 3pt			
pH 7.0 Gain -5.09109	Standard Lot # G296-06	Exp. Date 10.23.19	
pH 7.0 Offset -108.189			
pH 4.01 Gain -5.13270	Standard Lot # G292-20	Exp. Date 10.26.19	
PH 4.01 Offset -109.073			
pH 10.0 Gain -5.12035	Standard Lot # CC562031	Exp. Date 5.23.20	
pH 10.0 Offset -110.233			
Acceptable? Y/N Yes			

ERDC data sheet

Orion Dual Star pH/ISE meter/probe calibration

Date: 10-29-18		Technician: DMB	
Ammonia Probe Orion 9512			
Ammonia Standard Concentration: 100 mg/L	Lot # WV1	Expiration date: 05/2020	
pH Adjusting ISA Solution 951211	Lot # UR1	Expiration date: N/A	
Standard Dilution Water Source M.W.Q + Ionic Strength adjuster			
Number of Standards in Curve 3	Concentration of Standards in Curve 1.0, 10.0, 100 mg/L		
Slope of Calibration Curve -59.2	Acceptable? (Y)/N		
Comments: HSC-NMP Elutriate test start with menidia and mysids			
pH Probe			
Number of Buffers in Curve			
pH Buffer 7.0 Lot #	Expiration Date		
pH Buffer 4.01 Lot #	Expiration Date		
pH Buffer 10.0 Lot #	Expiration Date		
Slope	Acceptable? Y/N		
Comments:			

ERDC data sheet

Orion Dual Star pH/ISE meter/probe calibration

Date: 11/2/18	Technician: Jay Lindsay		
Ammonia Probe Orion 9512			
Ammonia Standard Concentration: 100 mg/L	Lot # WV1	Expiration date: 05/2020	
pH Adjusting ISA Solution 951211	Lot # UB1	Expiration date: NA	
Standard Dilution Water Source	Milli Q + Ionic Strength Adjuster		
Number of Standards in Curve 3	Concentration of Standards in Curve	1, 10, 100 mg/L	
Slope of Calibration Curve ~~-55.5~~ -56.3	Acceptable? Y/N		
Comments: ## SC-NMP Elutriate test termination with Menidia & mysids			
pH Probe			
Number of Buffers in Curve			
pH Buffer 7.0 Lot #	Expiration Date		
pH Buffer 4.01 Lot #	Expiration Date		
pH Buffer 10.0 Lot #	Expiration Date		
Slope	Acceptable? Y/N		
Comments:			

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 10/25/2018

SPECIES: *Menidia beryllina*

AGE: 8 day

LIFE STAGE: Juvenile

HATCH DATE: 10/17/2018

BEGAN FEEDING: Immediately

FOOD: Rotifers, *Artemia* sp.

Water Chemistry Record:	**Current**	**Range**
TEMPERATURE:	25°C	23-26 °C
SALINITY/CONDUCTIVITY:	25 ppt**	24-26 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	160 mg/l	160-210 mg/l
pH:	8.19	7.87-8.25

Comments: ** Acclimated to 27 ppt on 10/25/18.

Facility Supervisor

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 10/25/2018

SPECIES: *Americamysis bahia* (formerly Mysidopsis)

AGE: <1 day

LIFE STAGE: Juvenile

HATCH DATE: 10/25/2018

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	**Mean**	**Range**
TEMPERATURE:	26 °C	21-26 °C
SALINITY/CONDUCTIVITY:	25 ppt**	21-30 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	140 mg/l	140-170 mg/l
pH:	8.15	7.77-8.20

Comments: ** Acclimated to 27 ppt on 10/25/18.

Facility Supervisor

Aquatic BioSystems, Inc • Quality Research Organisms

TEST ORGANISM RECEI' ND ACCLIMATION SHEET

Project: HSC- NMP	Test Initiation Date: 10-29-18 Time: 1100
Laboratory: FEDC	Test Date(s): 10/28/18-11/2/18 Time: 1100
Test Species: Menidia beryllina	Page 1 of 1
Exposure duration: 96h	Environmental chamber temperature: 20°C

Day	Date	Original Number	Number Dead/removed	Estimated Survival	Water Change (Y/N)	Feeding (Y/N)	Temp. (°C)	Salinity/Cond. (ppt / uS/cm)	pH (SU)	D.O. (mg/L)	Initials	Comments (mg/L)
0*	10/26	2885	Ø	100%	Partial	Y	21.6	29.2	7.61	11.31	[illegible]	Box 2.2 (5 fish bags)
1	10/27	2885	Ø	–	N	Y	20.2	29.7	7.70	10.69	VR	
2	10/28	2885	Ø	–	N	Y	20.1	30.1	7.74	9.20	VR	
3	10/29											Test initiation
4												
5												
6												
7												
8												
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24												

* Taken immediately upon receiving

Reviewed by Lauren May on 29 March19

TEST ORGANISM RECEI' ND ACCLIMATION SHEET

Project: HSC-NMP
Laboratory: ERDC
Test Species: Americamysis bahia
Exposure duration: 96h

Test Initiation Date: 10.29.18 Time: 1100
Test Date(s): 10/29/18 - 11/2/18 Time: 1100
Page 1 of 1
Environmental chamber temperature: 20°C

Day	Date	Original Number	Number Dead/removed	Estimated Survival	Water Change (Y/N)	Feeding (Y/N)	Temp. (°C)	Salinity/Cond. (ppt / uS/cm)	pH (SU)	D.O. (mg/L)	Initials	Comments (mg/L)
0*	10/26	2885	Ø	100%	Partial	Y	21.2	29.2	7.21	12.05	MK	Box 2 of 2 2 shrimp bags
1	10/27	2885	Ø	–	N	Y	20.2	29.5	7.34	10.91		
2	10/28	2885	Ø	–	N	Y	20.1	29.9	7.39	9.34		
3	10/29											test initiation
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
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19												
20												
21												
22												
23												
24												

* Taken immediately upon receiving

Reviewed by Lauren May on 29 March 19

Houston: NMP

Date:

Site	Start Salinity	Salt added (g)	Final Salinity
1	~~5.09~~	155.6g	29.16
1sw	7.79	160.0g	29.82
2	5.25	184.1g	29.08
2sw	5.07	~~185.~~ 205.3g	29.74
3	4.73	205.79	29.73
3sw	4.82	117.5	28.91
4	4.13	210.0.	29.2
4sw	3.62	~~215.0~~ 122.0	30.0
5	3.44	216.5	29.8
5sw	2.97	125.9	29.83
6	2.03	228.1	32.74
6sw	1.80	131.0	29.65
7	2.31	225.8	29.7
7sw	1.71	131.2	29.2
8	2.68	207.0	29.38
8sw	2.54	127.0	29.18
9	2.75	206.3	29.37
9sw	2.61	127.6	29.34
10	2.47	224.5	29.81
10sw	2.24	129.3	29.22
11	1.18	235.1	29.51
11sw	1.17	134.4	29.69

ERDC Datasheet

Miscellaneous Documentation Sheet

Study:	HSC North of Morgan's Point	
Date	Technician	Comment
10-29-19	JMD	Reference Toxicant Solution Log Menidia beryllina

Measured 6.0030 g KCl and dissolved in 29.94 ppt Crystal Sea in a 3L volumetric flask.
Poured off 1500 mL into graduated cylinder and distributed 400 mL to each of 3 600 mL beakers. Discarded remaining solution in cylinder
Refilled volumetric flask with crystal sea and mixed.
Repeated above process until ~~the~~ and 3 reps of the following concentrations were prepared 2, 1, 0.5, 0.25 and 0.125 g/L KCl

ERDC Datasheet

Miscellaneous Documentation Sheet

Study:	HSC north of Morgans point.	
Date	Technician	Comment
10-29-18	DMP	Reference Toxicant solution log. Americamysis bahia test (elutriate)

Measured 3.0022 g KCl. and dissolved in 29.9# pot Crystal Sea in a 3 L volumetric flask.

poured off 1500 mL into a graduated cylinder and distributed 400 mL each into three 1L beakers. discarded remaining in cylinder

Refilled volumetric flask with crystal sea, mixed and repeated above process to obtain the following concentrations 3reps each

1.0, 0.5, 0.25, 0.125, 0.0625 g/L KCL.

REFERENCE TOXICITY TEST SHEET

Project: HSC NMP
Laboratory: ERDC-EL
Test Species: A. bahia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1400
Test Termination Date: 11/2/18 Time: 1400
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	Number Alive 0 h	24 h	48 h	72 h	96 h	Temp. (°C) 0 h	96 h	Salinity (ppt) 0 h	96 h	pH (SU) 0 h	96 h	D.O. (mg/L) 0 h	96 h	Comments
Control	A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Ammonia <0.5
	B	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
	C	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
6%	A	10		10	10	10	9	20.28	20.4	30.18	31.2	7.91	7.75	7.40	6.26	
	B	10		10	10	10	10		20.6		30.7		7.75		6.29	
	C	10		10	10	10	10		20.3		31.5		7.76		6.48	
12.5%	A	10		10	10	10	10	20.41	20.3	30.23	31.3	7.92	7.79	7.41	6.28	
	B	10		10	10	10	10		20.4		30.6		7.77		6.08	
	C	10		10	10	10	9		20.5		31.3		7.79		6.28	
25%	A	10		10	10	10	10	20.32	20.4	30.33	31.4	7.91	7.78	7.36	6.08	
	B	10		10	9	9	9		20.4		31.3		7.79		6.18	
	C	10		10	10 TB	10	10		20.5		31.0		7.77		6.20	
50%	A	10		10	TB 10	10	10	20.37	20.3	30.60	32.0	7.92	7.78	7.51	6.38	
	B	10		10	12 9/10	TB 9/10	10		20.4		31.4		7.77		6.38	
	C	10		10	9	9	9		20.4		31.6		7.78		6.36	
100%	A	10		0				20.49	20.2	31.17	31.5	7.92	7.80	7.49	6.31	Ammonia <0.5
	B	10		0					20.1		31.3		7.80		6.48	
	C	10		0					20.1		31.4		7.79		6.52	
	Initials:	VR	–	NM	NM	TB	BK	VR	NM	VR	NM	VR	NM	VR	NM	0-B

Reviewed by Lauren May on 29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 1
Test Species: A. bahia
Exposure duration: 96h
Test Initiation Date: 10/29/18 Time: 1340
Test Termination Date: 11/2/18 Time: 1246
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10 12	12	12	12	10	19.65	21.4	20.2	20.0	20.3	29.99	30.09	30.8	31.7	32.1	7.95	7.75	7.88	7.86	7.84	7.81	6.68	6.52	5.90	5.92	< 0.5	0.560
	B	10	10	9	9	9					20.6					30.9					7.81					6.21		
	C	10	10	10	10	9					20.6					31.6					7.87					6.33		
	D	10	10	10	9	9					20.6					30.6					7.86					5.98		
	E	10	10	10	10	10					20.1					32.9					7.88					6.29		
10%	A	10	10	9	9	9	20.31	21.6	20.9	20.7	20.6	30.10	30.1	30.2	30.2	30.5	7.94	7.78	7.87	7.85	7.86	7.63	6.37	6.24	6.01	6.18	2.10	2.20
	B	10	10	10	10	9					20.7					31.3					7.85					6.14		
	C	10	11	11	11	10					20.8					30.5				7.84	~~8.12~~					6.12		
	D	10	10	9	9	9					20.8					30.4					7.84					6.01		
	E	10	11	11	11	11					20.6					30.5					7.85					6.21		
50%	A	10	10	~~9~~ 10	10	9	20.15	21.3	20.8	20.6	20.8	29.76	29.9	30.1	30.4	30.8	8.02	7.91	8.00	8.01	8.01	7.61	6.68	6.59	6.38	6.20	10.8	8.73
	B	10	10	10	10	9					20.8					30.1					8.04					6.25		
	C	10	10	10	10	8					20.8					29.9					8.03					6.18		
	D	10	10	7	7	7					20.7					30.9					8.02					5.92		
	E	10	10	10	10	10					20.5					31.0					8.02					6.12		
100%	A	10	10	8	7	1	19.66	21.2	19.6	~~8.7~~	20.5	29.31	29.4	29.4	29.5	29.8	8.00	7.93	8.08	8.11	8.13	7.82	6.49	6.43	6.07	5.91	29.3	16.7
	B	10	10	9	8	7					20.5					30.9					8.12					6.08		
	C	10	10	7	5	3					20.5					29.7					8.14					5.83		
	D	10	9	8	6	4					20.4					30.0					8.13					5.82		
	E	10	10	9	7	5					20.2					30.5					8.11					6.15		
Initials:		AK/MB	MB	NM	TB	MB	VR	JL	NM	EL	NM	VR	JL	NM	JL	NM	VR	JL	NM	JL	NM	VR	JL	NM	JL	NM	JMB	JMB
Date:		10/29	10/30	10/31	11-1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1340	1059	1203	1350	1284	1139	754	1000	1310	0750	1139	754	1000	1310	0750	1139	754	1000	1310	0750	1139	754	1000	1310	0750	1402	1400
Initials (QA):		VR	RB	JL	JL	RB																						

Lauren May
29 March 19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 2
Test Species: A. bahia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1300
Test Termination Date: 11/2/18 Time: 1301
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L)) 0 h	96 h
site water	A	10	10	10	9/10	10	19.34	21.7	21.4	21.2	21.0	29.92	29.7	29.8	30.1	29.5	7.98	7.86	7.90	7.94	8.00	7.79	5.87	5.85	5.47	6.03	<0.5	0.967
	B	10	10	10	10	10					21.1					30.1					7.91					5.51		
	C	10	10	10	10	10					21.1					30.3					7.93					5.85		
	D	10	10	10	10	10					21.2					30.5					7.93					6.08		
	E	10	10	10	10	10					21.0					30.3					7.93					5.78		
10%	A	10	9/10	10	10	10	20.34	21.4	21.2	21.0	21.0	30.09	30.2	30.5	30.8	31.1	7.93	7.83	7.87	7.87	7.95	7.55	6.34	5.99	6.68	5.92	0.739	<1
	B	10	10	10	10	10					21.0					31.2					7.86					6.00		
	C	10	10	10	10	10					21.0					31.1					7.85					6.20		
	D	10	10	10	10	10					21.1					30.5					7.83					5.84		
	E	10	10	10	10	10					21.2					30.4					7.82					5.84		
50%	A	10	10	10	10	10	20.15	21.4	21.2	21.0	20.9	29.71	29.6	29.8	30.0	31.6	8.02	7.91	7.93	7.91	7.85	7.59	6.42	5.98	6.08	6.21	3.98	3.37
	B	10	10	10	10	9					20.8					30.1					7.89					5.67		
	C	10	10/11	11	11	10					20.9					30.1					7.92					6.09		
	D	10	10	10	10	10					21.0					29.9					7.92					5.87		
	E	10	10	10	10	9					21.0					30.2					7.92					5.87		
100%	A	10	10	9	9	8	19.59	21.1	20.8	20.8	20.8	29.22	29.4	29.5	29.5	30.5	8.08	7.97	8.01	8.00	7.93	7.74	6.23	6.31	6.03	6.24	8.43	6.00
	B	10	10	10	10	10					20.5					29.8					7.99					5.92		
	C	10	10	10	10	10					20.5					30.3					8.01					6.09		
	D	10	10	10	9	9					20.5					30.3					8.02					6.05		
	E	10	10	10	10	10					20.6					30.3					8.01					6.06		
Initials:			AK/MB	MB	MM	TO	AK	VR	JC	MM	MM	NM	VR	JC	MM	MM	NM	VR	JC	MM	MM	NM	VR	JC	MM	MM	NM	JMB	JMB
Date:			10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:			1300	1036	1206	1354	1341	1141	907	1000	1505	0907	1141	807	1000	1505	0907	1141	807	1000	1505	0907	1141	907	1000	1505	0907	1700	1400
Initials (QA):			VR	RB	VR	RB	VR																						

Lauren May
29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 3
Test Species: A. bahia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1400
Test Termination Date: 11/2/18 Time: 1320
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	10	19.30	20.6	20.4	20.5	20.2	29.11	29.1	29.5	29.6	29.9	8.04	7.88	7.87	7.93	7.86	7.97	6.42	6.81	6.28	5.97	< 0.5	< 1
	B	10	10	10	10	10					20.3					30.2					7.89					6.13		
	C	10	11	10	10	10					20.3					30.9					7.92					6.38		
	D	10	9	9	9	9					20.3					30.1					7.92					6.37		
	E	10	10	10	10	10					20.3					30.0					7.91					6.33		
100%	A	10	10	10	10	8	19.57	20.3	20.3	20.11	20.05	29.87	30.0	30.2	30.9	31.9	8.10	7.92	7.95	7.95	7.93	7.74	6.59	6.79	6.09	6.44	1.49	1.32
	B	10	10	10	10	12					20.3					30.8					7.93					6.31		
	C	10	10	10	10	10					20.3					31.1					7.94					6.25		
	D	10	10	10	10	10					20.5					30.7					7.96					6.15		
	E	10	9	9	9	9					20.1					31.5					7.94					6.31		
	A																											
	B																											
	C																											
	D																											
	E																											
	A																											
	B																											
	C																											
	D																											
	E																											
Initials:		AK/NB	NM	NM	TB		UR	JL	NM	JL	NM	UR	JL	NM	JL	NM	UR	JL	NM	JL	NM	UR	JL	NM	JL	NM	DMB	JMB
Date:		10/29	10/30	10/31	11-1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1400	1000	1250	1340	1320	1143	759	1000	1313	0845	1143	0759	1000	1313	0845	1143	0759	1000	1313	0845	1143	0759	1000	1313	0845	1402	1400
Initials (QA):		UR	RA	UR	RB	UR																						

Lauren May
29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 4
Test Species: A. bahia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: ~~1330~~ 1350 JR
Test Termination Date: 11/2/18 Time: 1239
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L)) 0 h	96 h
site water	A	10	10	10	10	9	19.5	20.24	19.8	20.1	20.2	30.20	30.2	30.8	31.1	29.9	7.99	7.85	7.94	7.93	7.86	7.75	6.62	6.19	6.35	5.97	<0.5	<1
	B	10	10	10	10	10					20.3					30.2					7.89					6.13		
	C	10	10	10	10	10					20.3					30.9					7.92					6.36		
	D	10	10	9	9	9					20.3					30.4					7.92					6.37		
	E	10	10	~~9~~ 10	9	8					20.3					30.0					7.91					6.33		
10%	A	10	10	10	10	10	20.35	20.13	20.0	20.1	20.1	30.16	30.4	30.3	30.3	31.9	7.92	7.80	7.83	7.77	7.93	7.53	6.65	6.21	5.98	6.44	1.49	1.57
	B	10	10	10	10	10					20.3					30.8					7.93					6.31		
	C	10	10	10	10	10					20.3					31.1					7.93					6.25		
	D	10	10	10	10	10					20.5					30.7					7.94					6.15		
	E	10	10	10	10	9					20.1					31.5					7.94					6.31		
50%	A	10	~~9~~ 10	~~10~~ 9	9	9	20.17	20.30	19.6	19.5	20.5	30.08	30.1	30.6	30.9	29.9	7.98	7.89	7.92	7.90	7.91	7.45	6.59	6.17	6.48	6.04	7.71	5.49
	B	10	9	9	9	9					20.4					29.8					7.92					6.07		
	C	10	10	9	9	9					20.4					29.8					7.91					6.13		
	D	10	10	10	8	8					20.4					29.8					7.92					6.30		
	E	10	10	10	10	10					20.4					29.8					7.92					6.23		
100%	A	10	10	8	8	8	19.65	19.83	19.5	19.4	20.5	29.71	30.2	30.7	31.2	30.7	8.00	7.92	7.96	7.97	7.95	7.04	6.54	6.50	6.41	6.13	14.7	10.4
	B	10	9	7	6	4					20.5					30.6					8.00					6.15		
	C	10	10	7	8	7					20.5					30.6					8.00					6.21		
	D	10	10	7	6	6					20.3					30.6					7.99					6.13		
	E	10	10	10	8	7					20.32					30.6					7.94					6.22		
Initials:			AH/JL	MB	NM	TB	MB	VR	JL	NM	NM	SL	VR	JL	NM	NM	NM	VR	SL	NM	NM	NM	VR	JL	NM	NM	NM	JL/JS	JL/JS
Date:			10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:			1350	1040	1212	1400	1239	1145	707	1000	1320	0844	1145	707	1000	1320	0844	1145	~~707~~ 714	1000	1320	0844	1145	~~707~~ 714	1000	1320	0844	1400	1400
Initials (QA):			VR	RB	VR	RB	RB	714 SL					714 SL					714 SL					714 SL						

Lauren May
29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 5
Test Species: ~~Menidia~~ VR A.bahia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1520
Test Termination Date: 11/2/18 Time: 1252
Page 1 of 1
Environmental chamber temperature: 20 C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	10	19.23	20.5	20.4	20.0	19.4*	30.03	30.4	29.9	30.2	30.3	7.97	6.78	7.90	7.83	7.96	8.07	6.35	5.48	5.82	5.77	<0.5	1.17
	B	10	10	10	10	8					19.4					30.4					7.91					6.10		
	C	10	10	10	10	10					19.4					30.6					7.93					6.15		
	D	10	10	10	10	10					19.3					30.7					7.94					6.29		
	E	10	10	10	10	10					19.3					30.6					7.94					6.34		
10%	A	10	10	10	10	10	20.53	20.6	20.3	20.0	19.3	30.17	30.2	30.5	30.8	31.2	7.94	7.84	7.86	7.84	7.85	7.78	6.64	6.17	6.27	6.29	1.11	1.30
	B	10	10	10	10	10					19.4					31.2					7.84					6.37		
	C	10	9	10	10	10					19.3					31.0					7.85					6.39		
	D	10	10	10	10	10					19.3					31.1					7.83					6.48		
	E	10	10	10	10	9					19.3					31.2					7.83					6.25		
50%	A	10	6	6	6	6	20.26	20.3	20.3	20.2	19.6	30.05	30.3	30.2	30.2	30.5	8.04	7.91	7.95	7.93	7.92	7.78	6.59	6.26	6.33	6.00	5.34	4.61
	B	10	10	10	10	10					19.5					30.3					7.93					5.99		
	C	10	10	10	10	9					19.5					30.8					7.95					6.14		
	D	10	10	10	10	9					19.4					30.9					7.93					6.26		
	E	10	10	10	10	9					19.3					31.1					7.99					6.49		
100%	A	10	9	9	9	9	19.89	20.1	20.2	20.0	19.6	29.90	30.3	30.4	30.5	30.8	8.01	7.96	7.99	7.99	8.00	7.67	6.50	6.37	6.45	3.93	10.9	5.71
	B	10	10	10	10	8					19.5					31.1					8.00					6.10		
	C	10	10	10	9	9					19.5					30.3					8.00					6.16		
	D	10	10	9	9	9					19.5					30.3					8.01					5.92		
	E	10	10	9	9	9					19.2					30.3					7.98					6.42		
Initials:			AH/JL	JMB	NM	TB	AR	VR	SL	NM	NM	NM	VR	SL	NM	NM	NM	VR	SL	NM	NM	NM	VR	SL	NM	NM	NM	JMB	JMB
Date:			10/29	10/30	10/31	11-1	11-2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:			1520	1436	1236	1411	1252	1148	701	1000	1330	1005	1148	701	1000	1330	1005	1148	701	1000	1330	1005	1148	701	1000	1330	1005	1400	1400
Initials (QA):			VR	LL	SL	KD																							

Reviewed by Lauren May on 29 March 19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 6
Test Species: A. bahia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1600
Test Termination Date: 11/2/18 Time: 1300
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	9	19.39	19.6	20.3	20.4	19.4	29.88	30.0	30.2	30.4	30.5	7.99	7.93	7.98	7.96	7.93	8.47	6.88	6.31	6.04	5.82	<0.5	<1
	B	10	9	9	9	9					19.7					30.3					7.94					5.89		
	C	10	10	9	9	8					19.7					30.3					7.95					6.18		
	D	10	10	10	9	9					19.7					30.3					7.94					6.29		
	E	10	9	9	9	8					19.6					30.6					7.96					6.43		
10%	A	10	10	10	10	10	20.30	20.6	20.2	20.6	19.7	30.46	30.5	30.6	30.6	30.9	7.93	7.82	7.87	7.82	7.83	7.30	6.65	6.35	6.23	6.42	1.16	1.57
	B	10	10	10	9	9					19.6					31.4					7.81					6.29		
	C	10	10	10	10	10					19.6					31.5					7.83					6.33		
	D	10	9	9	8	8					19.6					30.7					7.80					6.24		
	E	10	10	10	10	10					19.6					31.3					7.82					6.31		
50%	A	10	10	10	10	10	20.54	20.5	20.1	20.3	19.7	31.51	31.6	31.9	32.3	32.7	7.97	7.90	7.92	7.90	7.91	7.30	6.73	6.28	6.44	6.26	4.70	4.94
	B	10	10	10	10	10					19.6					31.9					7.91					6.03		
	C	10	10	10	10	10					19.5					31.9					7.92					6.24		
	D	10	10	10	10	10					19.6					31.8					7.92					6.32		
	E	10	10	10	10	10					19.6					31.9					7.93					6.42		
100%	A	10	10	9	9	8	19.78	19.7	20.2	20.5	19.7	32.89	32.9	33.0	32.9	33.2	7.99	7.92	7.97	7.96	7.98	7.56	6.46	6.21	5.82	6.23	11.8	9.46
	B	10	10	10	10	9					19.6					33.3					7.99					6.23		
	C	10	10	10	10	9					19.6					33.2					8.01					6.20		
	D	10	10	9	9	9					19.6					33.5					8.01					6.21		
	E	10	10	10	10	10					19.6					33.9					7.99					5.96		
Initials:			AK/TB	MRS	NM	NM		VR	SC	NM	NM	NM	VR	SC	NM	NM	NM	VR	SC	NM	NM	NM	VR	SC	NM	NM	NM	JMB	JMB
Date:			10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:			1057	1254	1430	1300	1150	719	1000	1339	1102	1150	719	1000	1339	1102	1150	719	1000	1339	1102	1150	719	1000	1339	1102	1400	1400
Initials (QA):			RB	SC	SC	VR																						

Reviewed by Lauren May on 29 March 19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 7
Test Species: Mytilus
Exposure duration: 96h
Test Initiation Date: 10/29/18 Time: 1525
Test Termination Date: 11/2/18 Time: 1235
Page | of |
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
Site Water	A	10	10	10	9	10	19.73	20.5	19.9	19.9	19.1	29.52	29.5	28.6	30.1	29.9	7.98	~~8.52~~ 9.89	7.93	8.01	~~8.26~~ 7.93	8.17	6.67	6.55	6.03	6.68	<0.5	<1
	B	10	10	10	10	9					19.0					30.2					7.95					6.51		
	C	10	10	10	10	8					19.0					29.9					7.94					6.44		
	D	10	10	10	10	9					19.1					30.1					7.94					6.44		
	E	10	8	7	7	7					19.0					33.8					7.94					6.53		
10%	A	10	10	10	10	10	20.48	19.5	19.9	19.9	19.0	30.15	30.3	30.4	30.0	30.9	7.92	7.85	7.85	8.02	7.84	7.53	6.75	6.19	5.98	6.50	2.33	2.20
	B	10	10	10	10	10					19.0					31.1					7.83					6.37		
	C	10	10	10	10	10					19.0					30.6					7.87					6.34		
	D	~~10~~ 13 ppm	~~11~~ 13	13	13	13					19.0					30.6					7.81					6.32		
	E	~~10~~ 11 ppm	11	11	11	11					19.1					32.7					7.80					6.31		
VR 100% 50%	A	10	10	10	9	9	20.31	19.6	19.9	19.8	19.0	30.00	30.1	30.2	29.7	30.5	8.00	7.94	7.96	7.93	7.94	7.55	6.77	6.48	6.42	5.94	10.6	8.75
	B	10	10	9	9	9					19.0					31.4					7.93					6.16		
	C	10	10	10	10	10					19.0					30.5					7.95					6.32		
	D	10	10	10	10	10					19.0					31.1					7.95					6.52		
	E	~~10~~ 11 ppm	~~20~~ 11	11	11	11					19.0					32.4					7.92					6.59		
100%	A	10	10	6	4	4	19.77	20.3	19.7	19.8	19.0	29.78	29.8	30.1	30.5	30.6	8.04	8.01	8.03	7.79	8.03	7.56	6.28	6.69	6.23	6.34	22.9	18.4
	B	10	10	4	3	3					19.0					30.1					8.05					6.47		
	C	10	10	4	2	2				19.9	19.0				30.2	30.1				7.94	8.07				6.05	6.24		
	D	10	10	3	1	0					19.0					30.1					8.06					6.13		
	E	~~10~~ 11 ppm	11	5	3	4				19.7	19.0				30.3	31.2				8.03	8.03				6.28	6.18		
Initials:			NB/TH/M	NB	NM	TB	MB	VR	JC	NM	NM	NM	VR	JC	NM	NM	NA	VR	JC	NM	NM	NM	VR	JC	NM	NM	NM	NMB	MB
Date:			10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:			1525	1025	1225	1407	1235	1152	725	1000	1329	0953	1152	725	1000	1329	0953	1152	725	1000	1329	0953	1152	725	1000	1329	0953	1400	1400
Initials (QA):			VR	NB	SC	RB	RB																						

Reviewed by Lauren May on 29 March 19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 8
Test Species: A. bahia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1340
Test Termination Date: 11/2/18 Time: 1215
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	~~10~~ 9	9	9	19.37	19.86	19.7	19.6	19.0	29.51	29.6	29.7	30.5	30.9	8.04	7.91	7.95	7.92	~~7.92~~ 7.92	8.50	6.75	~~6.57~~ 6.57	~~6.30~~ 6.30	6.32	<0.5	<1
	B	10	9	~~7~~ 9	9	9					19.0					30.7					7.96				6.30	6.34		
	C	10	10	10	10	10					19.0					30.6					7.94					6.32		
	D	10	10	10	10	10					19.0					30.6					7.94					6.38		
	E	10	10	10	10	9					19.0					31.3					7.94					6.36		
10%	A	10	10	10	9	9	20.25	19.97	19.7	19.7	19.0	30.13	30.2	30.2	30.8	31.1	7.92	7.82	7.81	7.79	7.71	7.55	6.70	6.49	6.52	5.78	1.21	1.75
	B	10	10	10	10	10					19.0					31.3					7.79					6.15		
	C	10	10	10	10	10					19.0					32.3					7.79					6.31		
	D	10	10	10	10	10					19.0					32.5					7.78					6.32		
	E	10	10	10	10	10					19.0					31.5					7.78	5.8				6.26		
50%	A	10	10	~~6~~ 10	10	10	20.12	20.1	19.8	19.7	19.0	29.92	29.9	30.0	30.7	32.2	8.00	7.89	7.90	7.85	7.79	7.48 VR	6.67	6.52	6.58	6.24	6.35	4.48
	B	10	10	10	10	10					19.1					31.0					7.86					6.21		
	C	10	10	10	9	9					19.0					31.0					7.87					6.19		
	D	10	10	~~7~~ 9	8	8					19.1					31.0					7.88					6.22		
	E	10	10	10	10	9					19.0					31.9					7.85					6.16		
100%	A	10	9	~~9~~ 8	8	8	19.77	19.9	19.6	19.5	19.0	29.64	29.8	30.1	31.1	31.9	8.06	7.98	7.97	7.89	7.87	7.48	6.60	6.39	6.68	6.34	12.2	8.1
	B	10	10	~~7~~ 8	8	8					19.0					31.7					7.93					6.35		
	C	10	10	~~6~~ 6	6	6					19.1					30.8					7.94					6.20		
	D	10	10	~~7~~ 7	7	7					19.0					30.9					7.95					6.10		
	E	10	10	~~6~~ 6	6	6					19.0					31.0					7.93					6.03		
Initials:		MB/TB	MB	NM	NM	MB	VR	JC	NM	NM	TM	VR	JC	NM	NM	NM	VR	JC	NM	NM	NM	VR	JC	NM	NM	NM	JAB	JAB
Date:		10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1		10/29	10/30	10/31	11/1	" /2	10/29	10/30	10/31	11/1	" /2	10/29	10/30	10/31	11/1	" /2	10/29	11/2
Time:		1340	1031	1253	1442	1215	1155	744	1000	1345	1017	1155	744	1000	1345	1017	1155	741	1000	1345	1017	1155	744	1000	1345	1017	1402	1400
Initials (Q.A.):		VR	MB	JC	JC	RB																						

Lauren Maf
29 March 19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 9
Test Species: A. bahia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1410
Test Termination Date: 11/2/18 Time: 1300
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	10	19.54	20.1	20.6	20.5	20.2	29.63	29.6	29.7	29.7	29.8	8.00	7.93	7.97	7.93	7.91	7.86	6.08	6.37	5.94	5.60	40.5	<1
	B	10	10	10	10	10					20.2					30.5					7.95					5.94		
	C	10	10	10	10	10					20.3					29.8					7.95					5.94		
	D	10	10	10	10	10					20.3					29.9					7.96					6.16		
	E	10	10	10	89	87					20.0					31.1					7.92					6.98		
10%	A	10	10	10	10	10	20.72	20.2	20.6	20.4	20.1	30.12	30.3	30.3	30.4	30.6	7.91	7.84	7.87	7.82	7.82	7.46	6.28	6.60	6.14	5.89	0.870	1.06
	B	10	9	9	9	9					20.1					30.7					7.83					6.01		
	C	10	10	9	9	9					20.1					30.7					7.81					5.97		
	D	10	9	8	8	8					20.0					30.9					7.84					6.12		
	E	10	10	10	10	10					19.9					30.8					7.82					6.08		
50%	A	10	9	9	9	9	20.29	20.5	20.5	20.3	20.1	29.92	30.1	30.1	30.1	30.3	8.00	7.92	7.92	7.81	7.84	7.55	6.58	6.28	5.30	5.49	3.43	3.42
	B	10	10	9	9	9					20.1					30.3					7.88					5.71		
	C	10	9	9	9	9					19.9					30.8					7.91					6.19		
	D	10	8	8	8	8					19.8					30.8					7.92					6.30		
	E	10	10	10	10	10					19.8					30.4					7.91					6.22		
100%	A	10	10	10	10	10	19.55	20.1	20.2	19.9	19.8	29.61	29.8	30.1	30.4	30.7	8.05	7.97	8.01	7.97	7.97	7.83	6.30	6.58	6.22	6.26	8.94	6.83
	B	10	10	10	10	9					19.8					30.0					7.99					6.25		
	C	10	10	10	10	10					19.8					29.9					8.00					6.20		
	D	10	9	9	9	9					19.8					30.2					8.00					6.29		
	E	10	10	10	89	9					19.4					30.6					7.98					6.11		
Initials:		TB/AH/AK	VR	NM	TB	AK	VR	JL	NM	NM	NM	VR	JL	NM	NM	NM	VR	JL	NM	NM	NM	VR	JL	NM	NM	NM	JMB	JMB
Date:		10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1410	1041	1218	1358	1300	1237	730	1000	1325	0933	1237	730	1000	1325	0935	1237	730	1000	1325	0935	1237	730	1000	1325	0935	1400	1400
Initials (QA):		VR	RB	SL	KB	VR																						

Reviewed by Lauren May on 29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 10
Test Species: A. bahia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1430
Test Termination Date: 11/2/18 Time: 1225
Page: 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	10	19.73	20.0	20.2	20.2	19.6	29.53	29.7	29.7	29.7	29.7	8.02	7.92	7.96	7.92	7.91	7.87	6.72	5.77	5.81	5.88	<0.5	<1
	B	10	10	10	9	9					19.5					29.9					7.93					6.23		
	C	10	10	10	9	9					19.5					30.0					7.94					6.12		
	D	10	10	10	10	9					19.4					29.9					7.94					6.11		
	E	10	10	10	10	10					19.7					30.6					7.94					6.23		
10%	A	10	10	10	10	10	20.38	20.2	20.0	19.9	19.5	30.17	30.3	30.6	30.9	31.2	7.93	7.84	7.88	7.83	7.82	7.54	6.71	6.50	6.47	6.04	1.28	1.34
	B	10	10	10	10	10					19.5					30.5					7.80					6.15		
	C	10	10	10	9	9					19.5					30.5					7.79					6.19		
	D	10	10	10	10	10					19.3					30.5					7.81					6.12		
	E	10	10	10	10	9					19.7					30.6					7.81					6.27		
50%	A	10	10	9	9	9	20.19	20.4	20.1	20.1	19.6	30.14	30.1	30.3	30.3	30.5	7.99	7.90	7.92	7.87	7.87	7.62	6.04	6.43	6.09	5.83	6.58	5.47
	B	10	10	10	10	9					19.4					31.2					7.89					6.32		
	C	10	10	10	10	10					19.4					30.9					7.91					6.28		
	D	10	10	10	10	10					19.3					30.5					7.91					6.02		
	E	10	9	9	9	9					19.3					30.7					7.90					6.13		
100%	A	10	10	7	8	7	19.75	20.1	20.2	20.1	19.5	30.06	30.1	30.1	30.1	30.4	8.04	7.95	8.00	7.96	7.96	7.72	6.66	6.15	6.09	5.19	12.8	10.2
	B	10	10	10	10	10					19.5					30.4					7.97					5.61		
	C	10	8	8	8	8					19.5					30.6					7.97					5.72		
	D	10	10	10	10	10					19.4					30.5					7.98					6.08		
	E	10	~~8~~ 10	10	10	9					19.4					30.8					7.97					6.12		
Initials:			MB	NM	NM	MB	VR	JC	NM	NM	NM	VR	JC	NM	NM	NM	VR	JC	NM	NM	NM	VR	JC	NM	NM	NM	JMB	JMB
Date:			10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:			1430	1056	1241	1326	1225	1235	747	1000	1343	1030	1235	747	1000	1343	1030	1235	747	1000	1347	1030	1235	747	1000	1343	1030	1400	1400
Initials (QA):			VR	RB	JC	JC	RB																						

Reviewed by Lauren May on 29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 11
Test Species: A. bahia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1510
Test Termination Date: 11/2/18 Time: 1312
Page 1 of 1
Environmental chamber temperature: 20C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L)) 0 h	96 h
Site water	A	10	10	8	8	9	19.34	20.1	20.5	20.3	19.8	30.02	30.0	30.5	30.1	30.3	8.01	7.91	7.93	7.90	7.85	8.50	6.64	6.17	6.02	5.71	<0.5	<1
	B	10	10	9	9	7					19.7					30.9					7.93					5.92		
	C	10	10	10	10	8					19.7					30.4					7.92					5.99		
	D	10	10	10	10	10					19.7					30.3					7.92					6.07		
	E	10	10	10	10	9					19.5					30.9					7.93					6.33		
10%	A	10	10	10	10	10	20.60	20.3	20.5	20.2	19.8	30.13	30.3	30.3	30.9	31.2	7.94	7.83	7.85	7.83	7.84	7.36	6.43	6.26	6.18	6.10	1.30	1.32
	B	10	10	10	10	10					19.8					31.2					7.83					6.17		
	C	10	10	10	10	10					19.6					30.5					7.81					6.20		
	D	10	10	10	10	9					19.6					30.6					7.79					6.12		
	E	10	10	10	10	9					19.6					31.2					7.80					6.32		
50%	A	10	10	10	10	10	20.41	20.6	20.4	20.5	19.8	29.98	29.0	30.1	30.2	30.4	8.02	7.91	7.91	7.90	7.88	7.54	6.43	6.11	6.04	5.75	6.09	5.51
	B	10	10	10	10	10					19.7					30.2					7.90					5.99		
	C	10	10	10	10	10					19.7					30.8					7.90					6.14		
	D	10	10	10	10	10					19.7					31.0					7.90					6.13		
	E	10	10	10	10	10					19.7					30.7					7.91					6.18		
100%	A	10	10	8	8	8	20.32	19.8	20.4	20.3	19.8	29.73	30.0	29.8	30.6	31.0	8.04	7.96	7.95	7.97	7.98	7.39	6.58	6.18	6.35	6.30	12.9	10.5
	B	10	10	10	10	10					19.7					30.8					7.99					6.28		
	C	10	10	8	8	8					19.7					30.1					8.01					6.33		
	D	10	10	10	9	8					19.7					29.9					8.01					6.24		
	E	10	10	10	10	8					19.7					30.2					8.02					6.24		
Initials:			JMB	NM	TB	AK	VR	JC	NM	NM	JM	VR	JC	NM	NM	NM	VR	JC	NM	NM	NM	VR	JC	NM	NM	NM	JMB	JMB
Date:		10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1510	1053	1245	1416	1312	1239	752	1000	1336	1046	1239	752	1000	1336	1046	1239	752	1000	1336	1046	1239	752	1000	1336	1046	1400	1400
Initials (QA):			VR	LB	JC	JC	VR																					

Reviewed by Lauren May on 29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: Control
Test Species: A. bahia
Exposure duration: 96h

Test Initiation Date: 10|29|18 Time: 1410
Test Termination Date: 11|2|18 Time: 1317
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive				Temp. (°C)					Salinity (ppt)					pH (SU)					D.O. (mg/L)					Ammonia (mg/L))	
			24 h	48 h	72 h	96 h	0 h	24 h	48 h	72 h	96 h	0 h	24 h	48 h	72 h	96 h	0 h	24 h	48 h	72 h	96 h	0 h	24 h	48 h	72 h	96 h	0 h	96 h
control	A	10	10	10	10	10	20.57	21.1	20.7	20.7	20.7	30.08	30.2	30.2	30.3	30.4	7.91	7.80	7.78	7.78	7.71	7.38	6.49	6.20	6.21	6.38	<0.5	<1
	B	10	9	9	8	8					20.6					30.5					7.72					6.38		
	C	10	10	10	10	10					20.6					30.6					7.73					6.14		
	D	10	10	10	10	10					20.6					30.5					7.75					6.23		
	E	10	10	10	10	10					20.6					30.5					7.75					6.36		
	A																											
	B																											
	C																											
	D																											
	E																											
	A																											
	B																											
	C																											
	D																											
	E																											
	A																											
	B																											
	C																											
	D																											
	E																											
Initials:		JJ/TB/NB	TB	pm	NM	MS	VR	JL	NM	NM	JL	VR	JL	NM	NM	NM	VR	JL	NM	NM	NM	VR	JL	NM	NM	NM	JMB	JMB
Date:		10/29	10/30	10/31	11/1	11-2	10/29	10/30	10/31	11/1	11/2	10/29	1030	10/31	11/1	11/2	10/29	10 30	10/31	11/1	11/2	10/29	630	10/31	11/1	11/2	10/29	11/2
Time:		1410	1000	1259	1338	1317	1200	711	1000	1316	0833	1200	711	1000	1316	0833	1200	711	1000	1316	0833	1200	711	1000	1316	0833	1400	1400
Initials (QA):		VR	RB	JL	RB	VR																						

Lauren May
29March19

REFERENCE TOXICITY TEST SHEET

Project: HSC NMP
Laboratory: ERDC-EL
Test Species: Menidia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1400
Test Termination Date: 11/2/18 Time: 1400
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	Number Alive 0 h	24 h	48 h	72 h	96 h	Temp. (°C) 0 h	96 h	Salinity (ppt) 0 h	96 h	pH (SU) 0 h	96 h	D.O. (mg/L) 0 h	96 h	Comments
Control	A	—		—	—	—	—	—	—	—	—	—	—	—	—	Ammonia <0.5
	B	—		—	—	—	—	—	—	—	—	—	—	—	—	
	C	—		—	—	—	—	—	—	—	—	—	—	—	—	
6%	A	~~10~~ 11		~~10~~ 11	~~10~~ 11	~~10~~ 11	11	20.64	20.7	30.27	30.7	7.92	7.76	7.42	6.24	
	B	10		10	10	10	10		20.6		31.2		7.78		6.31	
	C	10		10	10	10	10		20.6		31.4		7.77		6.34	
12.5%	A	10		10	10	10	10	20.66	20.6	30.43	31.0	7.92	7.76	7.48	6.34	
	B	10		10	8	7	6		20.6		31.1		7.78		6.38	
	C	10		10	10	10	9		20.5		31.3		7.78		6.40	
25%	A	10		10	10	10	9	20.67	20.6	30.66	31.3	7.2992	7.80	7.47	6.56	
	B	10		10	10	10	10		20.6		31.5		7.77		6.48	
	C	10		10	10	10	10		20.5		31.5		7.77		6.38	
50%	A	~~10~~ 11		10	10	10	10	20.67	20.6	31.17	32.1	7.92	7.77	7.46	6.42	
	B	10		10	10	9	8		20.6		32.3		7.77		6.37	
	C	10		10	10	10	10		20.7		32.1		7.77		6.38	
100%	A	10		5	4	3	3	20.68	20.8	32.24	33.2	7.92	7.78	7.42	6.37	Ammonia <0.5
	B	10		4	1	1	1		20.8		33.7		7.80		6.43	
	C	10		5	3	2	1		20.8		33.6		7.81		6.49	
Initials:		VR	—	NM	NM	TB	VK	VR	NM	VR	NM	VR	NM	VR	NM	0-3

Reviewed by Lauren May on 29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 1
Test Species: Menidia
Exposure duration: 96h
Test Initiation Date: 10/29/18 Time: 1445
Test Termination Date: 11/2/18 Time: 1332
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	10	19.65	20.2	19.6	19.2	19.6	29.99	30.1	30.6	31.2	31.3	7.95	7.92	7.86	7.83	8.06	7.81	6.17	6.54	6.98	6.42	< 0.5	<1
	B	10	10	10	10	10					19.7					31.1					8.06					6.55		
	C	10	10	10	10	10					19.7					30.5					8.05					6.43		
	D	10	10	10	10	10					19.7					30.5					8.03					6.60		
	E	10	10	10	10	10					19.7					30.5					8.05					6.43		
10%	A	10	10	10	10	10	20.31	20.2	19.8	19.8	19.9	30.10	30.3	30.4	31.0	31.0	7.94	7.81	7.82	7.79	8.01	7.63	6.21	6.19	6.63	6.25	2.10	1.42
	B	~~10~~ 11	11	11	11	10					19.8					30.5					8.04					6.31		
	C	10	10	10	10	10					19.6					30.7					8.02					6.51		
	D	10	10	10	10	9					19.6					30.6					8.03					6.58		
	E	10	10	10	10	10					19.6					30.6					8.01					6.55		
50%	A	10	10	10	10	10	20.15	20.3	19.9	19.5	19.9	29.76	30.0	30.0	30.1	30.2	8.02	7.94	7.98	7.96	8.20	7.61	6.08	5.98	6.18	6.51	10.8	6.53
	B	10	10	10	10	10					19.9					30.1					8.20					6.62		
	C	10	10	10	10	10					19.7					30.4					~~8.28~~ 8.25					6.55		
	D	10	10	10	10	10					19.6					30.4					~~8.28~~ 8.26					6.62		
	E	10 ~~11~~	10	10	8	8					19.4					30.9					~~8.27~~ 8.24					6.82		
100%	A	10	~~10~~ 9	6	4	4	19.66	20.2	19.8	19.5	19.9	29.31	30.0	29.7	30.1	30.3	8.00	7.99	8.05	8.03	8.28	7.82	6.30	6.14	6.25	6.70	20.8	12.7
	B	10	~~8~~ 8	4	4	4					19.8					30.4					8.28					6.74		
	C	10	~~9~~ 9	6	1	1					19.8					29.8					8.31					6.60		
	D	10	10	8	4	3					19.7					30.38					8.27					6.73		
	E	10	10	8	8	7					19.6					31.1					8.26					6.67		
Initials:		MB/TB	NM	NM	TB	KV	LR	SL	NM	SL	TB	LR	SL	NM	SL	TB	LR	SL	NM	SL	TB	LR	SL	NM	SL	TB	JMB	JMB
Date:		10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1445	1234	1308	1256	1332	1139	840	1000	1114	1333	1139	946	1000	1114	1333	1139	740	1000	1114	1333	1139	940	1000	1114	1333	17:00	1400
Initials (QA):		LR	MB	LR	AB	LR																						

Lauren May
29 March 19

ELUTRIATE TOXICITY TEST SHEET

Project: HSCNMP
Site ID: 2
Test Species: Menidia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1450
Test Termination Date: 11/2/18 Time: 1346
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	9	19.34	20.7	20.2	20.4	20.4	29.92	30.0	29.9	30.0	30.1	7.98	7.87	7.86	7.84	8.10	7.79	6.37	5.97	6.09	6.32	<0.5	<1
	B	10	10	10	10	10					20.4					30.1					8.11					6.31		
	C	10	10	10	10	10					20.5					30.1					8.10					6.29		
	D	10	10	10	10	9					20.4					30.5					8.10					6.33		
	E	10	10	10	10	9					20.3					30.4					8.10					6.42		
10%	A	10	10	10	10	10	20.34	20.7	20.2	20.4	20.5	30.09	29.27	30.5	30.7	30.9	7.93	7.90	7.80	7.76	7.99	7.55	5.94	6.18	6.41	6.46	0.739	0.661
	B	10	9 (10)	9 (10)	9 (10)	10	AK 11-2				20.6					30.2					7.99					6.38		
	C	10	10	10	10	10					20.6					30.2					7.97					6.16		
	D	10	10	10	10	10					20.6					30.3					7.97					6.31		
	E	10	10	10	10	9					20.4					30.5					7.98					6.38		
50%	A	10	10	10	10	10	20.15	20.9	20.4	20.5	20.7	29.71	29.8	30.0	30.2	30.3	8.02	7.89	7.89	7.86	8.09	7.59	6.23	6.18	6.38	6.27	3.88	2.46
	B	10	10	10	10	10					20.8					29.8					8.10					6.37		
	C	10	10	10	10	10					20.8					29.9					8.09					6.29		
	D	10	10	10	10	10					20.7					29.8					8.09					6.21		
	E	10	10	10	10	10					20.6					29.9					8.10					6.40		
100%	A	10	10	10	10	9	19.59	21.1	20.5	20.7	20.7	29.22	29.3	29.5	29.5	29.7	8.08	7.96	7.97	7.93	8.17	7.74	6.23	6.22	5.98	6.26	8.43	5.19
	B	10	10	10	10	8					20.9					29.3					8.18					6.21		
	C	10	10	10	10	10					20.9					29.1					8.18					6.37		
	D	10	10	10	10	10					20.9					29.5					8.18					6.24		
	E	10	10	10	10	10					20.7					29.4					8.18					6.19		
Initials:			TB/AK	JM	NM	TB	AV	VR	JC	NM	JC	NM	VR	JC	NM	JL	TB	VR	JC	NM	JC	NM	VR	JC	NM	JC	TB	JMB	JMB
Date:			10/29	10/30	10/31	11-1	11-2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:			1340	1224	1318	1305	0946	1141	945	1000	1014	1340	1141	945	1000	1014	1340	1141	945	1000	1014	1340	1141	945	1000	1014	1340	1700	1400
Initials (QA):			VR	MS	JC	KB	VR																						

Lauren May
29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 3
Test Species: Menidia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1530
Test Termination Date: 11/2/18 Time: 1352
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L)) 0 h	96 h
site water	A	10	10	10	10	10	19.30	19.8	20.6	20.5	20.5	29.11	29.5	29.7	29.7	29.9	8.04	7.91	7.89	7.89	7.91	7.97	6.42	6.01	5.75	6.04	<0.5	<1
	B	10	10	10	10	10					20.4					29.8					7.92					6.07		
	C	10	10	10	10	10					20.4					29.8					7.92					6.13		
	D	10	10	10	10	10					20.4					29.8					7.91					6.29		
	E	10	10	10	10	10					20.4					29.7					7.94					6.23		
100%	A	10	10	10	10	10	19.57	20.0	20.5	20.4	20.5	29.87	30.0	30.4	30.4	30.7	8.10	7.95	7.94	7.92	7.94	7.74	6.30	6.13	5.91	6.07	1.48	1.09
	B	10	10	10	10	10					20.5					30.6					7.94					6.13		
	C	10	10	10	10	10					20.5					30.6					7.94					6.15		
	D	10	10	10	10	10					20.3					30.6					7.95					6.21		
	E	10	10	10	10	10					20.3					30.6					7.94					6.22		
	A																											
	B																											
	C																											
	D																											
	E																											
	A																					7.74 UR						
	B																											
	C																											
	D																											
	E																											
Initials:		AK/DB	NM	NM	TB	MK	UR	JC	MM	JC	NM	UR	JC	NM	JC	NM	UR	JC	NM	JC	NM	UR	JC	NM	JC	NM	DMS	JMB
Date:		10/29	10/30	10/31	11-1	11-2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1530	1215	1304	1331	1352	1143	0834	1000	1143	1247	1143	0834	1000	1143	1247	1143	0834	1000	1143	1247	1143	0834	1000	1143	1247	1403	1400
Initials (QA):		UR	MM	JC	BB	UR																						

Lauren May
29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 4
Test Species: Menidia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1452
Test Termination Date: 11/2/18 Time: 1337
Page [of]
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	9	19.51	20.1	19.9	20.0	19.9	30.20	30.4	30.2	30.4	30.5	7.99	7.90	7.89	7.89	8.12	7.75	6.59	6.01	5.98	6.26	<0.5	<1
	B	10	10	10	10	10					19.9					30.4					8.12					6.36		
	C	10	10	10	10	10					19.9					30.4					8.13					6.39		
	D	10	10	10	10	10					20.0					30.3					8.12					6.38		
	E	10	9	9	9	9					19.9					30.7					8.12					6.41		
10%	A	10	10	10	10	10	20.35	20.4	19.8	20.1	20.1	30.16	30.2	30.4	30.4	30.5	7.92	7.88	7.82	7.98	7.97	7.93	6.29	5.94	6.02	6.18	1.49	1.11
	B	10	10	10	10	10					19.9					30.6					7.99					6.43		
	C	10	10	10	10	10					20.0					30.5					7.99					6.40		
	D	10	10	10	10	10					20.0					30.7					7.98					6.26		
	E	10	10	10	10	9					20.0					30.2					7.97					6.18		
50%	A	10	10	10	10	10	20.17	20.5	19.9	20.0	20.2	30.08	28.9	30.3	30.5	30.3	7.98	7.88	7.89	7.89	8.10	7.45	6.28	5.94	5.86	6.30	7.71	5.19
	B	~~10~~ 9	8	8	10	8					20.0					30.3					8.12					6.36		
	C	10	10	10	10	8					20.0					30.2					8.11					6.23		
	D	10	10	10	10	10					20.0					30.1					8.11					6.06		
	E	10	10	10	9	9					20.0					29.9					8.11					6.15		
100%	A	10	10	10	4	3	19.65	20.5	20.0	20.2	20.2	29.71	29.8	29.9	29.8	29.9	8.00	7.92	7.98	7.88	8.21	7.04	5.67	5.82	5.82	6.26	14.7	11.2
	B	10	10	10	~~8~~ 7	7					20.1					29.9					8.21					6.24		
	C	10	10	9	8	6					19.9					30.2					8.19					6.26		
	D	10	10	10	9	6					20.0					30.0					8.20					6.10		
	E	10	10	10	10	8					19.9					29.9					8.20					6.14		
Initials:		AK TB	AM	NM	TB	AK	VR	JC	NM	JC	TB	VR	JC	NM	JC	TD	VR	JC	NM	JC	TB	VR	JC	NM	JC	TB	2nd	AMB
Date:		10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1452	1238	1311	1310	1337	1145	0850	1000	1018	1208	1145	0850	1000	1018	1208	1145	0850	1000	1018	1208	1145	0850	1000	1018	1208	1400	1400
Initials (QA):		VR	AM	VR	RS	VR																						

Lauren May
29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 5
Test Species: Menidia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1520
Test Termination Date: Time: 1324
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	10	19.23	19.9	19.7	19.6	19.7	30.03	30.4	30.6	30.7	31.3	7.97	7.92	7.91	7.88	7.91	8.07	6.58	6.18	5.80	6.34	<0.5	<1
	B	10	10	10	10	10					19.8					30.6					7.92					6.18		
	C	10	10	10	10	10					19.7					31.0					7.93					6.18		
	D	10	10	10	10	10					19.7					30.8					7.93					6.17		
	E	10	10	10	10	10					19.7					30.9					7.92					6.06		
10%	A	10	8	8	8	8	20.53	20.2	19.4	19.7	19.8	30.17	30.3	31.0	31.1	31.3	7.94	7.80	7.81	7.77	7.82	7.78	6.51	6.52	6.36	6.16	1.11	0.882
	B	10	9	9	9	8					19.8					30.7					7.81					6.27		
	C	10	10	10	9	9					19.7					30.7					7.80					6.43		
	D	10	10	10	10	10					19.7					30.9					7.78					6.29		
	E	10	10	10	10	10					19.8					30.6					7.79					6.21		
50%	A	10	10	10	10	10	20.26	19.8	19.8	19.9	19.8	30.05	30.9	30.9	31.0	31.2	8.04	7.83	7.89	7.87	7.96	7.78	6.67	6.16	5.68	5.99	5.34	3.67
	B	10	10	10	10	10					19.8					30.4					7.92					6.13		
	C	10	10	10	10	10					19.8					30.4					7.96					6.19		
	D	10	8	8	8	8					19.8					30.4					7.91					6.12		
	E	10	10	10	10	10					19.8					30.5					7.91					6.23		
100%	A	10	10	10	10	10	19.89	20.1	19.7	19.8	19.8	29.90	30.0	30.2	30.3	30.5	8.01	7.93	7.94	7.93	7.96	7.67	6.14	6.02	5.85	5.78	10.9	7.94
	B	10	9	9	9	9					19.7					30.5					7.98					5.91		
	C	10	10	10	10	10					19.7					30.7					7.98					6.11		
	D	10	10	10	9	9					19.8					30.6					8.00					6.25		
	E	10	10	10	10	10					19.8					30.6					7.99					6.24		
Initials:			AKTB	NM	NM	TB	AK	VR	JL	NM	JL	NM	VR	JL	NM	JL	NM	VR	JL	NM	JL	NM	VR	JL	NM	JL	NM	JMB	JMB
Date:			10/30	10/31	11-1	11-2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:			1213	1313	1255	1324	1148	957	1000	1119	1206	1148	957	1000	1119	1206	1148	957	1000	1119	1206	1148	957	1000	1119	1206	1400	1400
Initials (QA):			VR	NM	JL	RB	VR																					

Reviewed by Lauren May on 29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 6
Test Species: Menidia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1600
Test Termination Date: 11/2/18 Time: 1338
Page 1 of
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	9	19.39	20.38	20.2	20.3	20.1	29.83	29.9	30.0	29.9	30.4	7.99	7.90	7.91	7.94	8.14	8.47	6.21	6.15	5.93	6.74	<0.5	<1
	B	10	10	10	10	10					20.0					30.1					8.14					6.59		
	C	10	10	10	10	10					20.0					30.0					8.14					6.60		
	D	10	10	10	10	10					19.8					30.2					8.14					6.57		
	E	10	9	9	9	9					20.0					30.1					8.14					6.67		
10%	A	10	10	10	10	9	20.70	14.81	20.3	20.3	20.2	30.45	30.5	30.6	30.7	30.9	7.93	7.81	7.82	7.89	7.99	7.30	6.49	6.03	6.51	6.53	1.16	0.915
	B	10	10	10	10	10					20.1					30.8					8.01					6.59		
	C	10	9	9	9	7					20.1					30.7					8.01					6.62		
	D	10	10	10	10	9					20.1					30.8					7.98					6.50		
	E	10	10	10	10	10					20.0					30.7					8.01					6.66		
50%	A	10	10	10	10	8	20.54	19.61	19.7	20.4	20.3	31.51	31.7	32.3	32.5	33.1	7.97	7.89	7.87	7.75	8.11	7.30	6.40	6.15	6.42	6.75	4.70	3.81
	B	10	10	10	10	9					20.2					32.2					8.13					6.59		
	C	10	9	9	9	9					20.1					31.9					8.11					6.53		
	D	10	9	9	9	9					20.1					31.7					8.12					6.41		
	E	10	9	9	9	9					20.1					32.4					8.12					6.48		
100%	A	10	10	10	10	5	19.78	20.22	20.4	20.8	20.4	32.89	33.0	33.0	33.1	33.4	7.99	7.97	7.94	7.93	8.17	7.56	6.28	6.02	6.30	6.36	11.8	9.15
	B	10	10	10	10	5					20.4					33.1					8.19					6.31		
	C	10	10	10	10	4					20.3					33.2					8.20					6.35		
	D	10	10	10	9	5					20.3					33.3					8.18					6.27		
	E	10	9	9	8	4					20.2					33.6					8.18					6.33		
Initials:			AK/JB	NM	NM	TB	AK	VR	SL	NM	SL	TB	VR	SL	NM	SL	TB	VR	SL	NM	SL	TB	VR	SL	NM	SL	TB	JMB	JMB
Date:			10/29	10/30	10/31	11-1	11-2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	JMB 11/2
Time:			1600	1246	1316	1245	1338	1150	1001	1000	0957	1227	1150	1001	1000	0957	1227	1150	1001	1000	0957	1227	1150	1001	1000	0957	1227	1400	1400
Initials (QA):			VR	MB	VR	VR	VR																						

Reviewed by Lauren May on 29march19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 7
Test Species: Menidia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1525
Test Termination Date: 11/2/18 Time: 1333
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L)) 0 h	96 h
site water	A	10	10	10	10	10	19.73	19.32	19.7	20.0	19.9	29.52	30.4	30.4	30.5	30.7	7.98	7.91	7.92	7.77	7.92	8.17	6.59	6.32	6.09	5.92	<0.5	<1
	B	10	10	10	10	10					19.8					29.9					7.92					6.17		
	C	10	10	10	10	10					19.8					29.9					7.92					6.34		
	D	10	10	10	10	10					19.8					30.0					7.92					6.58		
	E	10	10	10	10	10					19.8					30.1					7.93					6.33		
10%	A	10	10	10	10	10	20.98	20.2	19.7	20.1	19.9	30.15	30.3	30.4	30.4	30.7	7.92	7.80	7.81	7.91	7.79	7.53	5.87	6.15	5.91	6.21	2.33	1.41
	B	10	10	10	9	9					19.9					30.4					7.80					6.30		
	C	10	10	10	10	10					19.8					30.8					7.81					6.41		
	D	10	10	10	10	10					19.8					30.5					7.82					6.50		
	E	10	10	10	10	10					19.8					30.4					7.81					6.43		
50%	A	~~10~~ 11	~~10~~ 11	~~10~~ 11	~~10~~ 10	8	20.31	20.2	19.8	20.1	19.9	30.00	30.1	30.2	30.2	30.4	8.00	7.92	7.93	7.94	7.93	7.55	6.03	6.04	5.99	5.97	10.6	7.65
	B	10	10	10	9	8					19.8					30.3					7.96					6.12		
	C	10	10	10	9	8					19.8					30.5					7.92					6.03		
	D	10	10	10	10	9					19.8					30.3					7.95					6.13		
	E	10	10	10	10	8					19.8					30.3					7.95					6.14		
100%	A	10	9	3	0	0	19.77	19.4	19.8	20.1		29.78	30.0	30.1	30.0		8.04	7.95	8.01	7.99		7.56	6.12	6.06	5.70		22.9	24.1
	B	10	8	0	0	0			20.7	~~20.3~~ 20.2				29.9					8.00					6.37				20.0
	C	10	9	1	0	6				20.0					30.0					8.02					5.98				23.7
	D	10	10	~~10~~ 10	0	0			20.7					30.1					8.00					6.37				20.0
	E	10	10	1	0	0				19.9					30.1					8.01					6.03				23.0
Initials:		AK	TB	pm	pm	TB	AK	VR	JC	NM	JC	NM	VR	JC	NM	JC	NA	VR	JC	NM	JC	NM	VR	JC	NM	JC	NM	JMB	JMB
Date:		10/29	10/30	10/31	11-1	11-2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1525	1155	1320	1313	1333	1152	1005	1000	1123	1215	1152	1005	1000	1123	1215	1152	1005	1000	1123	1213	1152	1005	1000	1123	1215	1400	1400
Initials (QA):		VR	MB	SL	JL	VR																						

Reviewed by Lauren May on 29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 8
Test Species: Menidia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1545
Test Termination Date: 11/2/18 Time: 1329
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	10	19.37	20.3	20.2	20.0	19.9	29.51	29.5	29.6	29.7	29.9	8.04	7.91	7.89	7.90	7.90	8.50	5.72	5.51	5.71	6.03	<0.5	2
	B	10	10	10	10	10					19.7					29.9					7.93					6.21		
	C	10	9	9	9	9					19.7					29.8					7.95					6.24		
	D	10	10	10	10	10					19.7					29.9					7.95					6.47		
	E	10	10	10	10	10					19.7					30.1					7.91					6.58		
10%	A	10	10	10	9	9	20.25	20.4	20.2	19.9	19.8	30.13	30.14	30.2	30.4	30.6	7.92	7.80	7.77	7.77	7.78	7.55	6.17	5.87	5.99	6.26	1.21	0.945
	B	10	10	10	10	9					19.7					30.5					7.78					6.36		
	C	10	10	10	9	9					19.7					30.4					7.76					6.18		
	D	10	10	10	10	10					19.7					30.4					7.89					6.32		
	E	10	10	10	10	10					19.7					30.5					7.90					6.24		
50%	A	~~10~~ 11	11	11	11	11	20.12	20.4	20.2	20.0	19.6	29.92	30.0	30.1	30.1	30.4	8.00	7.88	7.88	7.88	7.90	7.58	6.29	5.93	5.92	6.37	6.35	3.76
	B	10	10	10	10	10					19.6					30.3					7.90					6.43		
	C	10	10	10	10	9					19.7					30.2					7.90					6.29		
	D	10	10	10	10	10					19.7					30.2					7.90					6.32		
	E	10	10	10	10	10					19.7					30.2					7.89					6.20		
100%	A	10	8	7	5	5	19.77	20.4	20.2	20.0	19.8	29.84	29.7	29.7	29.8	29.9	8.06	7.95	7.98	7.97	7.95	7.48	6.25	5.97	5.99	6.20	12.2	9.04
	B	10	10	10	5	4					19.7					30.1					7.99					6.20		
	C	10	10	10	7	7					19.7					29.9					7.98					6.20		
	D	10	10	10	9	8					19.7					29.9					7.98					6.10		
	E	10	10	10	8	6					19.7					29.9					7.98					6.04		
Initials:		AK/TD	NM	NM	TB	AK	VR	JL	NM	JL	NM	VR	JL	NM	JL	NM	VR	JL	NM	JL	NM	VR	JL	NM	JL	NM	JMB	JMB
Date:		10/29	10/30	10/31	11-1	11-2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1545	1231	1331	1318	1329	1155	1017	1000	1135	1217	1155	1012	1000	1135	1217	1155	1012	1000	1135	1217	1155	1012	1000	1135	1217	1400	1400
Initials (QA):		VR	MB	JL	RB	VR																						

Lauren May
29 March 19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 9
Test Species: Menidia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 520
Test Termination Date: 11/2/18 Time: 1323
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	9	19.54	19.6	19.8	20.0	19.9	29.63	30.1	30.2	29.7	30.4	8.00	7.93	7.93	7.90	7.95	7.86	6.70	6.30	~~5.28~~ 5.87	6.57	<0.5	<1
	B	10	10	10	10	10					19.8					30.0					7.94					6.52		
	C	10	10	10	10	10					19.7					30.2					7.94					6.58		
	D	10	10	10	10	10					19.7					30.3					7.94					6.66		
	E	10	10	10	10	9					19.7					30.0					7.95					6.65		
10%	A	10	9	9	9	9	20.72	20.5	19.9	19.9	19.8	30.12	30.1	30.2	30.4	30.5	7.91	7.79	7.77	7.77	7.81	7.46	6.12	6.02	~~5.99~~ 6.02	~~6.51~~ 6.47	0.870	0.735
	B	10	10	10	10	10					19.7					30.8					7.79					6.47		
	C	10	10	10	9	9					19.7					30.5					7.79					6.47		
	D	10	10	10	10	10					19.6					30.8					7.78					6.52		
	E	10	10	9	9	9					19.7					36.6					7.78					6.53		
50%	A	10	10	10	10	9	20.29	20.6	19.8	20.0	19.8	29.92	30.0	30.1	30.1	30.4	8.00	7.87	7.87	7.88	7.86	7.55	6.19	6.13	~~5.97~~ 6.03	~~6.19~~ 6.28	3.43	2.89
	B	10	10	9	9	7					19.7					30.4					7.89					6.28		
	C	10	10	10	10	10					19.7					30.4					7.89					6.28		
	D	10	10	10	10	10					19.7					30.4					7.87					6.28		
	E	10	10	10	10	9					19.7					30.3					7.88					6.37		
100%	A	10	10	10	10	10	19.95	19.9	19.6	20.0	~~20.3~~ 20.1	29.61	29.7	29.9	29.8	30.1	8.05	7.95	7.95	7.97	7.96	7.83	6.11	6.27	~~5.99~~ 5.90	5.93	8.94	6.86
	B	10	10	10	10	10					~~19.7~~ 19.7 ~~30.4~~ 30.1					30.1					7.95					6.01		
	C	10	10	10	10	9					19.7 ~~30.0~~ 30.0					30.0					7.97					6.01		
	D	10	10	10	10	10					19.7 ~~30.2~~ 30.2					30.2					7.97					6.25		
	E	10	10	10	10	10					19.7 ~~30.2~~ 30.2					30.2					7.98					6.41		
Initials:		TB/AK	NM	NM	TB	NM	VR	JL	NM	JL	NM	VR	JL	NM	BL	NM	VR	JL	NM	JL	NM	VR	JL	NM	JL	NM	JMB	JMB
Date:		10/29	10/30	10/31	11-1	11-2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1520	1140	1035	1300	1323	1237	1014	1000	1135	1146	1237	1014	1000	1135	1146	1237	1014	1000	1135	1146	1237	1014	1000	1135	1146	1400	1400
Initials (QA):		VR	MB	VR	KB	VR																						

Reviewed by Lauren May on 29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 10
Test Species: Menidia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1555
Test Termination Date: 11/2/18 Time: 1344
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L)) 0 h	96 h
Site water	A	10	10	10	10	10	19.73	19.8	20.3	20.6	20.2	29.93	30.0	30.4	30.36	30.4	8.02	7.92	7.93	7.91	8.12	7.87	6.88	5.75	5.76	6.16	<0.5	<1
	B	10	10	10	10	10					20.2		30			29.7					8.13					6.26		
	C	10	10	10	10	10					20.2					29.6					8.14					6.36		
	D	10	10	10	10	10					20.2					29.6					8.12					6.33		
	E	10	10	10	10	10					20.2					29.7					8.13					6.33		
10%	A	10	10	10	10	9	20.29	19.84	20.4	20.6	20.3	30.17	30.7	30.9	30.9	31.1	7.93	7.81	7.81	7.79	7.78	7.54	6.48	5.83	6.20	6.34	1.28	1.00
	B	10	10	10	9	9					20.2					30.3					7.97					6.30		
	C	10	10	10	10	10					20.2					30.3					7.95					6.18		
	D	10	10	10	10	10					20.2					30.3					7.96					6.25		
	E	10	10	10	9	9					20.2					30.3					7.95					6.21		
50%	A	10	10	10	10	10	20.19	19.70	20.5	20.5	20.4	30.14	31.0	31.0	31.0	31.2	7.99	7.84	7.86	7.84	8.08	7.62	6.68	5.76	6.11	6.30	6.58	4.45
	B	10	10	10	10	10					20.3					30.6					8.06					6.19		
	C	10	10	10	10	10					20.3					30.3					8.06					6.34		
	D	10	10	10	10	10					20.3					30.2					8.07					6.24		
	E	9 10 NM	9	10	10	9					20.3					30.3					8.07					6.16		
100%	A	10	10	10	10 NM	10 NM	19.75	19.62	20.5	20.4	20.4	30.06	30.8	30.8	30.9	31.1	8.04	7.89	7.93	7.91	8.13	7.72	6.71	5.88	6.19	6.25	12.8	9.68
	B	10	10	10	9/10 NM	8 NM					20.4					30.2					8.17					6.29		
	C	10	10	10	9	8					20.4					30.2					8.17					6.32		
	D	10	10	10	7	5					20.3					30.3					8.17					6.42		
	E	10 11 NM	11	10	8 10 NM	8					20.3					30.3					8.17					6.38		
Initials:		AK TB	NM	VR	TB	NM	VR	JC	NM	JC	TB	VR	JC	NM	JC	TB	VR	JC	NM	JC	TB	VR	JC	NM	JC	TB	JMB	JMB
Date:		10/29	10/30	10/31	11-1	11-2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1555	1230	1320	1324	1344	1235	1019	1000	1134	1330	1235	1019	1000	1134	1330	1235	1019	1000	1134	1330	1235	1019	1000	1134	1330	1400	1400
Initials (QA):		VR	MM	VR	RB	VR																						

Reviewed by Lauren May on 29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 11
Test Species: Menidia
Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1450
Test Termination Date: 11/2/18 Time: 1352
Page 1 of 1
Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive 24 h	48 h	72 h	96 h	Temp. (°C) 0 h	24 h	48 h	72 h	96 h	Salinity (ppt) 0 h	24 h	48 h	72 h	96 h	pH (SU) 0 h	24 h	48 h	72 h	96 h	D.O. (mg/L) 0 h	24 h	48 h	72 h	96 h	Ammonia (mg/L) 0 h	96 h
site water	A	10	10	10	10	10	19.34	19.9	20.6	20.3	20.1	30.02	30.4	30.5	30.6	30.6	8.01	7.91	7.85	7.82	7.93	8.50	6.51	6.41	6.32	6.15	<0.5	<1
	B	10	10	10	10	10					20.0					30.3					7.92					6.13		
	C	10	10	10	10	10					20.0					30.4					7.92					6.16		
	D	10	10	10	10	10					20.0					30.3					7.92					6.15		
	E	10	10	10	10	10					20.0					30.3					7.92					6.26		
10%	A	10	10	10	10	10	20.60	19.9	20.6	20.5	20.0	30.13	30.2	30.3	30.3	30.5	7.94	7.83	7.77	7.81	7.80	7.36	~~7.85~~ 7.84	6.38	6.22	6.15	1.30	1.05
	B	10	10	10	10	10					20.1					30.3					7.77		6.43			6.18		
	C	10	10	10	10	10					20.0					30.3					7.76					6.15		
	D	10	9	9	9	9					20.0					30.4					7.79					6.27		
	E	~~10~~ 11	11	11	11	9					20.0					30.5					7.79					6.31		
50%	A	10	10	10	10	10	20.41	19.9	20.6	20.7	20.1	29.98	30.0	30.1	30.1	30.6	8.02	7.89	7.84	7.87	7.90	7.54	~~7.85~~ 7.84	6.31	5.87	6.12	6.09	4.59
	B	10	10	10	10	10					20.1					30.2					7.91		6.38			6.15		
	C	10	10	10	10	10					20.0					30.2					7.90					6.14		
	D	~~10~~ 9 NM	9	9	9	9					20.0					30.2					7.92					6.26		
	E	10	10	9	9	9					20.0					30.3					7.91					6.28		
100%	A	10	10	10	6	6	20.32	20.2	20.6	20.6	20.1	29.93	29.8	29.8	29.8	30.1	8.04	7.96	7.92	7.96	7.99	7.39	~~7.96~~ 7.96	6.20	5.89	6.29	12.9	9.72
	B	10	10	10	7	4					20.0					30.0					8.00		6.25			5.85		
	C	10	10	9	6	6					20.0					30.0					8.01					6.05		
	D	10	10	9	7	6					20.0					30.1					~~8.02~~ 8.02					6.29		
	E	10	10	9	8	5					20.0					30.1					8.01					6.40		
Initials:		AK/TB	NM	NM	TB	AK	LR	JL	NM	SL	NM	LR	SL	NM	SL	NM	LR	JL	NM	SL	NM	LR	SL	NM	SL	NM	JNB	JNB
Date:		10/29	10/30	10/31	11.1	11.2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1450	1204	1328	0321	1352	1239	1022	1000	1129	1230	1239	1022	1000	1129	1230	1239	1022	1000	1129	1230	1239	1022	1000	1129	1230	1400	1400
Initials (QA):		LR	NM	SL	AK	LR																						

Reviewed by Lauren May on 29 March 19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP

Site ID: Control

Test Species: Menidia

Exposure duration: 96h

Test Initiation Date: 10/29/18 Time: 1300

Test Termination Date: 11/2/18 Time: 1314

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Environmental chamber temperature: 20°C

Conc.	Repl.	No. Loaded	No. Alive				Temp. (°C)					Salinity (ppt)					pH (SU)					D.O. (mg/L)					Ammonia (mg/L))	
			24 h	48 h	72 h	96 h	0 h	24 h	48 h	72 h	96 h	0 h	24 h	48 h	72 h	96 h	0 h	24 h	48 h	72 h	96 h	0 h	24 h	48 h	72 h	96 h	0 h	96 h
control	A	10	10	10	10	10	20.85	20.8	20.8	20.8	20.6	30.18	30.3	30.2	30.4	30.6	7.90	7.76	7.71	7.72	7.71	7.45	6.27	5.70	5.83	5.96	< 0.5	<1
	B	10	10	10	10	10					20.7					30.7					7.74					6.05		
	C	10	10	10	10	10					20.7					30.7					7.76					6.26		
	D	10	10	10	10	10					20.6					30.7					7.74					6.11		
	E	10	10	10	9	9/10					20.9					30.7					7.76					6.06		
	A																											
	B																											
	C																											
	D																											
	E																											
	A																											
	B																											
	C																											
	D																											
	E																											
	A																											
	B																											
	C																											
	D																											
	E																											
Initials:		AK TB	NM	NM	TB	AK	VR	JC	NM	JC	NM	VR	JC	NM	JL	NM	VR	JC	NM	JL	NM	VR	JC	NM	JL	NM	J-B	JMB
Date:		10/29	10/30	10/31	11-1	11-2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	10/30	10/31	11/1	11/2	10/29	11/2
Time:		1300	1140	1303	1330	1314	1159	944	1000	1145	1240	1159	944	1000	1145	1240	1159	944	1100	1145	1240	1159	944	1000	1145	1240	1400	1400
Initials (QA):		VR	NM	SL	RB	VR																						

Lauren May
29 March 19

5.8 Appendix H. Sediment Chain of Custody Information

CHAIN OF CUSTODY RECORD
USACE ERDC Laboratories, 3909 Halls Ferry Road, Vicksburg, MS 39180

Page ____

Houston Ship Channel North of Morgan's Point	Sampling Company:	ERDC:	EL, CEERD-EP-R	EL, CEERD-EP-R	Additional Notes:
	POC:	Project Manager:	Cheryl Montgomery	Dan Farrar	
	Address:	Address:	696 Virginia Road, Concord, MA 01742	3909 Halls Ferry Road Bldg 6000, Vicksburg, MS 39180	
	Email:	Email:	cheryl.montgomery@usace.army.mil	daniel.farrar@erdc.dren.mil	
	Phone:	Phone:	W: 978-318-8644 C: 781-530-8317	W: 601-634-2118 M: 601-529-6042	

Container / hold time groups: 1 15L HDPE Cubitainer, Pre-filtered, time: 48 hours (DOC, Dissolved Ammonia, Dissolved Metals, Dissolved Sulfides, Dissolved Cyanide); Hold (Dioxins/Furans, OC Pests, PAH/PCP, PCBs, SVOC); 2 40 ml Clear VOA w/ HCL, non-filtered, hold Time: 7 days (TPH high-level); 2 1L HDPE Cubitainer, non-filtered, Hold Time: 48 hours (TOC, Total Hg and Se, TSS); 3 40 ml Clear VOA w/ HCL, non-filtered, Hold time: 7 days (VOC); 125 ml HDPE pre-filtered, Hold Time: 24 HOURS (Cr III and VI); Sediment: Terra Core Kit, Hold Time: 14 days (VOC, VOC); 1 4 oz clear glass jar, Hold Time: 14 days (TPH)

#	Sample Name	Date	Time	Depth	Media	# of containers	Station	DOC	Dissolved Ammonia	Dissolved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/ Furans, OC Pests, PAH/PCP, PCBs, SVOC	TPH high-level	TOC	Total Hg and Se	TSS	Bulk Sediment*	VOC	Cr III and VI	VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ MeOH)	TPH
1	HSCNew-NMP-06	10-4-18	0750	NA	Sed	8												X			X	X	X
2	HSCNew-NMP-05	10-4-18	1215			8 9												X			X	X	X
3	HSCNew-NMP-04	10-5-18	0940			8												X			X	X	X
4	HSCNew-NMP-03	10-5-18	1430			8												X			X	X	X
5	HSCNew-NMP-02	10-6-18	0920			8												X			X	X	X
6	HSCNew-NMP-01	10-6-18	1220			8												X			X	X	X
7	HSCNew-NMP-03-DUP	10-5-18	1710			8												X			X	X	X
8	HSCNew-NMP-EQPB	10-6-18	1414		H_2O	9 11		X	X	X	X	X	X		X	X	X				X	X	
9	HSCNew-NMP-02-Sed-QC	10-6-18	0920		H2O Sed QC	5															X	X	X
10																							
11																							
12																							
13																							
14																							
15																							
Total																							

Field Duplicate → (sample 7)

* Bulk sediment includes (3) two-gallon buckets

1. I hereby transfer the sample containers to ERDC. Samples have been properly labeled and kept on ice or refrigerated.
[signature] Signature — 10-9-18 Date

2. I accept these samples for transfer to ERDC.
[signature] Signature of ERDC Representative — 10/9/18 Date

Temperature of Cooler

CHAIN OF CUSTODY RECORD
USACE ERDC Laboratories, 3909 Halls Ferry Road, Vicksburg, MS 39180

Page 1

Houston Ship Channel North of Morgan's Point

Sampling Company: Benchmark	ERDC:	EL, CEERD-EP-R	EL, CEERD-EP-R
POC: Neil Henthorne	Project Manager:	Cheryl Montgomery	Dan Farrar
Address: Po Box 158, Katy, TX 77492	Address:	696 Virginia Road, Concord, MA 01742	3909 Halls Ferry Road Bldg 6008, Vicksburg, MS 39180
Email:	Email:	cheryl.montgomery@usace.army.mil	daniel.farrar@erdc.dren.mil
Phone: 281-703-0257	Phone:	W: 978-318-8844 C: 781-630-8317	W: 601-634-2118 M: 601-529-6042

Additional Notes: Bulk Sediment 3 two gallon Buckets

								1 10L HDPE Cubitainer, Pre-filtered Hold time: 48 hours						2 40 ml Clear VOA w/HCL non-filtered Hold Time: 7 days	2 1L HDPE Cubitainer, non-filtered Hold Time: 48 hours			3 40 ml Clear VOA w/HCl, non-filtered Hold time: 7 days	125 ml HDPE pre filtered Hold Time: 24 HOURS	Terra Core Kit Hold Time: 14 days (Sediment)		1 4 oz clear glass jar, Hold Time: 14 days (Sediment)	sediment
#	Sample Name	Date	Time	Depth	Media	# of containers	Station	DOC	Dissolved Ammonia	Dissolved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/Furans, OC Pests, PAH/PCP, PCBs, SVOC	TPH high-level	TOC	Total Hg and Se	TSS	VOC	Cr III and VI	VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ NaOH)	TPH	
1	HSCNew-NMP-11	10-2-18	0831	N/A	Sed	8	11													x	x	x	X
2	HSCNew-NMP-10	10-2-18	1300				10													x	x	x	X
3	HSCNew-NMP-09	10-2-18	0715				9													x	x	x	X
4	HSCNew-NMP-08	10-3-18	0931				8													x	x	x	X
5	HSCNew-NMP-07	10-3-18	1313			9	7													x	x	x	X (4 Buckets)
6																							
7																							
8																							
9																							
10																							
11																							
12																							
13																							
14																							
15																							
Total																							

1. I hereby transfer the sample containers to ERDC. Samples have been properly stored and kept on ice or refrigerated.
[signature] Signature — Date 10-4-18 — Nei [signature] 10-6-18

2. I accept these samples for transfer to ERDC:
N. [signature] 10-6-18 [signature] Signature of ERDC Representative — Date — Temperature of Cooler

CHAIN OF CUSTODY RECORD

USACE ERDC Laboratories, 3909 Halls Ferry Road, Vicksburg, MS 39180

Page 1 of 2

Houston Ship Channel North of Morgan's Point			
Sampling Company:			
POC: Neil Hawthorne	ERDC: EL, CEERD-EP-R		EL, CEERD-EP-R
Address:	Project Manager: Cheryl Montgomery		Dan Farrar
	Address: 696 Virginia Road, Concord, MA 01742		3909 Halls Ferry Road Bldg 6009, Vicksburg, MS 39180
Email:	Email: cheryl.montgomery@usace.army.mil		daniel.farrar@erdc.dren.mil
Phone:	Phone: W: 978-318-8644, C: 781-630-8317		W: 601-634-2118, M: 601-529-8042

Additional Notes:

Container groups: 1 10L HDPE Cubitainer, Pre-filtered time: 48 hours (DOC through Dissolved Cyanide); Hold (Dioxins/Furans, OC Pests, PAH/PCP, PCBs, SVOC); 2 40 ml Clear VOA w/HCl, Hold Time: 7 days (TPH high-level); 2 1L HDPE Cubitainer, non-filtered, Hold Time: 48 hours (TOC, Total Hg and Se, TSS); 3 40 ml Clear VOA w/ HCl, non-filtered, Hold time: 7 days (VOC); 125 ml HDPE, filtered, Hold Time 24 HOURS (Cr III and VI); Terra Core Kit, Hold Time: 14 days (Sediment VOC); 1 4 oz clear glass jar, Hold Time: 14 days (TPH)

#	Sample Name	Date	Time	Depth	Media	# of containers	Station	DOC	Dissolved Ammonia	Dissolved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/Furans, OC Pests, PAH/PCP, PCBs, SVOC	TPH high-level	TOC	Total Hg and Se	TSS	VOC	Cr III and VI	VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ MeOH)	TPH	5 gallon cubitainers
1	HSCNew-NMP-01-SW	10-22-18	10:00	N/A	H2O	14	1	X	X	X	X	✓	✓ X	X	X	X	X	X	X				X
2	HSCNew-NMP-03-SW	10-22-18	10:53			14	3																
3	HSCNew-NMP-03-SW-DUP	10-22-18	11:30			9	DUP																
4	HSCNew-NMP-05-SW	10-22-18	12:00			14	5																
5	HSCNew-NMP-07-SW	10-22-18	12:40			14	7																
6	HSCNew-NMP-09-SW	10-22-18	1310			14	9																
7	HSCNew-NMP-11-SW	10-22-18	1340			14	11																
8																							
9																							
10																							
11																							
12																							
13																							
14																							
15																							
Total:																							

1. I [illegible] transfer the sample containers to ERDC. Samples have been properly labeled and kept on ice or refrigerated. [signature] 10-22-18

Signature Date

2. I accept these samples for transfer to ERDC: [signature] 10-23-18 4.9

Signature of ERDC Representative Date Temperature of Cooler

CHAIN OF CUSTODY RECORD
USACE ERDC Laboratories, 3909 Halls Ferry Road, Vicksburg, MS 39180

Houston Ship Channel North of Morgan's Point

	Sampling Company:	ERDC:	EL, CEERD-EP-R	EL, CEERD-EP-R	Additional Notes:
	POC: Neil Henthorne	Project Manager:	Cheryl Montgomery	Dan Farrar	
	Address:	Address:	696 Virginia Road Concord, MA 01742	3909 Halls Ferry Road Bldg 6009 Vicksburg, MS 39180	
	Email:	Email:	cheryl.montgomery@usace.army.mil	daniel.farrar@erdc.dren.mil	
	Phone:	Phone:	W: 978-318-8644 C: 781-530-8317	W: 601-634-2118 M: 601-529-8042	

Equip blank kit: 25 VOA vials, 8 hdpe jars, 1 3/4 10L cubitainers.

								1 10L HDPE Cubitainer, Pre-filtered Hold Time: 48 hours						2 40 ml Clear VOA w/HCL, non-filtered Hold Time: 7 days	2 L HDPE Cubitainer, non-filtered Hold Time: 48 hours			2 40 ml Clear VOA w/HCL, non-filtered Hold Time: 7 days	125 ml HDPE pre-Diurnal Hold Time: 24 HOURS	Terra Core Kit Hold Time: 14 days		14 oz clear glass jar, Hold Time: 14 days
																			Sediment		
	Sample Name	Date	Time	Depth	Media	# of containers	Station	DOC	Dissolved Ammonia	Dissolved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/ Furans, OC Pests, PAH/PCP, PCBs, SVOC	TPH high-level	TOC	Total Hg and Se	TSS	VOC	Cr III and VI	VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ MeOH)	TPH
1	HSCNew-NMP-02-SW	10/22/18	1002	3.5ft	W	14	02	X	X	X	X	X	X	X	X	X	X	X	X			
2	HSCNew-NMP-04-SW		1030	12.5ft	W	14	04	X	X	X	X	X	X	X	X	X	X	X	X			
3	HSCNew-NMP-06-SW		1125	5.1	W	14	06	X	X	X	X	X	X	X	X	X	X	X	X			
4	HSCNew-NMP-08-SW		1200	20.1	W	14	08	X	X	X	X	X	X	X	X	X	X	X	X			
5	HSCNew-NMP-10-SW		1230	16.0	W	14	10	X	X	X	X	X	X	X	X	X	X	X	X			
6	HSCNew-NMP-EQB		0900	—	W	33	—															
7																						
8																						
9																						
10																						
11																						
12																						
13																						
14																						
15																						
Total																						

includes 5 5gal cubi
"
"
"
"

1. I relinquish the sample containers to ERDC. Samples have been properly packed and kept on ice or refrigerated.
Signature — Date: 10-23-18

2. I accept these samples for transfer to ERDC:
Signature of ERDC Representative — Date: 10-23-18 — Temperature of Cooler: 4.9

U.S. Army Corps of Engineers

US Army Corps of Engineers®
Engineer Research and Development Center

Sampling, Chemical Analysis, and Bioassessment in Accordance with CWA Section 404

Houston Ship Channel Expansion Channel Improvement Project, North of Morgan's Point Houston Ship Channel, Texas

(Part 6 of 6: Appendices 8-9, CDFATE Modeling Report & USEPA R6 Validation Worksheets)

Cheryl R. Montgomery, Ph.D.
Brooke N. Stevens, Ph.D.
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US Army Corps of Engineers
Engineer Research and Development Center
Environmental Laboratory
Vicksburg, MS

FINAL

5 December 2023*

*Supersedes all previous versions. Only coversheet revised; no change to content.

Appendix 8: CDFATE Report

Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point Sediments, 404 Sediment Characterization and Testing – Mixing Zone Modeling for Discharge in Upland Placement Areas

June 19, 2019

Prepared for:

USACE, Galveston District (SWG)
2000 Fort Point Road
Galveston, TX 77550

Prepared by:
Department of the Army
U.S. Army Engineer Research and Development Center
Environmental Laboratory
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Susan E. Bailey

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1.0 Objectives

This report details the mixing zone modeling performed by the U.S. Army Engineer Research and Development Center (ERDC) to support a CWA Section 404 sediment testing characterization study for Houston Ship Channel Expansion Channel Improvement Project (HSC ECIP), North of Morgan's Point (NMP). Simulations of dredged material discharges into four upland placement areas (PAs) were run using the Fate of Continuous Discharge from Dredging Operations into Open Water (CDFATE) module, Windows version 1.0, (Havis 1994, Doneker and Jirka 1990, Akar and Jirka 1991, Jones 1990) of the ADDAMS model to establish compliance with water column toxicity criteria for the HSC sediment samples HSCNew-NMP-02, HSCNew-NMP-03, HSCNew-NMP-04, HSCNew-NMP-05, HSCNew-NMP-06, HSCNew-NMP-07, HSCNew-NMP-08, HSCNew-NMP-09, HSCNew-NMP-10, and HSCNew-NMP-11. Elutriate chemistry and elutriate bioassay data (Sections 4.5 and 4.6 of the HSC ECIP NMP Report) were evaluated and applied in the modeling.

2.0 Dredging and Placement Locations

The dredging and placement plan for NMP Segments 4, 5, and 6 is displayed below in Figure 1. Four upland placement sites are identified to receive dredged material from the project. Sediment from location HSCNew-NMP-01 from ship channel segment 1 (not shown on the map) is now not planned to be dredged and is therefore not included in the mixing zone analysis. Sediment from Segment 4 in the vicinity of locations HSCNew-NMP-02 and -NMP-03 will be placed in the New BW-8 PA. Segment 4 sediment from locations HSCNew-NMP-04 and -NMP-05 will be placed in the New E2-Clinton PA. Segment 5 sediment from location HSCNew-NMP-06 and Segment 6 sediment from locations -NMP-07, -NMP-08, -NMP-09 and -NMP-10 will be placed into the Glendale PA. Sediment from the vicinity of sample location HSCNew-NMP-11 will be placed in the Filter Bed PA.

Discharge locations and drainage paths to receiving waters for the four PAs are shown in Figure 2. The New BW-8 PA will discharge to existing and future onsite unnamed ditches (mostly grass lined ditches and some underground culverts) to Buffalo Bayou/HSC. New E2-Clinton PA will discharge to unnamed ditches and culverts to Turkey Run Gully, which is a mostly grass drainage ditch that discharges into Hunting Bayou. Glendale PA will also discharge to Turkey Run Gully, upstream of the New E2-Clinton PA discharge, flowing through a mix of underground culverts, mostly grass drainage ditch, concrete ditch from Mercury to Cheston Dr. 2 blocks E of Holland, then grass drainage ditch to Hunting Bayou. Hunting Bayou is considered the receiving water for both the New E2-Clinton and Glendale PAs. Filter Bed PA discharges to unnamed overgrown grass ditches to City of Houston (COH) underground storm water line to Buffalo Bayou. A mixing zone evaluation is needed to determine if the effluent discharged from these PAs will be sufficiently diluted within allowable mixing zones to comply with applicable water quality and toxicity criteria.

Figure 1. DMMP NW Dredging and Placement Locations

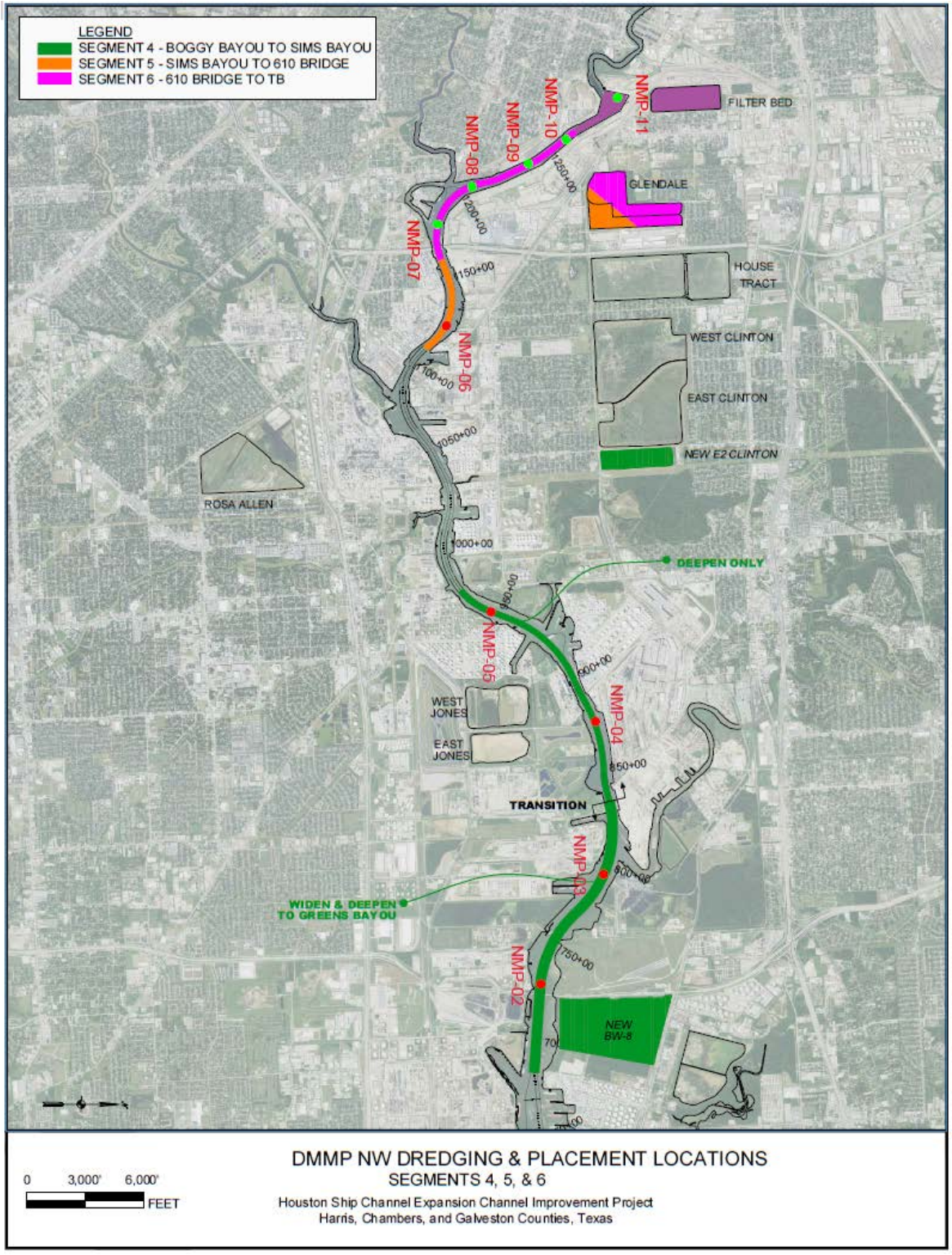
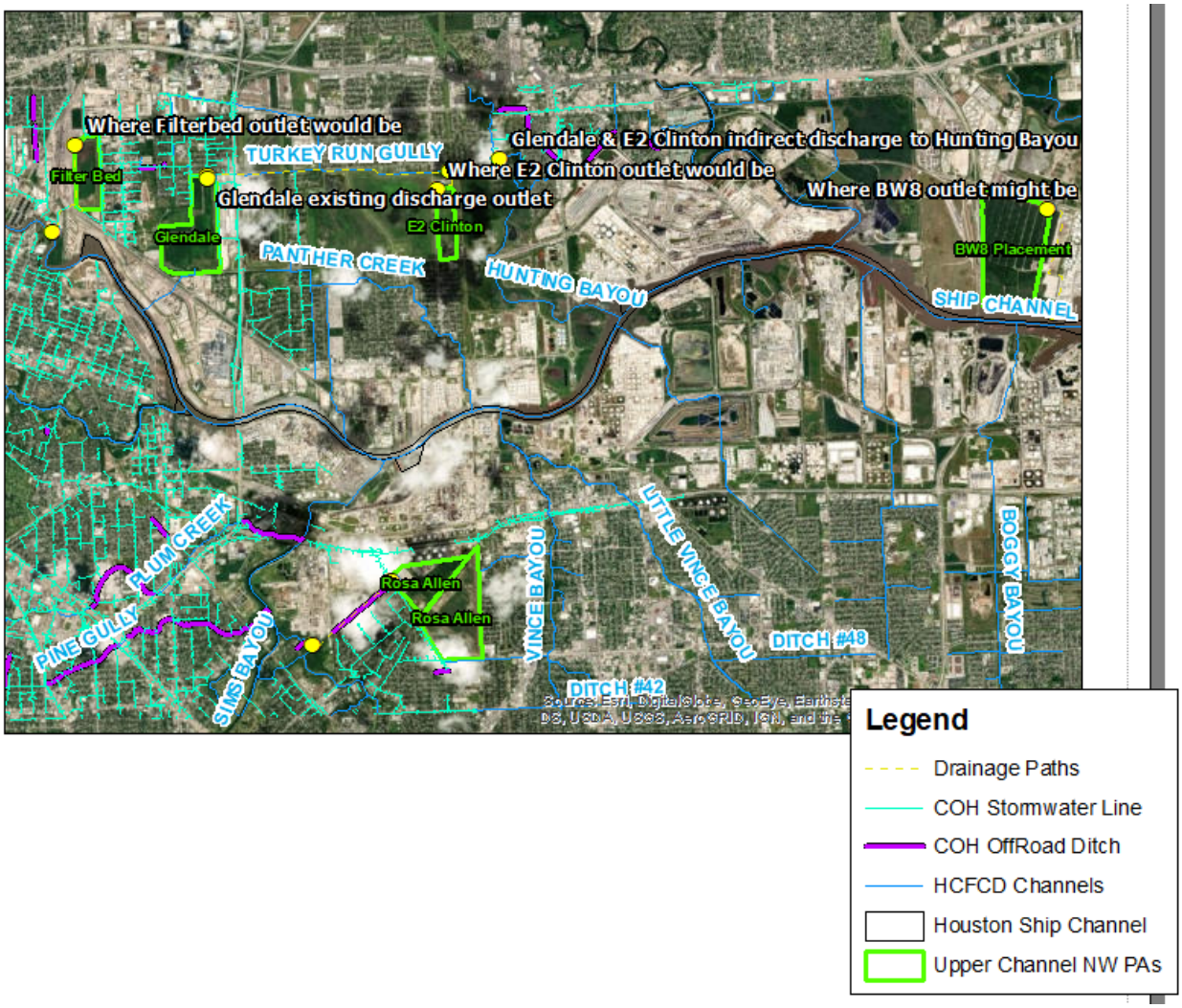


Figure 2. Upland Placement Area Discharge Locations and Drainage Paths to Receiving Water



3.0 Mixing Zone Evaluation Approach

Dilution of effluent from the dredged material placement area occurs when the effluent discharge mixes with the waters of the receiving stream. The extent to which the two streams (PA effluent and receiving stream) mix depends on physical characteristics of the flows such as density and flow rate (or velocity) of both streams, geometry of the receiving stream, and size and orientation of the effluent pipe (or channel). The CDFATE model is used here to evaluate the extent of mixing for effluent from each PA into their respective receiving streams.

The amount of dilution (D) that is required to meet water quality criteria is a function of the contaminant concentration in the effluent discharge (as represented by elutriate concentrations (C), the applicable water quality criteria (C_{wq}), and the background concentration of the receiving water (C_B). Required dilution is expressed in terms of how many parts of receiving water need to be mixed with one part of

effluent to reach the applicable criteria. Equations to calculate dilution requirements for both water quality ($D_{a\text{-}wq}$) and toxicity ($D_{a\text{-}tox}$) are provided below.

$$D_{a-wq} = \frac{C-C_{wq}}{C_{wq}-C_B} \quad (1)$$

where

$D_{a\text{-}wq}$ = dilution required to achieve concentration equivalent to water quality criteria
C = contaminant concentration in elutriate sample
C_{wq} = water quality criteria
C_B = background (receiving water) contaminant concentration

$$D_{a-tox} = \frac{100-LPC}{LPC} \quad (2)$$

where

$D_{a\text{-}tox}$ = dilution required to achieve LPC for toxicity
LPC = limiting permissible concentration based on elutriate toxicity evaluation

As shown in Equation 1, the quality of the receiving water affects dilution requirements. The higher the background concentration, the more water has to be mixed in to sufficiently dilute. The concentration of the mixture will necessarily fall between the concentration of the effluent and of the receiving water. If the background concentration is above the criteria, then it is impossible to demonstrate sufficient dilution to reach the criteria.

Texas surface water quality standards allow for application of a mixing zone (MZ) and zone of initial dilution (ZID). Acute toxicity is not allowed in a mixing zone, and chronic toxicity is not allowed beyond a mixing zone (TCEQ 2012). The ZID is a small area where initial dilution with receiving waters occurs and may not meet criteria applicable to the receiving water. Acute criteria may be exceeded within a ZID; thus acute criteria apply at the edge of the ZID. Chronic criteria apply at the edge of the mixing zone. Typically, the amount of mixing and dilution increases with distance from the discharge point. CDFATE modeling is necessary to determine the location (distance from the discharge point) at which dilution is sufficient to reach acute and chronic criteria and thus determine the dimensions needed for the ZID and mixing zones for each discharge location.

4.0 Elutriate Chemistry and Toxicity

Elutriate chemistry and toxicity were evaluated for comparison to water quality criteria to determine the need for a mixing zone evaluation for each PA. Sediment samples HSCNew-NMP-01-SD, HSCNew-NMP-02-SD, HSCNew-NMP-03-SD, HSCNew-NMP-04-SD, HSCNew-NMP-05-SD, HSCNew-NMP-06-SD, HSCNew-NMP-07-SD, HSCNew-NMP-08-SD, HSCNew-NMP-09-SD, HSCNew-NMP-10-SD and HSCNew-NMP-11-SD were collected during October 2018; corresponding water samples were also collected from the same locations in October, 2018 (Appendix 2 of the HSC ECIP NMP Report). Elutriate samples were prepared from the sediment samples as reported in Section 2.2.1 of the Tier III Biological Testing Report (Appendix

8 of the HSC ECIP NMP Report). The analytical results for the water and elutriate samples are provided in Sections 3.3 and 3.5, respectively, and Appendix 5 of the HSC ECIP NMP Report. Contaminants of concern (COCs) for which the elutriate concentration is shown to be below marine water screening criteria do not pose a problem for meeting criteria. Sixteen COCs were identified in which either the elutriate concentration exceeded the screening criteria (either acute or chronic), or the reporting limits (RLs) were above the screening criteria and therefore could not be verified as meeting the criteria. The elutriate results for the sixteen (16) COCs whose reported results exceed criteria are presented below in Table 1.

Table 1a Analytical Results for Houston Ship Chanel (HSC) Expansion Channel Improvement Project – Analytes of Interest for NMP Mixing Zone Analysis

	Hexachloro-butadiene µg/L	Hexachloro-cyclopentadiene µg/L	Anthracene µg/L	Pyrene µg/L	4,4'-DDT µg/L
Marine Water Screening Criteria:					
TSWQS (Acute)	-	-	-	-	0.13
EPA WQC (CMC)	-	-	-	-	0.13
NOAA (Marine Acute)	32	7	300	300	0.065
Region 6 (Marine Chronic)	0.32	0.07	0.18	0.24	0.001
Elutriate Samples:					
HSCNew-NMP-02-EL	**0.51 Ub**	**0.51 Ub**	0.079	**0.33**	**0.006 U**
HSCNew-NMP-03-EL	**0.50 Ub**	**0.50 Ub**	0.0045 Jb	0.017	**0.006 U**
HSCNew-NMP-03-EL-Field Dup	**0.50 Ub**	**0.50 Ub**	0.057	0.074	**0.006 U**
HSCNew-NMP-04-EL	**0.51 Ub**	**0.51 Ub**	0.15	0.20	**0.006 U**
HSCNew-NMP-05-EL	**0.50 Ub**	**0.50 Ub**	0.037	0.067	**0.006 U**
HSCNew-NMP-06-EL	**0.52 Ub**	**0.52 Ub**	0.013	0.092	**0.006 U**
HSCNew-NMP-07-EL	**0.50 Ub**	**0.50 Ub**	0.096	0.13	**0.006 U**
HSCNew-NMP-08-EL	**0.51 Ub**	**0.51 Ub**	**0.62**	**0.25**	**0.006 U**
HSCNew-NMP-09-EL	**0.51 Ub**	**0.51 Ub**	**0.85**	**0.28**	**0.006 U**
HSCNew-NMP-10-EL	**0.52 Ub**	**0.52 Ub**	0.10	0.10	**0.006 U**
HSCNew-NMP-11-EL	**0.47Ub**	**0.47Ub**	0.013	0.092	**0.006 U**
Site Water Samples:					
HSCNew-NMP-02-SW	**0.51 Ub**	**0.51 Ub**	0.010 Ub	0.0024 Jb	**0.006 U**
HSCNew-NMP-04-SW	**0.50 Ub**	**0.50 Ub**	0.010 Ub	0.0028 Jb	**0.006 U**
HSCNew-NMP-05-SW	**0.50 Ub**	**0.50 Ub**	0.010 Ub	0.0066 Jb	**0.006 U**
HSCNew-NMP-11-SW	**0.51 Ub**	**0.51 Ub**	0.010 Ub	0.0077 Jb	**0.006 U**

Footnotes:

(1) U/Ub = Analyte included in the analysis, but not detected (non-detect)

(2) J/Jb= Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration

(3) **Bold text** indicates samples that exceeded screening criteria

Table 1b **Analytical Results for Houston Ship Chanel (HSC) Expansion Channel Improvement Project – Analytes of Interest for NMP Mixing Zone Analysis**

	Dieldrin µg/L	Endrin µg/L	Endrin Aldehyde µg/L	Heptachlor µg/L	Heptachlor Epoxide µg/L
Marine Water Screening Criteria:					
TSWQS (Acute)	0.71	0.037	-	0.053	-
EPA WQC (CMC)	0.71	0.037	0.037	0.053	0.053
NOAA (Marine Acute)	0.355	0.0185	0.0185	0.0265	0.0265
Region 6 (Marine Chronic)	0.002	0.002	0.002	0.004	0.004
Elutriate Samples:					
HSCNew-NMP-02-EL	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-03-EL	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-03-EL-Field Dup	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-04-EL	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-05-EL	**0.006 U**	**0.006 U**	**0.006 U**	**0.006**	**0.006 U**
HSCNew-NMP-06-EL	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-07-EL	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-08-EL	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-09-EL	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-10-EL	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-11-EL	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
Site Water Samples:					
HSCNew-NMP-02-SW	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-04-SW	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-05-SW	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**
HSCNew-NMP-11-SW	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**	**0.006 U**

Footnotes:

(1) U/Ub = Analyte included in the analysis, but not detected

(2) J/Jb= Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.

(3) **Bold text** indicates samples that exceeded screening criteria.

Table 1c **Analytical Results for Houston Ship Chanel (HSC) Expansion Channel Improvement Project – Analytes of Interest for NMP Mixing Zone Analysis**

	Toxaphene µg/L	Copper µg/L	Lead µg/L	Silver µg/L	Zinc µg/L	Cyanide µg/L
Marine Water Screening Criteria:						
TSWQS (Acute)	0.21	13.5	133	2	92.7	-
EPA WQC (CMC)	0.21	4.8	210	1.9	90	1
NOAA (Marine Acute)	0.21	4.8	210	0.95	90	1
Region 6 (Marine Chronic)	0.0002	3.6	5.3	-	84.2	5.6
Elutriate Samples:						
HSCNew-NMP-02-EL	**0.30U**	**5.0 U**	5.0 U	**1.4**	50	**10 Cl, U**
HSCNew-NMP-03-EL	**0.30U**	1.5 J	5.0 U	**5.0 U**	44	**10 Cl, U**
HSCNew-NMP-03-EL-Field Dup	**0.30U**	**5.0 U**	5.0 U	**1.1 J**	**184**	**10 Cl, U**
HSCNew-NMP-04-EL	**0.30U**	**5.0 U**	5.0 U	**5.0 U**	44	**10 Cl, U**
HSCNew-NMP-05-EL	**0.30U**	**5.0 U**	5.0 U	**5.0 U**	69	**10 Cl, U**
HSCNew-NMP-06-EL	**0.30U**	**5.0 U**	5.0 U	**5.0 U**	71	**10 Cl, U**
HSCNew-NMP-07-EL	**0.30U**	**5.0 U**	5.0 U	**5.0 U**	66	**10 Cl, U**
HSCNew-NMP-08-EL	**0.30U**	**5.0 U**	5.0 U	**5.0 U**	**162**	**10 Cl, U**
HSCNew-NMP-09-EL	**0.30U**	**5.0 U**	5.0 U	**3.2 J**	47	**10 Cl, U**
HSCNew-NMP-10-EL	**0.30U**	0.70 J	**16**	**1.2 J**	73	**10 Cl, U**
HSCNew-NMP-11-EL	**0.30U**	0.60 J	5.0 U	**5.0 U**	**149**	**10 Cl, U**
Site Water Samples:						
HSCNew-NMP-02-SW	**0.30U**	2.4 J	5.0 U	**1.3 J**	77	**10 Cl, U**
HSCNew-NMP-04-SW	**0.30U**	2.2 J	5.0 U	**5.0 U**	79	**10 Cl, U**
HSCNew-NMP-05-SW	**0.30U**	3.0 J	1.0 J	**5.0 U**	62	**10 Cl, U**
HSCNew-NMP-11-SW	**0.30U**	**4.6 J**	1.5 J	**5.0 U**	**86**	**10 Cl, U**

Footnotes:

(1) U/Ub = Analyte included in the analysis, but not detected

(2) J/Jb = Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.

(3) Cl = Residual Chlorine or other oxidizing agent was detected in the container used to analyze this sample

(4) **Bold text** indicates samples that exceeded screening criteria.

The site water results for samples that represent receiving water are also provided in Table 1. Site water from the sample locations nearest the discharges to Buffalo Bayou/HSC (sample HSCNew-NMP-02-SW for New BW-8 PA, and sample HSCNew-NMP-11-SW for Filter Bed PA) represent background concentrations for the receiving water for those PAs. Site water data was not available for the receiving water location on Hunting Bayou from New E2-Clinton PA (receiving material from locations HSCNew-NMP-04 and -NMP-05) and Glendale PA (receiving material from sample locations HSCNew-NMP-06, -NMP-07, -NMP-08, -NMP-09 and -NMP-10). USGS Gauge data from 2000 were reviewed but determined to be unusable for this work as the data set was not a COC match and had several unreported or elevated reporting limits. As Hunting Bayou discharges into Buffalo Bayou/HSC between sample locations HSCNew-NMP-04 and -NMP-05, and representative data was unavailable, the site water data (conservative worst-case) from

these two locations were applied as the background concentrations for the discharges from Glendale and New E2-Clinton PAs into Hunting Bayou.

4.1 COCs with Reporting Limits above Criteria

For the following COCs in Table 1, analytical reporting limits (RLs) are above chronic criteria and qualified "U": hexachlorobutadiene, hexachlorocyclopentadiene, 4,4'-DDT, dieldrin, endrin, endrin aldehyde, heptachlor, heptachlor epoxide, toxaphene, copper and cyanide. The RLs are also above acute criteria for endrin, toxaphene, silver and cyanide. In cases where these contaminants are not detected in elutriate or receiving water, the RLs are (conservatively) assumed to be both the elutriate and the receiving water concentrations. Use of the RL in such circumstances makes it impossible to achieve dilution to meet either acute or chronic criteria concentrations, as it cannot be certain as to whether the criteria are exceeded.

The following COCs, were non-detect in any of the elutriate, site water and sediment samples: hexachlorocyclopentadiene, endrin, endrin aldehyde, heptachlor epoxide, toxaphene and cyanide. Given the lack of detections in sediment and surface water, there is no reason to believe these contaminants are present at concentrations of concern, and they are not evaluated further.

4.2 COCs above Criteria and Background

Several other COCs have limited evidence of their presence in the HSC sediment and waters. Heptachlor was shown as being detected at the reporting limit for one elutriate sample, but was not detected in any site water or sediment samples. Also, 4,4'-DDT was not detected in elutriate or site water and was only detected in sediment samples HSCNew-NMP-04-SD, HSCNew-NMP-05-SD and HSCNew-NMP-08-SD. Dieldrin was detected only in sediment of HSCNew-NMP-03-SD-Field Dup. Hexachlorobutadiene was only detected in sediment sample HSCNew-NMP-02-SD. The detection of these COCs suggests they are present, and they are therefore retained in the evaluation.

4.3 COCs with Background above Criteria

If background receiving water concentrations are already above criteria, then it is impossible to dilute the effluent to below the criteria (Section 3.0). In this case, a mixing zone evaluation is not necessary. Of the contaminants that were not eliminated from the evaluation in Section 4.1, the following contaminants have receiving water concentrations (either detected or RL applied) above chronic criteria: hexachlorobutadiene, 4,4'-DDT, dieldrin, heptachlor, and copper (HSCNew-NMP-11, Filter Bed PA only). As a result of both the finding that the receiving water concentrations (either detected or RL applied) are above chronic criteria for these COCs and that acute criteria were not exceeded for hexachlorobutadiene, 4,4'-DDT, dieldrin, and heptachlor, these COCS will not be further evaluated for mixing zone requirements. However, copper will continue to be evaluated as dilution can be achieved for three of the four PAs and it was the only COC where concentrations exceeded acute criteria.

Silver does not have an applicable chronic standard. However, since silver concentrations (either detected or RLs) in receiving waters (background) were above marine acute criteria, sufficient dilution cannot be achieved, and further evaluation with respect to a mixing zone is unnecessary.

Despite the inability to determine a mixing zone for these contaminants (hexachlorobutadiene, 4,4'-DDT, dieldrin, heptachlor and silver), compliance with water quality standards still needs to be demonstrated for each PA. Some alternatives to be considered to demonstrate compliance (in a follow-on evaluation) include: 1) reanalyzing elutriate and or receiving water chemistry with RLs below criteria; and 2) search for historical evaluation of receiving water chemistry that might have RLs below criteria. Furthermore, non-detect concentrations could potentially be handled in some manner other than assigning the RL as the concentration (USEPA 1991). If concentrations below criteria could justifiably be used as the receiving water concentrations, dilution requirements could then be determined for these COCs. Without that justification, however, these COCs will not be evaluated based on the inability to sufficiently dilute.

4.4 Bioassay Results

In 404 evaluations, it is recommended (but not required) that a multi-species testing approach be used to assess potential effects on the receiving waters. As reported in Section 3.6 and Appendix 8 of the HSC ECIP NMP Report, standard acute (96 hour) toxicity tests were conducted to assess toxicity of the elutriate samples. The tests subjected two species, *Menidia beryllina* and *Americamysis bahia*, to each elutriate sample. Elutriate bioassay test results are reported in Section 3.6 and Appendix 8 of the HSC ECIP NMP Report and presented below in Table 2.

Reported endpoints from the bioassay tests depends on the resulting mortality. If test mortality was high enough (50% effect was bracketed by dilution series and a no observed effects concentration (NOEC) was obtained), the end result of the effluent elutriate toxicity evaluation is the 96-hr median lethal concentration (LC50), expressed as a percentage of the suspended dredged material concentration (or 100% elutriate). However, if acute toxicity was demonstrated but mortality was not high enough to calculate a LC50, then the NOEC and lowest observed effects concentration (LOEC) were reported.

As shown in Table 2, there was no acute elutriate toxicity to four of the tested elutriates (HSCNew-NMP-02, -NMP-03, -NMP-05 and –NMP-09). Only material from HSCNew-NMP-02 and HSCNew-NMP-03 will be placed in New BW-8 PA, and since no acute toxicity was demonstrated for either material, mixing requirements on the basis of the bioassay testing are not needed for New BW-8 PA. However, the remaining elutriate samples (HSCNew-NMP-04, -NMP-06, -NMP-07, -NMP-08, -NMP-10 and –NMP-11) did display acute toxicity, and require the application of a mixing zone for New E2-Clinton PA, Glendale PA and Filter Bed PA.

It should be noted, as pointed out in Section 3.6 and Appendix 8 of the HSC ECIP NMP Report, that concentrations of ammonia measured in all of the elutriates in which acute toxicity was observed were high enough to cause mortality to the test organisms based on literature reported values for ammonia toxicity. This suggests that ammonia was a factor in determining the observed toxicity in both test organisms. Ammonia is considered a non-persistent contaminant which often causes toxicity in elutriate tests (Kennedy et al. 2015). Being non-persistent, it is expected to dissipate rapidly and its presence is not expected to result in chronic effects.

As discussed previously, chronic criteria apply at the edge of the mixing zone and acute criteria at the edge of the ZID. The NOEC was applied as the acute criteria. The chronic criteria was determined as either the

LC50 multiplied by an application factor (AF) or (where a LC50 was not calculated) the LOEC multiplied by an AF. The AF generally represents the inverse of the acute-to-chronic ratio (ACR). An AF of 0.01 was used here as a conservative approach within this initial screening evaluation. The 0.01 AF was recommended by the National Academy of Science (NAS) and adopted in the MPRSA and USEPA/UACE dredged material testing guidance (Kennedy et al. 2015). There is precedent, however, for applying AFs other than 0.01 where ammonia is the driver of toxicity. Kennedy et al. (2105) suggests the use of a larger AF of 0.05 to 0.1 for dredging evaluations for nonpersistent contaminants. Although the conservative AF of 0.01 was used in this evaluation, it is recommended that a less conservative AF be considered in light of the ammonia toxicity and conservative nature of the 0.01 factor, and that the toxicity criteria be recalculated in subsequent evaluation.

Table 2 **Biological Testing Results for Houston Ship Chanel (HSC) Expansion Channel Improvement Project – Elutriate Bioassay Results of Interest for NMP Mixing Zone Analysis**

PA Assigned in DMMP	Sample	Endpoint	*96-h Americamysis bahia*			*96-h Menidia beryllina*		
			Endpoint Result	Acute criteria (1)	Chronic criteria (2)	Endpoint Result	Acute criteria (1)	Chronic criteria (2)
New BW-8	HSCNew-NMP-02	NOEC	100%	NA	NA	100%	NA	NA
		LOEC	NA (1)			NA (1)		
		LC50	NA (1)			NA (1)		
	HSCNew-NMP-03	NOEC	100%	NA	NA	100%	NA	NA
		LOEC	NA (1)			NA (1)		
		LC50	NA (1)			NA (1)		
New E2-Clinton	HSCNew-NMP-04	NOEC	50%	50%	1%	50%	50%	1%
		LOEC	100%			100%		
		LC50	NA (1)			NA (1)		
	HSCNew-NMP-05	NOEC	100%	NA	NA	100%	NA	NA
		LOEC	NA (1)			NA (1)		
		LC50	NA (1)			NA (1)		
Glendale	HSCNew-NMP-06	NOEC	100%	NA	NA	50%	50%	0.95%
		LOEC	NA (1)			100%		
		LC50	NA (1)			95 (78 – 117)		
	HSCNew-NMP-07	NOEC	50%	50%	0.79%	10%	10%	0.59%
		LOEC	100%			50%		
		LC50	79 (73 – 86)			59 (52 – 66)		
	HSCNew-NMP-08	NOEC	50%	50%	1%	50%	NA	NA
		LOEC	100%			100%		
		LC50	NA (1)			NA (1)		
	HSCNew-NMP-09	NOEC	100%	NA	NA	100%	NA	NA
		LOEC	NA (1)			NA (1)		
		LC50	NA (1)			NA (1)		

	HSCNew-NMP-10	NOEC	100%	NA	NA	50%	NA	NA
		LOEC	NA (1)			100%		
		LC50	NA (1)			NA (1)		
Filter Bed	HSCNew-NMP-11	NOEC	100%	NA	NA	50%	NA	NA
		LOEC	NA (1)			100%		
		LC50	NA (1)			NA (1)		

Footnotes:

(1) If no acute toxicity demonstrated, not applicable (NA); if acute toxicity predicted, then acute criteria (CMC) = NOEC

(2) If no acute toxicity demonstrated, not applicable (NA); if acute toxicity predicted, but LC50 cannot be calculated, then chronic criteria (CCC) = LOEC x AF; if acute toxicity predicted, and LC50 calculated, then CCC = LC50 x AF. AF = application factor (assumed to be 0.01).

4.5 Dilution Requirements

4.5.1 Water Quality

Table 3 presents the chemical concentrations (elutriate and background), water quality criteria and calculated dilution requirements to be applied in the CDFATE modeling for the COCs that were not previously eliminated from evaluation based on lack of detection (Section 4.1) and inability to dilute due to background concentrations above criteria (Section 4.3). The lowest of the acute criteria was applied to the dilution calculation using Equation 1.

For these COCs, the greatest dilution requirements to meet acute criteria are: 6.9 (Zn) for New BW-8 PA, 0.11 (Cu) for New E2-Clinton PA, 6.7 (Zn) for Glendale PA, and 13.4 (Zn) for Filter Bed PA. To meet chronic criteria, the greatest dilution requirements are 13.0 (Zn) for New BW-8 PA, 2.3 (Cu) for New E2-Clinton PA, 36 (Pb) for Glendale PA, and dilution is not possible for Filter Bed PA based on Zn receiving water (background) concentrations.

4.5.2 Toxicity

Based on the acute and chronic criteria determined from the bioassay evaluation (Section 4.4), dilution requirements were calculated for each elutriate and test species using Equation 2. The resulting dilution requirements are also presented in Table 3. The highest dilution required for any elutriate sample and species for a given PA is applied as the dilution requirement for that PA. With respect to the bioassay results, the highest dilution requirements to meet acute concentrations are 1.0 for New E2-Clinton PA, 1.0 for Glendale PA, and 1.0 for Filter Bed PA; where a 1.0 dilution means a 1:1 dilution (one part elutriate to one part receiving water), resulting in a concentration reduction of 50%. For chronic toxicity, dilution requirements are 99.0 for New E2-Clinton PA, 168.5 for Glendale PA, and 99.0 for Filter Bed PA. On the basis of bioassay testing, dilution requirements are not applicable for New BW-8 PA, as HSCNew-NMP-02 and HSCNew-NMP-03 did not display toxicity for either tested species.

4.5.3 Overall Dilution Requirements

Considering both COCs and bioassay results, the overall highest dilution requirements are 6.9 at New BW-8 PA, 1.0 (reduction of 50%) at New E2-Clinton PA, 6.7 at Glendale PA and 13.4 at Filter Bed PA to

meet acute criteria, and 13.0 at New BW-8 PA, 99.0 at New E2-Clinton PA, 168.5 at Glendale PA and 99.0 at Filter Bed PA to meet chronic criteria.

Table 3 Summary of Dredge Material Tier II Exceedances and Required Dilution

Parameter	Concentration (µg/L)									
	New BW-8 PA		New E2-Clinton PA		Glendale PA					Filter Bed PA
	HSC New-NMP-02	HSC New-NMP-03	HSC New-NMP-04	HSC New-NMP-05	HSC New-NMP-06	HSC New-NMP-07	HSC New-NMP-08	HSC New-NMP-09	HSC New-NMP-10	HSC New-NMP-11
Anthracene	0.079	0.057 (7)	0.015	0.037	0.013	0.096	0.62	0.85	0.10	0.013
Background	0.010 Ub	0.010 Ub	0.010 Ub	0.010 Ub	0.010 Ub	0.010 Ub	0.010 Ub	0.010 Ub	0.010 Ub	0.010 Ub
CMC (5)	300	300	300	300	300	300	300	300	300	300
CCC (6)	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Dilution required to meet CMC(1)	0	0	0	0	0	0	0	0	0	0
Dilution required to meet CCC (1)	0	0	0	0	0	0	**2.600**	**3.959**	0	0
Pyrene	0.33	0.074 (8)	0.20	0.067	0.092	0.13	0.25	0.28	0.10	0.092
Background	0.0024 Jb	0.0024 Jb	0.0066 Jb (9)	0.0066 Jb (9)	0.0066 Jb (9)	0.0066 Jb (9)	0.0066 Jb (9)	0.0066 Jb (9)	0.0066 Jb (9)	0.0077 Jb
CMC (5)	300	300	300	300	300	300	300	300	300	300
CCC (6)	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Dilution required to meet CMC(1)	0	0	0	0	0	0	0	0	0	0
Dilution required to meet CCC (1)	**0.383**	0	0	0	0	0	**0.030**	**0.171**	0	0
Copper	5.0 U	5.0 U (10)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	0.70 J	0.60 J
Background	2.4 J	2.4 J	3.0 J	3.0 J	3.0 J	3.0 J	3.0 J	3.0 J	3.0 J	4.6 J
CMC (5)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
CCC (6)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Dilution required to meet CMC(1)	**0.083**	**0.083**	**0.111**	**0.111**	**0.111**	**0.111**	**0.111**	**0.111**	0	0
Dilution required to meet CCC (1)	**1.167**	**1.167**	**2.333**	**2.333**	**2.333**	**2.333**	**2.333**	**2.333**	0	0
Lead	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	16	5.0 U
Background	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.5 J
CMC (5)	133	133	133	133	133	133	133	133	133	133
CCC (6)	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3

Parameter	Concentration (µg/L)									
	New BW-8 PA		New E2-Clinton PA		Glendale PA					Filter Bed PA
	HSC New-NMP-02	HSC New-NMP-03	HSC New-NMP-04	HSC New-NMP-05	HSC New-NMP-06	HSC New-NMP-07	HSC New-NMP-08	HSC New-NMP-09	HSC New-NMP-10	HSC New-NMP-11
Dilution required to meet CMC(1)	0	0	0	0	0	0	0	0	0	0
Dilution required to meet CCC (1)	0	0	0	0	0	0	0	0	**36**	0
Zinc	50	184 (11)	44	69	71	66	162	47	73	149
Background	77	77	79	79	79	79	79	79	79	86
CMC (5)	90	90	90	90	90	90	90	90	90	90
CCC (6)	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2
Dilution required to meet CMC(1)	0	**6.963**	0	0	0	0	**6.667**	0	0	**13.409**
Dilution required to meet CCC (1)	0	**12.961**	0	0	0	0	**15.560**	0	0	**TBD**
96-h *Americamysis bahia*										
NOEC (%)	100	100	50	100	100	50	50	100	100	100
LOEC (%)	NA	NA	100	NA	NA	100	100	NA	NA	NA
LC50 (%)	NA	NA	NA	NA	NA	79	NA	NA	NA	NA
CMC Concentration (3)	NA	NA	50	NA	NA	50	50	NA	NA	NA
Dilution required to meet CMC(2)	NA	NA	**1**	NA	NA	**1**	**1**	NA	NA	NA
CCC Concentration (4)	NA	NA	1	NA	NA	0.79	1	NA	NA	NA
Dilution required to meet CCC (2)	NA	NA	**99.0**	NA	NA	**125.6**	**99.0**	NA	NA	NA
96-h *Menidia beryllina*										
NOEC (%)	100	100	50	100	50	10	50	100	50	50
LOEC (%)	NA	NA	100	NA	100	50	100	NA	100	100
LC50 (%)	NA	NA	NA	NA	95	59	NA	NA	NA	NA

Parameter	Concentration (µg/L)									
	New BW-8 PA		New E2-Clinton PA		Glendale PA					Filter Bed PA
	HSC New-NMP-02	HSC New-NMP-03	HSC New-NMP-04	HSC New-NMP-05	HSC New-NMP-06	HSC New-NMP-07	HSC New-NMP-08	HSC New-NMP-09	HSC New-NMP-10	HSC New-NMP-11
CMC Concentration (3)	NA	NA	50	NA	50	50	50	NA	50	50
Dilution required to meet CMC(2)	NA	NA	**1**	NA	**1**	**1**	**1**	NA	**1**	**1**
CCC Concentration (4)	NA	NA	1	NA	0.95	0.59	1	NA	1	1
Dilution required to meet CCC (2)	NA	NA	**99.0**	NA	**104.3**	**168.5**	**99**	NA	**99**	**99**
Maximum dilution required for CMC (17)	**0.083**	**6.963**	**1**	**0.111**	**1**	**1**	**6.667**	**0.111**	**1**	**13.409**
Maximum dilution required for CCC (17)	**1.167**	**12.961**	**99**	**2.333**	**104.3**	**168.5**	**99**	**3.959**	**99**	**TBD**

Footnotes:

(1) Dilution ($D_{a\text{-}wq}$) = $(C - C_{WQ})/(C_{WQ} - C_{Background})$
- $D_{a\text{-}wq}$ = dilution required to achieve concentration equivalent to water quality criteria
- C = contaminant concentration in elutriate sample
- C_{WQ} = water quality criteria (lesser of TSWQS (Acute) or EPA WQC (CMC))
- $C_{Background}$ = background (ODMDS) contaminant concentration (HSCNEW-SMP-ODMDS-SW)

(2) Dilution ($D_{a\text{-}tox}$) = (100 – LPC)/LPC
- $D_{a\text{-}tox}$ = dilution required to achieve LPC for toxicity
- LPC = limiting permissible concentration based on elutriate toxicity evaluation

(3) If no acute toxicity demonstrated, not applicable (NA); if acute toxicity predicted, then CMC = NOEC

(4) If no acute toxicity demonstrated, not applicable (NA); if acute toxicity predicted, but LC50 cannot be calculated, then CCC = LOEC x AF; if acute toxicity predicted, and LC50 calculated, then CCC = LC50 x AF. AF = application factor (assumed to be 0.01).

(5) CMC = lowest of TSWQS (acute), EPA WQC (CMC), and NOAA (marine acute). This was NOAA (marine acute) for all COCs except lead (TSWQS (acute)).

(6) Region 6 (marine chronic)
(7) NMP03 was 0.0045 Jb; NMP-03-EL-Field Dup was 0.057. Used higher of the two values.
(8) NMP03 was 0.017; NMP-03-EL-Field Dup was 0.074. Used higher of the two values.
(9) HSCNew-NMP-04-SW is 0.0028 Jb; HSCNew-NMP-05-SW is 0.0066 Jb. Used HSCNew-NMP-05-SW as worst case.
(10) HSCNew-NMP-03-EL was 1.5 J; HSCNew-NMP-03-EL-Field Dup was 5.0 U. Used HSCNew-NMP-03-EL-Field Dup as worst case.
(11) HSCNew-NMP-03-EL was 44; HSCNew-NMP-03-EL-Field Dup was 184. Used HSCNew-NMP-03-EL-Field Dup as worst case.
(12) U = analyte included in the analysis, but not detected; set equal to the RL
(13) Ub = compound was analyzed for but was not detected (non-detect)
(14) J = Detected but below the Reporting Limit (Limit of Quantitation); therefore, result is an estimated concentration.
(15) Jb = estimated value less than RL
(16) Cl = Residual Chlorine or other oxidizing agent was detected in the container used to analyze this sample
(17) TBD = To be determined. It is impossible to meet acute or chronic criteria based on background concentrations above criteria. COC will be reviewed to better refine receiving water concentrations.

5.0 Dredged Material and Site Water Properties

The dredged slurry entering the PAs will consist of a mixture of the dredged material and entrained site water. Most of the solid particulates are expected to settle within the PA, so that the effluent will consist primarily of site water with some fraction (primarily fines) of suspended solids that did not settle. As discussed in Section 3.0, physical properties of both the effluent and receiving water, such as density as a function of salinity and temperature, affect the mixing behavior between the effluent and receiving water. Water samples were taken at mid-depth. Properties of the collected site water are shown in Table 5.

Grain size distributions and other physical properties of the sediment samples were collected as part of the sampling event. Although they are not used directly in the CDFATE modeling, the physical properties of the dredged material are always useful in interpreting the results. These are provided in Section 3.2.1 and Appendix 4 of the HSC ECIP NMP Report and Table 4 below.

Table 4 Results of Physical Analyses for Composited Dredge Material Samples (1)

	HSC New NMP -02- SD	HSC New NMP -03- SD	HSC New NMP- 03-SD- DUP	HSC New NMP -04 - SD	HSC New NMP -05- SD	HSC New NMP -06- SD	HSC New NMP -07- SD	HSC New NMP -08- SD	HSC New NMP -09- SD	HSC New- NMP -10- SD	HSC New- NMP -11- SD
Grain Size Percentages											
Gravel	0	0	0	0	0	0	0	0	0	0	0
Sand Coarse	0.4	0.7	0.6	0.4	2.8	0.1	0.2	0.1	0.4	0.2	0.4
Sand Medium	1.4	0.8	1.1	0.9	3.3	1.3	1.7	0.6	0.5	0.4	0.6
Sand Fine	19.7	39.6	48.8	11.6	28.3	16.7	28.4	13.5	7.7	12.4	41.4
Sand Total	21.5	41.1	50.5	12.9	34.4	18.1	30.3	14.2	8.6	13	42.4
Silt	38.7	29.6	23.4	28.7	25.8	38.1	30.6	17.7	18.3	23	23
Clay	39.8	28	26.1	58.2	39.5	42.3	39.1	68	73.1	63.9	34.7
Solids, %	65.1	81.3	54.9	65.5	67.5	68.1	69.1	69.3	66.1	72.3	79.6
Specific Gravity (g/cc)	2.67	2.64	2.69	2.65	2.67	2.65	2.66	2.64	2.65	2.69	2.66
Atterberg Liquid Limit (%)	44	23	25	70	47	42	45	57	55	56	32
Atterberg Plastic Limit (%)	17	12	11	23	16	17	16	19	21	20	14

Footnotes:

(1) Full particle size distribution report provided in Appendix 4 of the HSC ECIP NMP Report

Table 5 Results of In Situ Site Water Parameters (1)

	HSC New NMP -02- SW	HSC New NMP -03- SW	HSC New NMP -04 - SW	HSC New NMP -05- SW	HSC New NMP -06- SW	HSC New NMP -07- SW	HSC New NMP -08- SW	HSC New NMP -09- SW	HSC New- NMP -10- SW	HSC New- NMP -11- SW
Water Depth (ft)	7.9	30.2	25.3	31	10.3	20.2	40.2	40.1	32.6	40.3
Sample Depth (ft)	3.5	15	12.5	15.5	5.1	10	20.1	20	16	20.1
Water Temperature(^{o}C)	22.84	19.93	22.74	19.68	22.87	19.43	23.08	20.24	23.09	19.5
Salinity (ppt)	4.59	3.93	3.61	2.84	1.76	1.18	1.81	2.32	1.8	1.13
Turbidity (NTU)	8.0	8.2	8.4	8.6	9.8	9.5	7.6	12.1	12.9	26.3

Footnotes:

(1) Full site water analysis report provided in Appendix 5 of the HSC ECIP NMP Report

6.0 CDFATE Input

Mixing zone calculations are made using the CDFATE model (Havis 1994, Doneker and Jirka 1990, Akar and Jirka 1991, Jones 1990). CDFATE uses four categories of input parameters for these calculations: 1) discharge parameters; 2) site receiving water conditions, 3) effluent density modeling and 4) mixing zone data. Each of these are discussed below:

6.1 Discharge Parameters

Table 6 describes the discharge parameters for each of the PAs. A 24-inch hydraulic cutterhead dredge is planned for use. Assuming a typical pipeline velocity of 15 fps and a conservative assumption of 20% downtime, yields a flow rate of 37.7 cfs (1.07 m^3/s) into the PAs. It was assumed the discharge rate from the PAs would be equal to the inflow rate. Each candidate PA is discussed further below.

Table 6 CDFATE Input – Discharge Parameters

Parameter	New BW-8 PA	New E2-Clinton PA	Glendale PA	Filter Bed PA
Type Discharge	CDF Discharge from Partially Full Pipe	CDF Discharge from Side Stream Channel	CDF Discharge from Side Stream Channel	CDF Discharge from Partially Full Pipe
Water Depth at Discharge Point (m) (1)	5.02 m	2.10	2.10	3.50/4.40 (2)
Angle of Receiving Water Side (deg)	3.00	26.0	26.0	40.0
Horizontal Discharge Angle (deg)	90.0	90.0	90.0	90.0
Discharge Rate (m^3/s)	1.07	1.07	1.07	1.07
Width of Channel/Pipe Carrying Effluent (m) (3)	1.83	5.18	5.18	1.83
Depth of Flow in Channel/Pipe (m)	0.38	1.07	1.07	0.38

Protruding Distance (m) (2)	45.72 / 60.00	4.10	4.10	2.2/15.24

Footnotes:

(1) Estimated water depth 2-3 m from end of protruding distance
(2) Actual protruding distance unknown. Two distances were evaluated at New BW-8 PA and Filter Bed PA.
(3) Actual culvert dimensions unknown but assumed as 6 ft for New BW-8 PA and Filter Bed PA discharges. Turkey Run Gully appeared to have a width of 17 ft (5.18 m)

6.1.1 Placement Area - New BW-8 PA

New BW-8 PA discharges to Buffalo Bayou/HSC just east of the PA through an underground culvert (HSC-PDT Email from C. Sepulveda 3/27/19). Although the actual size and orientation of the culvert is not known, the culvert size was assumed to be 6 ft (1.83 m). Using Manning's equation, and assuming a slope of 0.01 (vertical:horizontal) and roughness value of 0.014 for concrete pipe, yields a flow depth of 1.25 ft (0.38 m). The pipe is assumed to extend perpendicular to the channel. Mixing is affected by the location the pipe discharges within the channel cross section, yet the actual pipe length is not known. Therefore, two separate model runs were performed assuming the pipe protrudes 150 ft (45.72 m) and 196 ft (60 m) into the channel. Bathymetry for Buffalo Bayou/HSC at the discharge location was obtained from USACE hydrographic surveys (eHydro). A recent survey of the Boggy Bayou to Greens Bayou section, dated 05 March 2019 provided bathymetry of the navigation channel; an older survey dated 12 March 2013 of the Carpenters Bayou to Boggy Bayou reach provided some additional depth information outside the navigation channel, although bathymetry was not available between the north bank (discharge point) and the navigation channel. A cross section was developed based on the bathymetry, for which an average depth was calculated as 24.7 ft (7.51 m). The channel width in that vicinity is approximately 1238 ft (377.5m). The water depth at the end of the pipe was estimated as 5.02 m, although the actual bathymetry was not known outside the channel. It was estimated that the angle between the bank and the horizontal culvert was 3.00 degrees based on the bank slope.

6.1.2 Placement Area – Filter Bed PA

The Filter Bed PA discharges to Buffalo Bayou/HSC through an underground culvert approximately 0.75 mi north of the turning basin (Figure 2). As with New BW-8 PA, the actual size and orientation of the culvert is not known, the culvert size was assumed to be 6 ft (1.83 m), with a flow depth of 0.38 m. Bathymetry of the Buffalo Bayou/HSC channel at the Filter Bed PA discharge location was obtained from USACE hydrographic surveys (eHydro), and a cross section delineated with an average channel depth of 14.8 ft (4.512 m). The channel width in that vicinity is approximately 305 ft (93 m). Two model runs were performed because the actual pipe distance was not known; one assumed the pipe protruded 2.2 m and one 15.24 m into the channel where the water depth is 3.5 m or 4.40 m, respectively. Side slope at the discharge location was estimated as 40 degrees.

6.1.3 Placement Area – New E2-Clinton PA and Glendale PA

Although New E2-Clinton and Glendale PAs are not located proximate to each other (Figure 2), they are discussed together because both New E2-Clinton PA and Glendale PA discharge into Hunting Bayou from Turkey Run Gulley, and their discharge parameters are the same. Bathymetry of neither Hunting Bayou nor Turkey Run Gulley was located. The depth of Hunting Bayou at the discharge location was provided as 7.5 – 8 ft (email Carl Sepulveda 3/27/19). From Google Earth, it appears the channel width at this

location is 50 ft (15.24 m). A trapezoidal cross section was assumed with a depth of 7.75 ft (2.36 m) and 2:1 (horizontal:vertical) side slopes (an angle of 26 degrees), which yields an average depth of 5.35 ft (1.63 m). Turkey Run Gulley was estimated from Google Earth to have a channel width of 17 ft (5.18 m), and an estimated water depth of 3.5 ft (1.07 m) and to extend perpendicularly into Hunting Bayou 4.1 m at a water depth of 2.1 m.

6.2 Site Receiving Water Conditions

Data input for the receiving water for each PA is provided in Table 7. Receiving water widths and depths were provided based on bathymetry or assumptions discussed above. For each PA, the channel was assumed to be narrow (bounded), as a conservative assumption, even though the channel width at the New BW-8 PA discharge is rather wide. Receiving water density was calculated based on temperature and salinity. It is important to note that the salinities measured at mid-depth (Table 5) may not be representative of the salinity of the dredge slurry from a cutterhead dredge operating at the sediment surface. According to City of Houston and PBS&J (2003), there is significant density stratification within the artificially deepened Buffalo Bayou/HSC. Salinity/conductivity profiles with depth, taken during several years, shows a steep increase in salinity with depth in some years, and less stratification in drier years when overall salinity is higher. Plots of conductivity with depth from the City of Houston and PBS&J (2003) report were used to estimate bottom salinities at the Buffalo Bayou locations in the report as: 9 ppt at Main Turning Basin (near Filter Bed PA discharge and location HSCNew-NMP-11), 12 ppt at Sims Bayou (downstream of HSCNew-NMP-06), and 15 ppt at Beltway 8 (near the New BW-8 PA discharge and HSCNew-NMP-02). As expected, salinity decreases with distance upstream. For the purpose of the CDFATE model, the receiving waters near the Filter Bed PA and New BW-8 PA discharges were assumed to have linear stratification. As it is shallower, the Hunting Bayou receiving water is expected to be less stratified. The conductivity plots from City of Houston and PBS&J (2003) were used to provide estimates of bottom salinity for Buffalo Bayou/HSC at the New BW-8 PA discharge (15 ppt) and Filter Bed PA discharge (9 ppt). Water temperatures and surface salinity were obtained from the collected water samples (Table 5), location HSCNew-NMP-11 for the Filter Bed PA outfall, and NMP-02 for the New BW-8 PA outfall. Salinity or density data was not located for Hunting Bayou at the discharge. It was assumed the receiving water at Hunting Bayou would be uniformly mixed, and might resemble the surface water of Buffalo Bayou/HSC at about the same distance from the mouth of Hunting Bayou, which would be between sample locations HSCNew-NMP-05 and HSCNew-NMP-06. Thus the salinity and temperature of those samples (Table 5) were averaged to estimate that of Hunting Bayou.

Table 7 CDFATE Input – Receiving Water Data – Site Conditions

Parameter	New BW-8 PA	New E2-Clinton PA	Glendale PA	Filter Bed PA
Receiving Water	Buffalo Bayou/HSC	Hunting Bayou	Hunting Bayou	Buffalo Bayou/HSC
Receiving Water Depth (m) (3)	7.51	1.63	1.63	4.51
Is Stream Narrow (Bounded)?	Yes	Yes	Yes	Yes
Receiving Water Density				
Stratification	Linear	Uniform	Uniform	Linear
Surface Temperature (°C)	22.84	21.3 (2)	21.3 (2)	19.5

Surface Salinity (ppt)	4.59	2.3 (2)	2.3 (2)	1.1
Surface Density (kg/m^3) (1)	1001.21	999.78	999.78	999.23
Bottom Temperature (^{o}C)	22.84	-	-	19.5
Bottom Salinity (ppt)	15	-	-	9
Bottom Density (kg/m^3) (1)	1009.21	-	-	1005.32
Channel Geometry	Straight	Moderately meandering	Moderately meandering	Winding
Channel Width (m)	377.5	15.24	15.24	93.0
Channel velocity (m/s)	0.022	0.055	0.055	0.136
Bottom Roughness (Manning's)	0.0177	0.055	0.055	0.0177
Wind Speed	Medium (1.0 – 6.0 m/s)	Medium (1.0 – 6.0 m/s)	Medium (1.0 – 6.0 m/s)	Medium (1.0 – 6.0 m/s)

Footnotes:

(1) Calculated based on temperature and salinity

(2) Average of HSC New NMP-05-SW and HSC New NMP-06-SW (Table 6)

(3) Average channel depth across channel cross-section

Stream gauges with discharge or velocity data were not in the vicinity of any discharge locations. The nearest stream location for Filter Bed PA discharge on Buffalo Bayou/HSC is USGS 008074000 Buffalo Bayou at Houston, approximately 8 mi upstream. The closest gauge located for the New BW-8 PA outfall on Buffalo Bayou/HSC is the NOAA g08010 gauge approximately 10.4 mi downstream at Fred Hartman Bridge. The nearest gauge for Hunting Bayou is the USGS sta 08075770 for Hunting Bayou at IH 610, approximately 5.5 mi upstream of the Turkey Run Gulley discharge. Summer stream flow data was located for Buffalo Bayou in a technical memorandum by Brown & Root, Inc. (1998), with a figure showing volume and velocity as a function of distance from river mouth. Based on the figure, it appears the New BW-8 PA discharge location has a discharge of approximately 2,200 cfs or a velocity of 0.07 ft/s (0.022 m/s). The Filter Bed PA discharge location appears to be approximately 2,000 cfs velocity 0.44 ft/s (0.136 m/s). For Hunting Bayou, discharge data was acquired for the upstream gauge at IH610. The median daily mean discharge between 1965 and 2019 was 7.66 cfs. It was assumed velocity would be similar between the gauge and discharge locations. Bathymetry was not available for either location. The channel width at the gauge was estimated as 20 ft (Google Earth), and a cross sectional area estimated as 43 ft^2. This yields a mean channel velocity of 0.18 ft/s (0.055 m/s). Manning's roughness values were obtained for Buffalo Bayou/HSC as 0.0177 from Guthrie and Schoenbaechler (2012), and for Hunting Bayou as 0.055 from AECOM Technical Services, Inc. (2014). Hourly wind speeds at the NOAA 8770777 station at Manchester, TX averaged 2.5 m/s during the year 2018.

6.3 Effluent Density Modeling

Table 8 provides CDFATE input data for the effluent discharged from the PAs and entering the receiving streams. The suspended solids (TSS) content of the effluent was estimated as 0.1 kg/m^3, and was assumed to consist mostly of clay with some fine silt. A column settling test (USACE 2015, Palermo et al. 1978, Palermo and Thackston 1988, Thackston et al., 1988) would be needed to predict the settling behavior of the dredged material in the PA and resulting TSS, which is also a function of the PA design and weir

operation. The assumed concentration of TSS is likely sufficient for modeling purposes, however, as density is controlled more so by the salinity than the solids content. The effluent densities were calculated based on temperature and salinity at the corresponding sample locations on Buffalo Bayou/HSC. Due to the discussed stratification (Section 5.0), it was assumed the salinity of the dredge slurry and effluent would be best represented by the bottom salinity in the channel. The salinity of the effluent from the Filter Bed PA was assumed to be represented by the bottom salinity near HSCNew-NMP-11 (9 ppt); New BW-8 PA discharge was assumed to have a salinity of 15 ppt. The salinity of discharges into New E2-Clinton would range between that of the bottom salinities of Buffalo Bayou/HSC at Beltway 8 and Sims Bayou, estimated as 13.5 ppt, and that of the Glendale PA discharge would range between that of the bottom salinities of Buffalo Bayou/HSC at Turning Basin and Sims Bayou, estimated as 11.5 ppt. A maximum distance of 2000 m and 100 reporting periods (locations at which concentration is reported) were used to fully delineate mixing zone requirements and provide sufficient resolution.

Table 8 CDFATE Input – Effluent Density and Modeling Parameters

Parameter	New BW-8 PA	New E2-Clinton PA	Glendale PA	Filter Bed PA
Effluent Clearwater Density (1)	1009.21	1008.31	1006.88	1005.32
Temperature (^oC)	22.84	21.7	21.2	19.5
Salinity (ppt)	15	13.5	11.5	9
Effluent concentration of solids (kg/m^3)	0.1	0.1	0.1	0.1
Percent Clumps (Specific gravity = 2.7)	0	0	0	0
Percent Sand (Specific gravity = 2.7)	0	0	0	0
Percent Fine Silt (Specific gravity = 2.65)	10	10	10	10
Percent Clay (Specific gravity = 2.65)	90	90	90	90
Effluent Density (kg/m^3) (2)	1009.27	1008.37	1006.94	1005.38
Modeling Parameters				
Max Distance of the Plume Model (m)	2000	2000	2000	2000
Number of Reporting Periods	100	100	100	100

Footnotes:

1) Calculated based on temperature and salinity
2) Calculated based on effluent clearwater density and solids concentration and specific gravity

6.4 Mixing Zone Data

Mixing zone input is provided in Table 9. CDFATE modeling was performed to delineate dilution with distance using a generic pollutant X with concentration of 100 and zero background concentration. These concentrations do not affect the physical degree of mixing and dilution and were merely used for easy calculation. Though a mixing zone distance and criterion were supplied as input, these values were also not used in determination of dilution with distance.

Table 9 CDFATE Input – Mixing Zone Data

Parameter	New BW-8 PA	New E2-Clinton PA	Glendale PA	Filter Bed PA
Name of Pollutant	X	X	X	X
Concentration of Pollutant above Background	100	100	100	100

Background Concentration	0	0	0	0
First Order Reaction Rate (sec^{-1})	0	0	0	0
Surface Heat Exchange Coefficient	0	0	0	0
Criterion Maximum Concentration (CMC)	10	10	10	10
Criterion Continuous Concentration (CCC)	1	1	1	1
Mixing Zone Distance (m)	500	500	500	500

These input parameters were used in Section 7.0 for the mixing zone/CDFATE calculations for each PA.

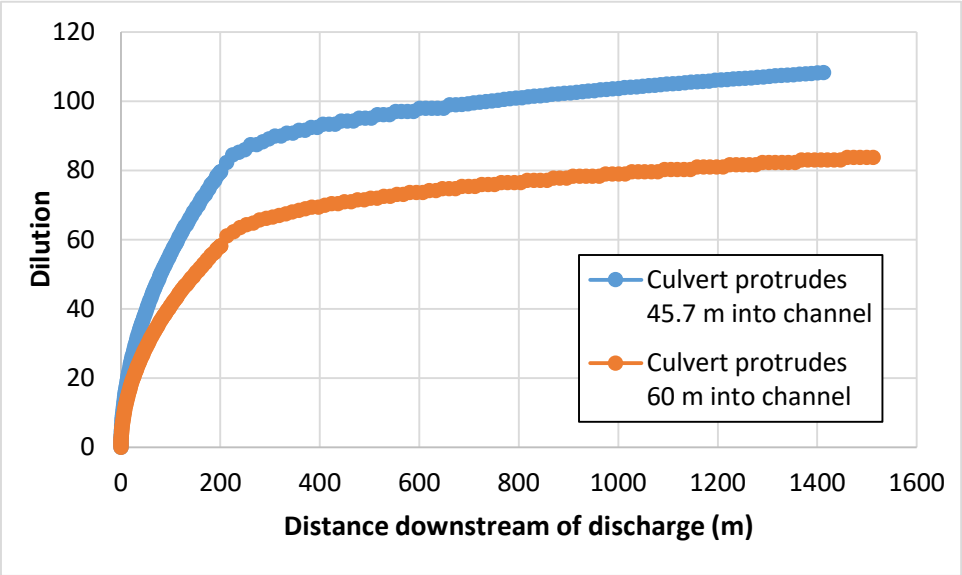
7.0 Mixing Zone Results

Six CDFATE model runs were performed using the input outlined in Section 6. Results are provided below for New BW-8 PA, Filter Bed PA, and New E2-Clinton and Glendale PA. For each PA, the dilution/mixing achieved within a given distance downstream from the discharge is compared to the dilutions required to achieve acute and chronic concentrations of COCs to determine distance required for the ZID and mixing zone. These evaluations do not include COCs which were excluded from the evaluation (Sections 4.1 – 4.3). The final mixing zone distances required for each PA are provided in Table 10.

7.1 Placement Area - New BW-8

The model results for discharges from New BW-8 PA into Buffalo Bayou/HSC are displayed in Figure 3, which shows dilution achieved with distance downstream from the discharge point. Two separate model runs were performed with different assumptions as to the length that the culvert extends into the channel, as the actual distance is unknown. It appears the shorter length of the culvert provides greater dilution. The dilution values are sufficient to provide mixing to dilute the concentrations to within acute and chronic criteria. Ignoring COCs where detection limits exceeded criteria (Section 4.1), and COCs for which background concentrations are above criteria (Section 4.2), the greatest dilution requirements for the New BW-8 PA are for zinc which requires a dilution factor of 6.9 for acute and 13.0 for chronic criteria. These dilution values can be met within 3.4 m (acute) and 11.0 m (chronic) for the longer culvert. Plume widths at these lengths are approximately 7 m and 13 m.

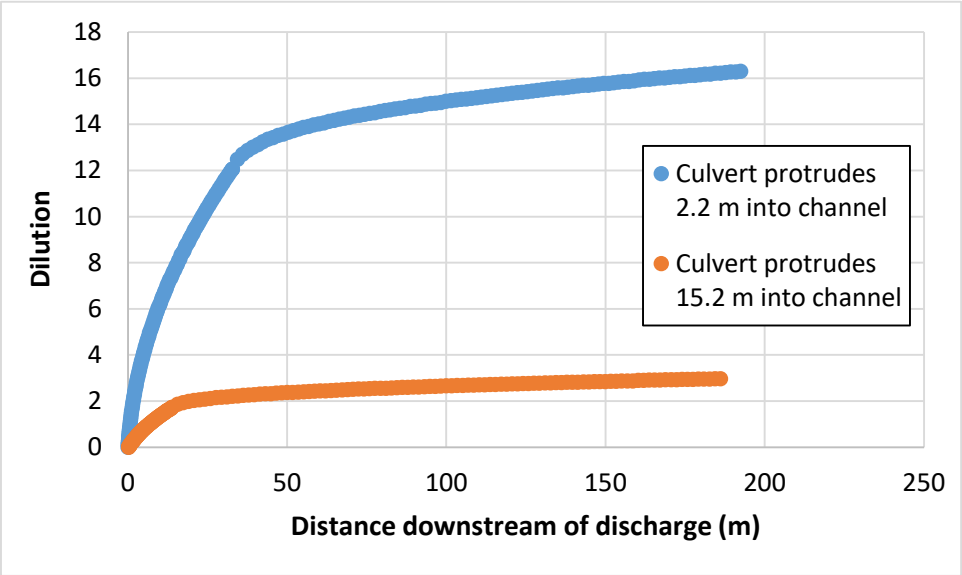
Figure 3. Dilution vs. Distance New BW-8 PA Discharge into Buffalo Bayou/HSC



7.2 Placement Area – Filter Bed

Figure 4 shows the dilution that is achieved with distance for the two scenarios which were modeled assuming two pipe extensions for the Filter Bed PA discharge into Buffalo Bayou/HSC since the actual discharge pipe length is not known. One curve shows the results if the culvert protrudes 2.2 m into the channel, and the other shows results with the culvert protruding 15.2 m. Extending the pipe farther into the channel achieved less dilution as it pushes the plume against the opposite bank. A mixing zone is not possible for meeting chronic requirements because the receiving water concentration of zinc is above the chronic criteria. To meet acute requirements for determination of a ZID, the greatest dilution required is for zinc, with a dilution factor of 13.4, which could be met within approximately 45 m if the culvert protrudes only 2.2 m. The plume width at 45 m would be approximately 23 m. Dilution could not be achieved with the longer pipe length which reaches a maximum dilution of approximately 3.0.

Figure 4. Dilution vs. Distance Filter Bed PA Discharge into Buffalo Bayou/HSC



7.3 Placement Areas New E2-Clinton and Glendale

Figure 5 and Figure 6 show the dilution achieved with distance downstream of the discharge into Hunting Bayou for effluent from New E2-Clinton PA and Glendale PA, respectively; note that the figures are identical. The only difference in input was a higher salinity assumption for New E2-Clinton PA, which did not impact the results. As can be seen from the figures, very little dilution is achieved over approximately 18 m. Beyond 18.8 m, the plume interacts with the bottom and both banks. Additional dilution is not expected to occur. Therefore the maximum dilution expected to occur within Hunting Bayou is 0.4.

As shown in Table 3, the greatest dilution requirements for New E-2 Clinton PA are 1 for acute conditions and 99 for chronic conditions, which are well above the predicted dilution in Hunting Bayou. For Glendale PA, the greatest dilution requirements are 6.7 for acute conditions and 168.5 for chronic criteria, which are also above that predicted. The predicted dilution of 0.4 is not sufficient to achieve concentrations below acute criteria for zinc or acute toxicity criteria based on bioassay results (Table 3). Dilution of 0.4 is also insufficient to achieve concentrations below chronic criteria for anthracene, copper, lead, zinc, and chronic toxicity criteria from bioassay results (Table 3).

As previously discussed, COCs with detection limits above criteria could not be evaluated. The uncertainty within the input parameters should be evaluated and the model refined accordingly to determine if discharge to Hunting Bayou is a feasible alternative.

Figure 5. Dilution vs. Distance for New E2-Clinton PA Discharge into Hunting Bayou

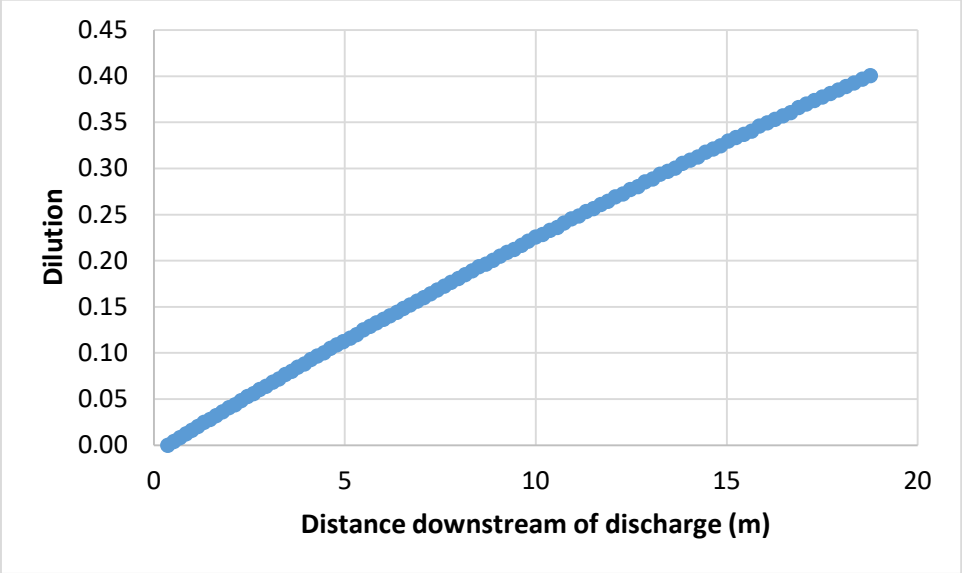


Figure 6. Dilution vs. Distance for Glendale PA Discharge into Hunting Bayou

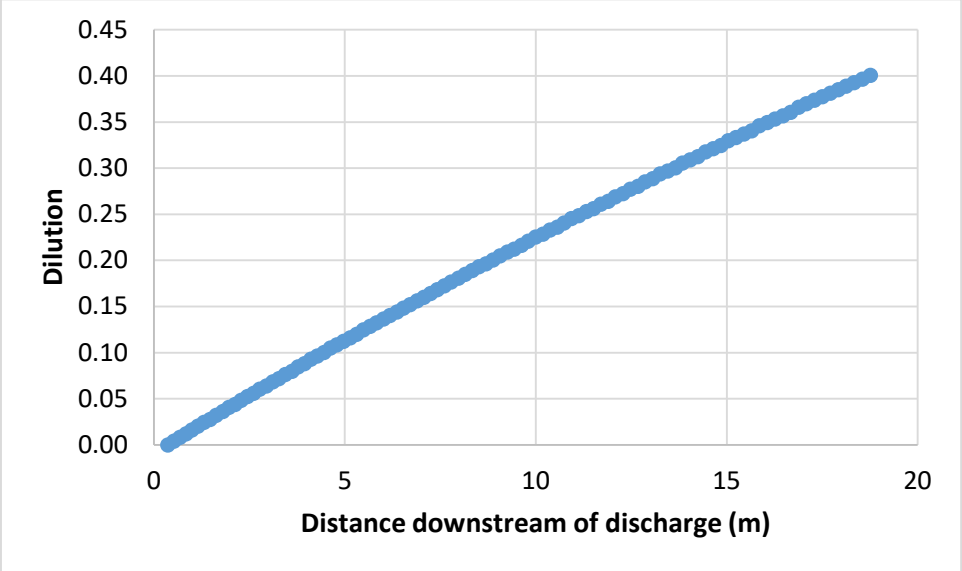


Table 10 Distances Required for ZID and Mixing Zones for Each PA

Placement Area	Greatest Dilution Required to Meet Acute Criteria (1)	Greatest Dilution Required to Meet Chronic Criteria (1)	Distance Required for ZID (m)	Distance Required for Mixing Zone (m)
New BW-8 PA	6.9	13.0	2.0-3.4 (2)	5.9-11.0 (2)
New E2-Clinton PA	1	99	TBD	TBD
Glendale PA	6.7	168.5	TBD	TBD
Filter Bed PA (3)	13.4	TBD	45	TBD

Footnotes:

(1) Greatest dilution required considering bioassay toxicity and COCs without detection limits above criteria.

(2) For culvert protruding between 45.7m and 60 m into the channel.

(3) Assuming pipe protrudes 2.2 m into channel.
(4) TBD = To Be Determined. It is impossible to meet acute or chronic criteria based on background concentrations above criteria. Model input and chemistry will be reviewed to better refine receiving water concentrations and model output.

The CDFATE modeling exercise showed that a ZID and mixing zone could be applied to meet acute and chronic criteria for the New BW-8 PA discharge. A rather large ZID (45 m) would be required to meet acute toxicity at the Filter Bed PA discharge location, assuming the discharge pipe is near the shore. Otherwise dilution is not possible, and dilution is not possible to meet chronic conditions due to zinc background concentrations. Modeling showed dilution to be insufficient for the New E2-Clinton and Glendale PAs to meet either chronic or acute conditions.

8.0 Uncertainty Evaluation

There was a great deal of uncertainty associated with numerous assumptions that were made for various input parameters in this preliminary mixing zone evaluation. The uncertainty associated with these parameters should be addressed to further refine the model as discussed below.

8.1 Chemistry, Toxicity and Elutriate Uncertainty

A mixing zone evaluation was performed to determine the ZID and mixing zone lengths needed to meet the greatest dilution requirements for each PA based on conservative assumptions regarding chemistry and toxicity results.

There is uncertainty regarding both the chemistry and toxicity evaluations. Sources of uncertainty include:

1) Elutriate and site water RLs above criteria. Instances where reporting limits exceed criteria force the use of overly conservative assumptions for background concentrations
2) Lack of receiving water chemistry and characterization for Hunting Bayou (New E2-Clinton PA and Glendale PA receiving water); use of alternate data from Buffalo Bayou may not be appropriate
3) Conservative AF used to calculate chronic criteria for bioassays
4) Consideration of impacts of ammonia on bioassay results. A toxicity reduction evaluation (TRE) could potentially be performed to evaluate the effect that ammonia had on the resulting toxicity. Even without a TRE, application of a higher AF might be justifiable in light of the ammonia effects and the highly conservative nature of the selected AF
5) Determination of whether chronic criteria are applicable based on the length of time that discharge is expected to occur at each PA
6) There were a number of COCs excluded from the evaluation because background concentrations were either above criteria or the RLs were above criteria (Section 4.2). It is currently not possible to show that water quality criteria can be met for these COCs

The uncertainties from (1) through (5) above were addressed in this preliminary mixing zone evaluation by making conservative assumptions; however, additional data collection or evaluation would allow refinements to the evaluation to produce more site-specific results and reduce uncertainty for all six factors listed above.

8.2 Modeling Uncertainty

In the preliminary CDFATE modeling, several non-site specific conservative initial assumptions were made that would influence the model output and could be refined:

1) Details pertaining to many of the CDFATE model input parameters were not available, requiring numerous assumptions for which the introduced bias (positive or negative) is not fully understood
2) Discharge/velocity data was not available in the near vicinity of any of the discharge locations and had to be extrapolated from distant gauges or report figures
3) The size and orientation of the culverts leading from New BW-8 PA and Filter Bed PA to Buffalo Bayou/HSC were not known, requiring assumptions to be made for water depth, culvert width, depth, slope and protruding distance into the channel
4) Bathymetry data for Hunting Bayou and geometry of Turkey Run Gulley where it discharges to Hunting Bayou were also largely assumed
5) Site receiving water conditions were in many instances assumed and should be refined
6) Salinity gradients within Buffalo Bayou were estimated based on a published figure of conductivity gradients for several years; salinity data for Hunting Bayou was not available, which could be important because there is significant density stratification within the artificially deepened Buffalo Bayou/HSC (City of Houston and PBS&J, 2003). Salinity/conductivity profiles with depth, taken during several years, showed a steep increase in salinity with depth in some years, and less stratification in drier years when overall salinity was higher

In order to provide greater confidence in results, additional site specific data should be collected to refine the mixing zone modeling and evaluation.

9.0 Summary, Conclusion and Recommendations

9.1 Summary

Elutriate and site water chemistry was evaluated for ten sediment samples along Segments 4 – 6 of the HSC-NMP. Some of the site waters also represented receiving water for the four proposed PAs. COCs that were detected in at least one of the media were retained for evaluation. Several COCs were eliminated from the evaluation because their RLs were above criteria and they were not detected in any of the elutriate, site water or sediment samples. For instances when the background concentration exceeded criteria, dilution could not be evaluated. The contaminants that could not be fully evaluated for a mixing zone for this reason included hexachlorobutadiene, 4,4'-DDT, dieldrin, heptachlor, and silver, therefore, it cannot be demonstrated that they will not violate water quality criteria. Required dilutions to meet chronic and acute water quality criteria were calculated for the contaminants remaining after these other COCs were excluded. These COCs were anthracene, pyrene, copper, lead and zinc.

The CDFATE model was used to complete a preliminary mixing evaluation of each PA effluent into the receiving waters. Model runs were performed for two scenarios each with different protruding pipe distances for New BW-8 PA and Filter Bed PA. Two model runs with different salinity assumptions were also done for the PAs discharging to Hunting Bayou (New E2-Clinton and Glendale).

The resulting data was compared to dilution requirements at each PA to estimate required ZID and mixing zone lengths for each PA. For New BW-8 PA, results showed that for the evaluated COCs and toxicity requirements, a ZID of 2.0 m – 3.4 m (depending on the actual pipe protruding distance) was required for and a mixing zone length between 5.9 m and 11.0 m would be required. For Filter Bed PA, modeling showed that a ZID of 45 m would be required to achieve acute criteria if the pipe was near the shore; dilution would not be possible if the culvert extended 15 m into the channel and it would not be possible to meet chronic criteria because zinc concentrations in the receiving water exceed chronic criteria. Modeling results for E2-Clinton PA and Glendale PA discharges into Hunting Bayou showed that a maximum dilution of 0.4 would be reached before the channel is completely mixed. This was not sufficient to meet acute or chronic criteria for the COCs or toxicity requirements for either PA.

9.2 Conclusions

Using both site-specific data when available, and conservative worst-case assumptions when it was not, the results of the CDFATE modeling showed the following:

- sufficient mixing can be achieved in Buffalo Bayou/HSC to dilute the effluent from dredged material placement into the New BW-8 PA to within acute and chronic criteria, requiring a ZID of up 2.0 – 3.4 m and a mixing zone length of 5.9 to 11.0 m
- based on the modeling at Hunting Bayou, sufficient dilution is not available to achieve either acute or chronic criteria for effluent discharging from either the New E2-Clinton PA or the Glendale PA
- mixing is insufficient and it is not possible to dilute effluent discharges from the Filter Bed PA to chronic criteria for zinc as receiving water (background) concentrations were shown to be above criteria. CDFATE modeling suggested that a ZID of 45 m would be required for sufficient mixing to achieve acute criteria for zinc
- verification of the ability to meet water quality for several COCs (hexachlorobutadiene, 4,4'-DDT, dieldrin, heptachlor, and silver) that were dropped from the evaluation due to background concentrations above criteria was not possible with the available data

Due to the uncertainty regarding the analytical data and model input parameters, additional data collection and evaluation is recommended to refine the mixing zone evaluation.

9.3 Recommendations

Numerous assumptions were made within the CDFATE modeling parameters and analytical results were unable to fully characterize the chemistry and toxicity of the effluent and receiving waters. In order to provide greater confidence in results, the mixing zone evaluation should be refined by additional data collection. Areas where data collection would be particularly helpful include:

- bathymetry and flow data at Hunting Bayou
- geometry of Turkey Run Gulley where it discharges to Hunting Bayou
- flow data at New BW-8 and Filter Bed discharge locations
- culvert geometries and orientation

- salinity distributions within each channel
- receiving water contaminant concentrations at Hunting Bayou
- alternate data for Buffalo Bayou receiving water COCs with RLs > criteria, and
- seek acceptance of alternate AF for chronic criteria

The CDFATE modeling effort should be repeated using refined data input for each PA with site-specific elutriate and receiving water concentrations for the COCs requiring the greatest dilution in order to delineate mixing zone requirements for the discharges associated with the HSC ECIP-NMP.

10.0 References

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Appendix A

CDFATE Model Output

Appendix A

CDFATE Model Output

APPENDIX A - TABLE OF CONTENTS

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CORMIX3 PREDICTION FILE:
3333333333333333333333333333333333333333333333333333333333333333333333333333333333
                    CORNELL MIXING ZONE EXPERT SYSTEM
Subsystem CORMIX3:                                          Subsystem version:
 Buoyant Surface Discharges
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:         BW8 PA Discharge at Buffalo Bayou
 Design case:
 FILE NAME:               cormix\sim\        .cx3
 Time of Fortran run:

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =    377.50  AS    =   2835.03  QA    =     62.37
 HA    =      7.51  HD    =      5.02
 UA    =     0.022 F     =     0.013 USTAR =0.8720E-03
 UW    =     5.000 UWSTAR=0.5520E-02
 Density stratified environment
 STRCND=  A         RHOAM = 1005.0000
 RHOAS = 1001.0000  RHOAB = 1009.0000  RHOAEF= 1005.0000  E     =0.0000E+00

DISCHARGE PARAMETERS (metric units)
 BANK  =  RIGHT     DISTB =     45.72  Configuration:
 Circular discharge pipe:
 D0    =     1.830 A0    =     0.145
 Dimensions of equivalent rectangular discharge:
 B0    =     0.381 H0    =     0.380 A0    =0.1446E+00  AR    =      0.998
 SIGMA =     90.00  SLOPE =     3.00
 U0    =     7.398 Q0    =     1.070       =0.1070E+01
 RHO0  = 1005.0000  DRHO0 =0.0000E+00  GP0   =0.0000E+00
 C0    =0.1000E+03  CUNITS=  X
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES (metric units)
 Q0    =0.1070E+01  M0    =0.7916E+01  J0    =0.0000E+00
 Associated length scales (meters)
 LQ    =     0.38  LM    =  99999.00  Lm    =    127.89  Lb    =      0.00

NON-DIMENSIONAL PARAMETERS
 FR0   =  99999.00  FRCH  =  99999.00  R     =    336.26

FLOW CLASSIFICATION
 333333333333333333333333333333333333333
 3  Flow class (CORMIX3)      =    SA1    3
 3  Applicable layer depth HS =     5.02  3
 333333333333333333333333333333333333333

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+03  CUNITS=  X
 NTOX  =  1         CMC   =0.1000E+02  CCC   =  CSTD
 NSTD  =  1         CSTD  =0.1000E+01
 REGMZ =  1
 REGSPC=  1         XREG  =    500.00  WREG  =      0.00  AREG  =      0.00
 XINT  =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the WATER SURFACE and at center of discharge
      channel/outlet:     45.72 m  from the RIGHT bank/shore.
    X-axis points downstream
    Y-axis points to left as seen by an observer looking downstream
    Z-axis points vertically upward (in CORMIX3, all values Z = 0.00)
NSTEP =100 display intervals per module
------------------------------------------------------------------------------
------------------------------------------------------------------------------
BEGIN MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)

Profile definitions:
   BV = Gaussian 1/e (37%) vertical thickness
   BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
   S = hydrodynamic centerline dilution
   C = centerline concentration (includes reaction effects, if any)

       X        Y       Z        S       C       BV       BH
      0.00     1.51    0.00     1.0 0.100E+03   0.44     0.28
 Cumulative travel time =           0. sec

END OF MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)
```

BEGIN MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Surface JET into a crossflow

Profile definitions:
BV = Gaussian 1/e (37%) vertical thickness
BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
0.00	1.51	0.00	1.0	0.100E+03	0.44	0.28
0.08	4.03	0.00	1.8	0.556E+02	0.72	0.56
0.19	6.56	0.00	2.6	0.385E+02	1.00	0.84
0.35	9.09	0.00	3.4	0.295E+02	1.28	1.11
0.54	11.61	0.00	4.2	0.239E+02	1.55	1.39
0.77	14.14	0.00	5.0	0.201E+02	1.83	1.67
1.04	16.66	0.00	5.8	0.173E+02	2.11	1.95
1.35	19.19	0.00	6.6	0.152E+02	2.39	2.23
1.70	21.72	0.00	7.4	0.136E+02	2.67	2.50
2.09	24.24	0.00	8.2	0.122E+02	2.94	2.78
2.51	26.77	0.00	9.0	0.111E+02	3.22	3.06
2.98	29.29	0.00	9.8	0.102E+02	3.50	3.34

** CMC HAS BEEN FOUND **
The pollutant concentration in the plume falls below CMC value of 0.100E+02
in the current prediction interval.
This is the extent of the TOXIC DILUTION ZONE.

3.48	31.82	0.00	10.6	0.947E+01	3.78	3.62
4.03	34.35	0.00	11.4	0.880E+01	4.06	3.89
4.61	36.87	0.00	12.2	0.822E+01	4.33	4.17
5.23	39.40	0.00	13.0	0.772E+01	4.61	4.45
5.89	41.92	0.00	13.8	0.727E+01	4.89	4.73
6.59	44.45	0.00	14.5	0.687E+01	5.17	5.00
7.33	46.98	0.00	15.3	0.652E+01	5.44	5.28
8.10	49.50	0.00	16.1	0.619E+01	5.72	5.56
8.92	52.03	0.00	16.9	0.590E+01	6.00	5.84
9.77	54.55	0.00	17.7	0.564E+01	6.28	6.12
10.67	57.08	0.00	18.5	0.540E+01	6.56	6.39
11.60	59.61	0.00	19.3	0.517E+01	6.83	6.67
12.57	62.13	0.00	20.1	0.497E+01	7.11	6.95
13.58	64.66	0.00	20.9	0.478E+01	7.39	7.23
14.63	67.18	0.00	21.7	0.460E+01	7.67	7.51
15.72	69.71	0.00	22.5	0.444E+01	7.94	7.78
16.85	72.24	0.00	23.3	0.429E+01	8.22	8.06
18.02	74.76	0.00	24.1	0.415E+01	8.50	8.34
19.22	77.29	0.00	24.9	0.401E+01	8.78	8.62
20.47	79.81	0.00	25.7	0.389E+01	9.05	8.89
21.75	82.34	0.00	26.5	0.377E+01	9.33	9.17
23.08	84.87	0.00	27.3	0.366E+01	9.61	9.45
24.44	87.39	0.00	28.1	0.356E+01	9.89	9.73
25.84	89.92	0.00	28.9	0.346E+01	10.16	10.01
27.28	92.44	0.00	29.7	0.337E+01	10.44	10.28
28.76	94.97	0.00	30.5	0.328E+01	10.72	10.56
30.27	97.50	0.00	31.3	0.320E+01	11.00	10.84
31.83	100.02	0.00	32.1	0.312E+01	11.27	11.12
33.43	102.55	0.00	32.9	0.304E+01	11.55	11.40
35.06	105.07	0.00	33.7	0.297E+01	11.83	11.67
36.74	107.60	0.00	34.5	0.290E+01	12.11	11.95
38.45	110.13	0.00	35.3	0.284E+01	12.38	12.23
40.20	112.65	0.00	36.1	0.277E+01	12.66	12.51
41.99	115.18	0.00	36.9	0.271E+01	12.94	12.78
43.82	117.70	0.00	37.7	0.266E+01	13.22	13.06
45.69	120.23	0.00	38.5	0.260E+01	13.49	13.34
47.60	122.76	0.00	39.3	0.255E+01	13.77	13.62
49.54	125.28	0.00	40.1	0.250E+01	14.05	13.90
51.53	127.81	0.00	40.9	0.245E+01	14.32	14.17
53.55	130.33	0.00	41.6	0.240E+01	14.60	14.45
55.62	132.86	0.00	42.4	0.236E+01	14.88	14.73
57.72	135.39	0.00	43.2	0.231E+01	15.16	15.01
59.86	137.91	0.00	44.0	0.227E+01	15.43	15.29
62.04	140.44	0.00	44.8	0.223E+01	15.71	15.56
64.26	142.96	0.00	45.6	0.219E+01	15.99	15.84
66.52	145.49	0.00	46.4	0.215E+01	16.27	16.12
68.82	148.02	0.00	47.2	0.212E+01	16.54	16.40
71.15	150.54	0.00	48.0	0.208E+01	16.82	16.67
73.53	153.07	0.00	48.8	0.205E+01	17.10	16.95
75.94	155.59	0.00	49.6	0.202E+01	17.37	17.23

78.39	158.12	0.00	50.4	0.198E+01	17.65	17.51
80.89	160.65	0.00	51.2	0.195E+01	17.93	17.79
83.42	163.17	0.00	52.0	0.192E+01	18.21	18.06
85.99	165.70	0.00	52.8	0.189E+01	18.48	18.34
88.60	168.22	0.00	53.6	0.187E+01	18.76	18.62
91.24	170.75	0.00	54.4	0.184E+01	19.04	18.90
93.93	173.28	0.00	55.2	0.181E+01	19.31	19.18
96.66	175.80	0.00	56.0	0.179E+01	19.59	19.45
99.42	178.33	0.00	56.8	0.176E+01	19.87	19.73
102.23	180.85	0.00	57.6	0.174E+01	20.14	20.01
105.07	183.38	0.00	58.4	0.171E+01	20.42	20.29
107.95	185.91	0.00	59.2	0.169E+01	20.70	20.57
110.87	188.43	0.00	60.0	0.167E+01	20.98	20.84
113.83	190.96	0.00	60.8	0.165E+01	21.25	21.12
116.83	193.48	0.00	61.6	0.162E+01	21.53	21.40
119.87	196.01	0.00	62.4	0.160E+01	21.81	21.68
122.95	198.54	0.00	63.2	0.158E+01	22.08	21.96
126.06	201.06	0.00	64.0	0.156E+01	22.36	22.24
129.22	203.59	0.00	64.8	0.154E+01	22.64	22.52
132.41	206.11	0.00	65.6	0.153E+01	22.91	22.80
135.64	208.64	0.00	66.4	0.151E+01	23.19	23.07
138.92	211.17	0.00	67.2	0.149E+01	23.47	23.35
142.23	213.69	0.00	68.0	0.147E+01	23.75	23.63
145.58	216.22	0.00	68.7	0.145E+01	24.02	23.91
148.97	218.74	0.00	69.5	0.144E+01	24.30	24.19
152.39	221.27	0.00	70.3	0.142E+01	24.58	24.47
155.86	223.80	0.00	71.1	0.141E+01	24.85	24.75
159.37	226.32	0.00	71.9	0.139E+01	25.13	25.03
162.91	228.85	0.00	72.7	0.137E+01	25.41	25.31
166.49	231.37	0.00	73.5	0.136E+01	25.68	25.58
170.12	233.90	0.00	74.3	0.135E+01	25.96	25.86
173.78	236.43	0.00	75.1	0.133E+01	26.24	26.14
177.48	238.95	0.00	75.9	0.132E+01	26.51	26.42
181.22	241.48	0.00	76.7	0.130E+01	26.79	26.70
185.00	244.00	0.00	77.5	0.129E+01	27.07	26.98
188.81	246.53	0.00	78.3	0.128E+01	27.34	27.26
192.67	249.06	0.00	79.1	0.126E+01	27.62	27.54
196.57	251.58	0.00	79.9	0.125E+01	27.90	27.82
200.50	254.11	0.00	80.7	0.124E+01	28.17	28.10

Cumulative travel time = 1116. sec

Some concentration build-up near bank/shore due to recirculation effects.
Find concentration and thickness values for the RECIRCULATION REGION
at end of MOD329!

END OF MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

BEGIN MOD327: STRONGLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Profile definitions:
BV = Gaussian 1/e (37%) vertical thickness
BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
200.50	254.11	0.00	80.7	0.124E+01	68.73	68.53
212.62	258.26	0.00	83.7	0.120E+01	69.97	69.78
224.74	260.43	0.00	85.2	0.117E+01	70.62	70.43
236.87	262.02	0.00	86.4	0.116E+01	71.10	70.91
248.99	263.31	0.00	87.3	0.115E+01	71.49	71.30
261.11	264.41	0.00	88.1	0.113E+01	71.82	71.63
273.23	265.38	0.00	88.9	0.113E+01	72.11	71.92
285.35	266.26	0.00	89.5	0.112E+01	72.37	72.18
297.47	267.05	0.00	90.1	0.111E+01	72.61	72.42
309.59	267.78	0.00	90.6	0.110E+01	72.83	72.64
321.72	268.46	0.00	91.2	0.110E+01	73.03	72.84
333.84	269.10	0.00	91.6	0.109E+01	73.23	73.03
345.96	269.70	0.00	92.1	0.109E+01	73.41	73.21
358.08	270.27	0.00	92.5	0.108E+01	73.58	73.38
370.20	270.82	0.00	92.9	0.108E+01	73.74	73.55
382.32	271.33	0.00	93.3	0.107E+01	73.89	73.70
394.44	271.83	0.00	93.7	0.107E+01	74.04	73.85
406.57	272.30	0.00	94.1	0.106E+01	74.19	73.99
418.69	272.76	0.00	94.4	0.106E+01	74.32	74.13
430.81	273.20	0.00	94.7	0.106E+01	74.45	74.26
442.93	273.63	0.00	95.1	0.105E+01	74.58	74.39
455.05	274.04	0.00	95.4	0.105E+01	74.71	74.51

467.17	274.44	0.00	95.7	0.105E+01	74.83	74.63
479.29	274.82	0.00	96.0	0.104E+01	74.94	74.75
491.42	275.20	0.00	96.3	0.104E+01	75.05	74.86

** REGULATORY MIXING ZONE BOUNDARY is within the Near-Field Region (NFR) **

503.54	275.57	0.00	96.6	0.104E+01	75.16	74.97
515.66	275.92	0.00	96.8	0.103E+01	75.27	75.08
527.78	276.27	0.00	97.1	0.103E+01	75.38	75.18
539.90	276.61	0.00	97.4	0.103E+01	75.48	75.29
552.02	276.94	0.00	97.6	0.102E+01	75.58	75.38
564.14	277.27	0.00	97.9	0.102E+01	75.67	75.48
576.27	277.58	0.00	98.1	0.102E+01	75.77	75.58
588.39	277.89	0.00	98.4	0.102E+01	75.86	75.67
600.51	278.20	0.00	98.6	0.101E+01	75.95	75.76
612.63	278.49	0.00	98.8	0.101E+01	76.04	75.85
624.75	278.79	0.00	99.1	0.101E+01	76.13	75.94
636.87	279.07	0.00	99.3	0.101E+01	76.22	76.02
648.99	279.35	0.00	99.5	0.101E+01	76.30	76.11
661.12	279.63	0.00	99.7	0.100E+01	76.38	76.19
673.24	279.90	0.00	99.9	0.100E+01	76.46	76.27

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **

The pollutant concentration in the plume falls below water quality standard or CCC value of 0.100E+01 in the current prediction interval.

This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

685.36	280.17	0.00	100.1	0.999E+00	76.54	76.35
697.48	280.43	0.00	100.3	0.997E+00	76.62	76.43
709.60	280.69	0.00	100.5	0.995E+00	76.70	76.51
721.72	280.94	0.00	100.7	0.993E+00	76.78	76.59
733.85	281.19	0.00	100.9	0.991E+00	76.85	76.66
745.97	281.44	0.00	101.1	0.989E+00	76.93	76.73
758.09	281.68	0.00	101.3	0.987E+00	77.00	76.81
770.21	281.92	0.00	101.5	0.985E+00	77.07	76.88
782.33	282.16	0.00	101.7	0.983E+00	77.14	76.95
794.45	282.39	0.00	101.9	0.981E+00	77.21	77.02
806.57	282.62	0.00	102.1	0.980E+00	77.28	77.09
818.70	282.85	0.00	102.3	0.978E+00	77.35	77.16
830.82	283.07	0.00	102.4	0.976E+00	77.42	77.22
842.94	283.30	0.00	102.6	0.975E+00	77.48	77.29
855.06	283.51	0.00	102.8	0.973E+00	77.55	77.36
867.18	283.73	0.00	103.0	0.971E+00	77.61	77.42
879.30	283.94	0.00	103.1	0.970E+00	77.68	77.49
891.42	284.15	0.00	103.3	0.968E+00	77.74	77.55
903.55	284.36	0.00	103.5	0.967E+00	77.80	77.61
915.67	284.57	0.00	103.6	0.965E+00	77.86	77.67
927.79	284.77	0.00	103.8	0.964E+00	77.92	77.73
939.91	284.97	0.00	103.9	0.962E+00	77.99	77.79
952.03	285.17	0.00	104.1	0.961E+00	78.05	77.85
964.15	285.37	0.00	104.3	0.959E+00	78.10	77.91
976.27	285.56	0.00	104.4	0.958E+00	78.16	77.97
988.40	285.76	0.00	104.6	0.956E+00	78.22	78.03
1000.52	285.95	0.00	104.7	0.955E+00	78.28	78.09
1012.64	286.14	0.00	104.9	0.953E+00	78.33	78.14
1024.76	286.32	0.00	105.0	0.952E+00	78.39	78.20
1036.88	286.51	0.00	105.2	0.951E+00	78.45	78.25
1049.00	286.69	0.00	105.3	0.949E+00	78.50	78.31
1061.12	286.87	0.00	105.5	0.948E+00	78.56	78.36
1073.25	287.05	0.00	105.6	0.947E+00	78.61	78.42
1085.37	287.23	0.00	105.8	0.945E+00	78.66	78.47
1097.49	287.41	0.00	105.9	0.944E+00	78.72	78.53
1109.61	287.58	0.00	106.0	0.943E+00	78.77	78.58
1121.73	287.76	0.00	106.2	0.942E+00	78.82	78.63
1133.85	287.93	0.00	106.3	0.940E+00	78.87	78.68
1145.97	288.10	0.00	106.5	0.939E+00	78.92	78.73
1158.10	288.27	0.00	106.6	0.938E+00	78.97	78.78
1170.22	288.44	0.00	106.7	0.937E+00	79.02	78.83
1182.34	288.60	0.00	106.9	0.936E+00	79.07	78.88
1194.46	288.77	0.00	107.0	0.934E+00	79.12	78.93
1206.58	288.93	0.00	107.1	0.933E+00	79.17	78.98
1218.70	289.09	0.00	107.3	0.932E+00	79.22	79.03
1230.83	289.26	0.00	107.4	0.931E+00	79.27	79.08
1242.95	289.42	0.00	107.5	0.930E+00	79.32	79.13
1255.07	289.57	0.00	107.7	0.929E+00	79.37	79.18
1267.19	289.73	0.00	107.8	0.928E+00	79.41	79.22
1279.31	289.89	0.00	107.9	0.927E+00	79.46	79.27
1291.43	290.04	0.00	108.0	0.926E+00	79.51	79.32
1303.55	290.20	0.00	108.2	0.924E+00	79.55	79.36
1315.68	290.35	0.00	108.3	0.923E+00	79.60	79.41
1327.80	290.50	0.00	108.4	0.922E+00	79.64	79.45
1339.92	290.65	0.00	108.5	0.921E+00	79.69	79.50

1352.04	290.80	0.00	108.7	0.920E+00	79.73	79.54
1364.16	290.95	0.00	108.8	0.919E+00	79.78	79.59
1376.28	291.10	0.00	108.9	0.918E+00	79.82	79.63
1388.40	291.25	0.00	109.0	0.917E+00	79.87	79.68
1400.53	291.39	0.00	109.2	0.916E+00	79.91	79.72
1412.65	291.54	0.00	109.3	0.915E+00	79.95	79.76

Cumulative travel time = 56214. sec

Some concentration build-up near bank/shore due to recirculation effects.
Find concentration and thickness values for the RECIRCULATION REGION
at end of MOD329!

END OF MOD327: STRONGLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

BEGIN MOD329: STRONGLY DEFLECTED PLUME WITH LEESIDE RECIRCULATION ZONE

This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

The near-shore RECIRCULATION REGION extends back to the discharge location:
Concentration C within that region: 0.458E+00
Layer thickness BV within that region: 79.95

END OF MOD329: STRONGLY DEFLECTED PLUME WITH LEESIDE RECIRCULATION ZONE

** End of NEAR-FIELD REGION (NFR) **

The initial plume WIDTH values in the next far-field module will be
CORRECTED by a factor 0.65 to conserve the mass flux in the far-field!

The LIMITING DILUTION (given by ambient flow/discharge ratio) is: 59.3
This value is below the computed dilution of 109.3 at the end
of the NFR.
Mixing for this discharge configuration is constrained by LOW AMBIENT FLOW!

The previous module predictions are unreliable since the limiting dilution
cannot be exceeded for this discharge into a deep unstratified layer.

A subsequent module (MOD381) will predict the properties of the
cross-sectionally fully mixed plume with limiting dilution and will
compute a POSSIBLE UPSTREAM WEDGE INTRUSION.

BEGIN MOD381: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

The DOWNSTREAM flow field for this unstable shallow water discharge is
VERTICALLY FULLY MIXED.
The mixing is controlled by the limiting dilution = 59.3

NO UPSTREAM INTRUSION will occur since the discharge is NON-BUOYANT.

X	Y	Z	S	C	BV	BH
1412.65	-45.72	0.00	59.3	0.169E+01	7.51	377.50

Cumulative travel time = 56214. sec

Vertically and laterally fully mixed over layer depth: END OF SIMULATION!

END OF MOD381: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

CORMIX3: Buoyant Surface Discharges End of Prediction File

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CORMIX3 PREDICTION FILE:
3333333333333333333333333333333333333333333333333333333333333333333333333333333333333333
                    CORNELL MIXING ZONE EXPERT SYSTEM
Subsystem CORMIX3:                                          Subsystem version:
 Buoyant Surface Discharges
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:         BW8 PA Discharge at Buffalo Bayou
 Design case:
 FILE NAME:               cormix\sim\        .cx3
 Time of Fortran run:

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =    377.50  AS    =   2835.03  QA    =     62.37
 HA    =      7.51  HD    =      5.02
 UA    =     0.022 F     =     0.013 USTAR =0.8720E-03
 UW    =     5.000 UWSTAR=0.5520E-02
 Density stratified environment
 STRCND=  A         RHOAM = 1005.0000
 RHOAS = 1001.0000  RHOAB = 1009.0000  RHOAEF= 1005.0000  E     =0.0000E+00

DISCHARGE PARAMETERS (metric units)
 BANK  =  RIGHT     DISTB =     60.00  Configuration:
 Circular discharge pipe:
 D0    =     1.830 A0    =     0.145
 Dimensions of equivalent rectangular discharge:
 B0    =     0.381 H0    =     0.380 A0    =0.1446E+00  AR    =      0.998
 SIGMA =     90.00  SLOPE =     3.00
 U0    =     7.398 Q0    =     1.070       =0.1070E+01
 RHO0  = 1005.0000  DRHO0 =0.0000E+00  GP0   =0.0000E+00
 C0    =0.1000E+03  CUNITS=  X
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES (metric units)
 Q0    =0.1070E+01  M0    =0.7916E+01  J0    =0.0000E+00
 Associated length scales (meters)
 LQ    =     0.38  LM    =  99999.00  Lm    =    127.89  Lb    =      0.00

NON-DIMENSIONAL PARAMETERS
 FR0   =  99999.00  FRCH  =  99999.00  R     =    336.26

FLOW CLASSIFICATION
 33333333333333333333333333333333333333
 3  Flow class (CORMIX3)      =    SA1    3
 3  Applicable layer depth HS =     5.02  3
 33333333333333333333333333333333333333

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+03  CUNITS=  X
 NTOX  =  1         CMC   =0.1000E+02  CCC   =  CSTD
 NSTD  =  1         CSTD  =0.1000E+01
 REGMZ =  1
 REGSPC=  1         XREG  =    500.00  WREG  =      0.00  AREG  =      0.00
 XINT  =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the WATER SURFACE and at center of discharge
      channel/outlet:     60.00 m  from the RIGHT bank/shore.
    X-axis points downstream
    Y-axis points to left as seen by an observer looking downstream
    Z-axis points vertically upward (in CORMIX3, all values Z = 0.00)
NSTEP =100 display intervals per module
------------------------------------------------------------------------------
------------------------------------------------------------------------------
BEGIN MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)

Profile definitions:
   BV = Gaussian 1/e (37%) vertical thickness
   BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
   S = hydrodynamic centerline dilution
   C = centerline concentration (includes reaction effects, if any)

       X        Y       Z        S       C       BV       BH
      0.00     1.51    0.00     1.0 0.100E+03   0.44     0.28
 Cumulative travel time =           0. sec

END OF MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)
```

BEGIN MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Surface JET into a crossflow

Near-field limitation in bounded channel.
Profile definitions:
BV = Gaussian 1/e (37%) vertical thickness
BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
0.00	1.51	0.00	1.0	0.100E+03	0.44	0.28
0.08	4.03	0.00	1.8	0.557E+02	0.72	0.56
0.19	6.56	0.00	2.6	0.386E+02	1.00	0.84
0.35	9.08	0.00	3.4	0.295E+02	1.28	1.11
0.54	11.61	0.00	4.2	0.239E+02	1.55	1.39
0.77	14.13	0.00	5.0	0.201E+02	1.83	1.67
1.04	16.66	0.00	5.8	0.173E+02	2.11	1.95
1.35	19.18	0.00	6.6	0.152E+02	2.39	2.23
1.70	21.71	0.00	7.4	0.136E+02	2.67	2.50
2.09	24.23	0.00	8.2	0.122E+02	2.94	2.78
2.51	26.76	0.00	9.0	0.112E+02	3.22	3.06
2.98	29.28	0.00	9.8	0.102E+02	3.50	3.34

** CMC HAS BEEN FOUND **
The pollutant concentration in the plume falls below CMC value of 0.100E+02
in the current prediction interval.
This is the extent of the TOXIC DILUTION ZONE.

3.48	31.81	0.00	10.6	0.947E+01	3.78	3.61
4.02	34.33	0.00	11.4	0.881E+01	4.05	3.89
4.60	36.86	0.00	12.2	0.823E+01	4.33	4.17
5.23	39.38	0.00	13.0	0.772E+01	4.61	4.45
5.88	41.91	0.00	13.7	0.727E+01	4.89	4.72
6.58	44.43	0.00	14.5	0.688E+01	5.17	5.00
7.32	46.96	0.00	15.3	0.652E+01	5.44	5.28
8.10	49.48	0.00	16.1	0.620E+01	5.72	5.56
8.91	52.01	0.00	16.9	0.591E+01	6.00	5.84
9.77	54.53	0.00	17.7	0.564E+01	6.28	6.11
10.66	57.06	0.00	18.5	0.540E+01	6.55	6.39
11.59	59.58	0.00	19.3	0.517E+01	6.83	6.67
12.56	62.11	0.00	20.1	0.497E+01	7.11	6.95
13.57	64.63	0.00	20.9	0.478E+01	7.39	7.22
14.62	67.16	0.00	21.7	0.461E+01	7.66	7.50
15.71	69.68	0.00	22.5	0.444E+01	7.94	7.78
16.84	72.21	0.00	23.3	0.429E+01	8.22	8.06
18.00	74.73	0.00	24.1	0.415E+01	8.50	8.34
19.21	77.26	0.00	24.9	0.402E+01	8.77	8.61
20.45	79.78	0.00	25.7	0.389E+01	9.05	8.89
21.74	82.31	0.00	26.5	0.377E+01	9.33	9.17
23.06	84.83	0.00	27.3	0.366E+01	9.60	9.45
24.42	87.36	0.00	28.1	0.356E+01	9.88	9.72
25.82	89.88	0.00	28.9	0.346E+01	10.16	10.00
27.26	92.40	0.00	29.7	0.337E+01	10.44	10.28
28.73	94.93	0.00	30.5	0.328E+01	10.71	10.56
30.25	97.45	0.00	31.3	0.320E+01	10.99	10.84
31.81	99.98	0.00	32.1	0.312E+01	11.27	11.11
33.40	102.50	0.00	32.9	0.304E+01	11.55	11.39
35.03	105.03	0.00	33.7	0.297E+01	11.82	11.67
36.71	107.55	0.00	34.5	0.290E+01	12.10	11.95
38.42	110.08	0.00	35.3	0.284E+01	12.38	12.22
40.17	112.60	0.00	36.1	0.277E+01	12.66	12.50
41.96	115.13	0.00	36.9	0.271E+01	12.93	12.78
43.78	117.65	0.00	37.6	0.266E+01	13.21	13.06
45.65	120.18	0.00	38.4	0.260E+01	13.49	13.33
47.56	122.70	0.00	39.2	0.255E+01	13.76	13.61
49.50	125.23	0.00	40.0	0.250E+01	14.04	13.89
51.49	127.75	0.00	40.8	0.245E+01	14.32	14.17
53.51	130.28	0.00	41.6	0.240E+01	14.60	14.45
55.57	132.80	0.00	42.4	0.236E+01	14.87	14.72
57.67	135.33	0.00	43.2	0.231E+01	15.15	15.00
59.81	137.85	0.00	44.0	0.227E+01	15.43	15.28
61.99	140.38	0.00	44.8	0.223E+01	15.70	15.56
64.21	142.90	0.00	45.6	0.219E+01	15.98	15.83
66.46	145.43	0.00	46.4	0.215E+01	16.26	16.11
68.76	147.95	0.00	47.2	0.212E+01	16.54	16.39
71.09	150.48	0.00	48.0	0.208E+01	16.81	16.67
73.47	153.00	0.00	48.8	0.205E+01	17.09	16.95

75.88	155.53	0.00	49.6	0.202E+01	17.37	17.22
78.33	158.05	0.00	50.4	0.198E+01	17.64	17.50
80.82	160.58	0.00	51.2	0.195E+01	17.92	17.78
83.35	163.10	0.00	52.0	0.192E+01	18.20	18.06
85.92	165.63	0.00	52.8	0.189E+01	18.47	18.33
88.52	168.15	0.00	53.6	0.187E+01	18.75	18.61
91.17	170.68	0.00	54.4	0.184E+01	19.03	18.89
93.85	173.20	0.00	55.2	0.181E+01	19.31	19.17
96.58	175.73	0.00	56.0	0.179E+01	19.58	19.45
99.34	178.25	0.00	56.8	0.176E+01	19.86	19.72
102.14	180.78	0.00	57.6	0.174E+01	20.14	20.00
104.98	183.30	0.00	58.4	0.171E+01	20.41	20.28
107.86	185.83	0.00	59.2	0.169E+01	20.69	20.56
110.78	188.35	0.00	60.0	0.167E+01	20.97	20.84
113.74	190.88	0.00	60.8	0.165E+01	21.24	21.11
116.73	193.40	0.00	61.5	0.162E+01	21.52	21.39
119.77	195.93	0.00	62.3	0.160E+01	21.80	21.67
122.84	198.45	0.00	63.1	0.158E+01	22.07	21.95
125.96	200.98	0.00	63.9	0.156E+01	22.35	22.23
129.11	203.50	0.00	64.7	0.154E+01	22.63	22.51
132.30	206.03	0.00	65.5	0.153E+01	22.91	22.79
135.53	208.55	0.00	66.3	0.151E+01	23.18	23.07
138.80	211.08	0.00	67.1	0.149E+01	23.46	23.34
142.11	213.60	0.00	67.9	0.147E+01	23.74	23.62
145.45	216.13	0.00	68.7	0.146E+01	24.01	23.90
148.84	218.65	0.00	69.5	0.144E+01	24.29	24.18
152.27	221.18	0.00	70.3	0.142E+01	24.57	24.46
155.73	223.70	0.00	71.1	0.141E+01	24.84	24.74
159.23	226.23	0.00	71.9	0.139E+01	25.12	25.02
162.77	228.75	0.00	72.7	0.138E+01	25.40	25.30
166.35	231.28	0.00	73.5	0.136E+01	25.67	25.57
169.97	233.80	0.00	74.3	0.135E+01	25.95	25.85
173.63	236.33	0.00	75.1	0.133E+01	26.23	26.13
177.33	238.85	0.00	75.9	0.132E+01	26.50	26.41
181.07	241.38	0.00	76.7	0.130E+01	26.78	26.69
184.84	243.90	0.00	77.5	0.129E+01	27.06	26.97
188.66	246.43	0.00	78.3	0.128E+01	27.33	27.25
192.51	248.95	0.00	79.1	0.126E+01	27.61	27.53
196.40	251.47	0.00	79.9	0.125E+01	27.89	27.80
200.33	254.00	0.00	80.7	0.124E+01	28.16	28.08

Cumulative travel time = 1115. sec

Some concentration build-up near bank/shore due to recirculation effects.
Find concentration and thickness values for the RECIRCULATION REGION
at end of MOD329!

END OF MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

The LIMITING DILUTION (given by ambient flow/discharge ratio) is: 59.3
This value is below the computed dilution of 80.7 at the end
of the NFR.
Mixing for this discharge configuration is constrained by LOW AMBIENT FLOW!

The previous module predictions are unreliable since the limiting dilution
cannot be exceeded for this discharge into a deep unstratified layer.

A subsequent module (MOD381) will predict the properties of the
cross-sectionally fully mixed plume with limiting dilution and will
compute a POSSIBLE UPSTREAM WEDGE INTRUSION.

BEGIN MOD381: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

The DOWNSTREAM flow field for this unstable shallow water discharge is
VERTICALLY FULLY MIXED.
The mixing is controlled by the limiting dilution = 59.3

NO UPSTREAM INTRUSION will occur since the discharge is NON-BUOYANT.

X	Y	Z	S	C	BV	BH
200.33	-60.00	0.00	59.3	0.169E+01	5.02	377.50

Cumulative travel time = 1115. sec

Vertically and laterally fully mixed over layer depth: END OF SIMULATION!

END OF MOD381: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

BEGIN MOD327: STRONGLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Profile definitions:
BV = Gaussian 1/e (37%) vertical thickness
BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
200.33	254.00	0.00	59.3	0.169E+01	58.91	58.74
213.45	258.37	0.00	62.0	0.161E+01	60.22	60.05
226.57	260.61	0.00	63.4	0.158E+01	60.89	60.73
239.69	262.26	0.00	64.4	0.155E+01	61.38	61.22
252.82	263.59	0.00	65.2	0.153E+01	61.78	61.62
265.94	264.72	0.00	66.0	0.152E+01	62.12	61.96
279.06	265.72	0.00	66.6	0.150E+01	62.42	62.26
292.18	266.62	0.00	67.2	0.149E+01	62.69	62.53
305.30	267.43	0.00	67.7	0.148E+01	62.94	62.77
318.42	268.19	0.00	68.2	0.147E+01	63.16	63.00
331.54	268.89	0.00	68.6	0.146E+01	63.37	63.21
344.66	269.54	0.00	69.1	0.145E+01	63.57	63.41
357.78	270.16	0.00	69.5	0.144E+01	63.76	63.59
370.91	270.75	0.00	69.9	0.143E+01	63.93	63.77
384.03	271.30	0.00	70.2	0.142E+01	64.10	63.93
397.15	271.84	0.00	70.6	0.142E+01	64.26	64.09
410.27	272.34	0.00	70.9	0.141E+01	64.41	64.25
423.39	272.83	0.00	71.2	0.140E+01	64.56	64.39
436.51	273.30	0.00	71.5	0.140E+01	64.70	64.53
449.63	273.75	0.00	71.8	0.139E+01	64.83	64.67
462.75	274.19	0.00	72.1	0.139E+01	64.97	64.80
475.87	274.62	0.00	72.4	0.138E+01	65.09	64.93
489.00	275.03	0.00	72.7	0.138E+01	65.22	65.05
** REGULATORY MIXING ZONE BOUNDARY is within the Near-Field Region (NFR) **						
502.12	275.42	0.00	73.0	0.137E+01	65.33	65.17
515.24	275.81	0.00	73.2	0.137E+01	65.45	65.29
528.36	276.19	0.00	73.5	0.136E+01	65.56	65.40
541.48	276.55	0.00	73.7	0.136E+01	65.67	65.51
554.60	276.91	0.00	74.0	0.135E+01	65.78	65.62
567.72	277.26	0.00	74.2	0.135E+01	65.88	65.72
580.84	277.60	0.00	74.4	0.134E+01	65.99	65.82
593.96	277.93	0.00	74.6	0.134E+01	66.09	65.92
607.09	278.26	0.00	74.9	0.134E+01	66.18	66.02
620.21	278.57	0.00	75.1	0.133E+01	66.28	66.12
633.33	278.89	0.00	75.3	0.133E+01	66.37	66.21
646.45	279.19	0.00	75.5	0.132E+01	66.47	66.30
659.57	279.49	0.00	75.7	0.132E+01	66.56	66.39
672.69	279.79	0.00	75.9	0.132E+01	66.64	66.48
685.81	280.08	0.00	76.1	0.131E+01	66.73	66.57
698.93	280.36	0.00	76.3	0.131E+01	66.82	66.65
712.05	280.64	0.00	76.5	0.131E+01	66.90	66.73
725.18	280.91	0.00	76.7	0.130E+01	66.98	66.82
738.30	281.18	0.00	76.9	0.130E+01	67.06	66.90
751.42	281.45	0.00	77.1	0.130E+01	67.14	66.98
764.54	281.71	0.00	77.2	0.129E+01	67.22	67.06
777.66	281.97	0.00	77.4	0.129E+01	67.30	67.13
790.78	282.22	0.00	77.6	0.129E+01	67.37	67.21
803.90	282.47	0.00	77.8	0.129E+01	67.45	67.28
817.02	282.72	0.00	77.9	0.128E+01	67.52	67.36
830.14	282.96	0.00	78.1	0.128E+01	67.59	67.43
843.27	283.20	0.00	78.3	0.128E+01	67.67	67.50
856.39	283.43	0.00	78.4	0.128E+01	67.74	67.57
869.51	283.67	0.00	78.6	0.127E+01	67.81	67.64
882.63	283.90	0.00	78.7	0.127E+01	67.88	67.71
895.75	284.12	0.00	78.9	0.127E+01	67.94	67.78
908.87	284.35	0.00	79.1	0.126E+01	68.01	67.85
921.99	284.57	0.00	79.2	0.126E+01	68.08	67.91
935.11	284.79	0.00	79.4	0.126E+01	68.14	67.98
948.23	285.00	0.00	79.5	0.126E+01	68.21	68.04
961.36	285.22	0.00	79.7	0.126E+01	68.27	68.11
974.48	285.43	0.00	79.8	0.125E+01	68.34	68.17
987.60	285.64	0.00	80.0	0.125E+01	68.40	68.23
1000.72	285.85	0.00	80.1	0.125E+01	68.46	68.30
1013.84	286.05	0.00	80.3	0.125E+01	68.52	68.36
1026.96	286.25	0.00	80.4	0.124E+01	68.58	68.42
1040.08	286.45	0.00	80.5	0.124E+01	68.64	68.48
1053.20	286.65	0.00	80.7	0.124E+01	68.70	68.54
1066.32	286.85	0.00	80.8	0.124E+01	68.76	68.60
1079.44	287.04	0.00	81.0	0.124E+01	68.82	68.66
1092.57	287.23	0.00	81.1	0.123E+01	68.88	68.71
1105.69	287.42	0.00	81.2	0.123E+01	68.93	68.77

1118.81	287.61	0.00	81.4	0.123E+01	68.99	68.83
1131.93	287.80	0.00	81.5	0.123E+01	69.05	68.88
1145.05	287.98	0.00	81.6	0.123E+01	69.10	68.94
1158.17	288.17	0.00	81.8	0.122E+01	69.16	68.99
1171.29	288.35	0.00	81.9	0.122E+01	69.21	69.05
1184.41	288.53	0.00	82.0	0.122E+01	69.27	69.10
1197.53	288.71	0.00	82.1	0.122E+01	69.32	69.16
1210.66	288.88	0.00	82.3	0.122E+01	69.37	69.21
1223.78	289.06	0.00	82.4	0.121E+01	69.42	69.26
1236.90	289.23	0.00	82.5	0.121E+01	69.48	69.31
1250.02	289.40	0.00	82.6	0.121E+01	69.53	69.36
1263.14	289.58	0.00	82.8	0.121E+01	69.58	69.42
1276.26	289.74	0.00	82.9	0.121E+01	69.63	69.47
1289.38	289.91	0.00	83.0	0.120E+01	69.68	69.52
1302.50	290.08	0.00	83.1	0.120E+01	69.73	69.57
1315.62	290.25	0.00	83.2	0.120E+01	69.78	69.62
1328.75	290.41	0.00	83.4	0.120E+01	69.83	69.67
1341.87	290.57	0.00	83.5	0.120E+01	69.88	69.72
1354.99	290.73	0.00	83.6	0.120E+01	69.93	69.76
1368.11	290.89	0.00	83.7	0.119E+01	69.98	69.81
1381.23	291.05	0.00	83.8	0.119E+01	70.02	69.86
1394.35	291.21	0.00	83.9	0.119E+01	70.07	69.91
1407.47	291.37	0.00	84.0	0.119E+01	70.12	69.95
1420.59	291.52	0.00	84.2	0.119E+01	70.16	70.00
1433.71	291.68	0.00	84.3	0.119E+01	70.21	70.05
1446.84	291.83	0.00	84.4	0.119E+01	70.26	70.09
1459.96	291.99	0.00	84.5	0.118E+01	70.30	70.14
1473.08	292.14	0.00	84.6	0.118E+01	70.35	70.18
1486.20	292.29	0.00	84.7	0.118E+01	70.39	70.23
1499.32	292.44	0.00	84.8	0.118E+01	70.44	70.27
1512.44	292.59	0.00	84.9	0.118E+01	70.48	70.32

 Cumulative travel time =   60757. sec

 Some concentration build-up near bank/shore due to recirculation effects.
   Find concentration and thickness values for the RECIRCULATION REGION
   at end of MOD329!

END OF MOD327: STRONGLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

BEGIN MOD329: STRONGLY DEFLECTED PLUME WITH LEESIDE RECIRCULATION ZONE

 This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

 The near-shore RECIRCULATION REGION extends back to the discharge location:
    Concentration C within that region: 0.589E+00
    Layer thickness BV within that region: 70.48

END OF MOD329: STRONGLY DEFLECTED PLUME WITH LEESIDE RECIRCULATION ZONE

** End of NEAR-FIELD REGION (NFR) **

CORMIX3: Buoyant Surface Discharges   End of Prediction File
3333333333333333333333333333333333333333333333333333333333333333333333333333

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CORMIX3 PREDICTION FILE:
3333333333333333333333333333333333333333333333333333333333333333333333333333333333333333
                    CORNELL MIXING ZONE EXPERT SYSTEM
Subsystem CORMIX3:                                          Subsystem version:
 Buoyant Surface Discharges
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:         Glendale E2 Clinton PA Discharges at Hun
 Design case:
 FILE NAME:               cormix\sim\        .cx3
 Time of Fortran run:

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =     15.24  AS    =     24.84  QA    =      1.37
 HA    =      1.63  HD    =      2.10
 UA    =     0.055 F     =     0.202 USTAR =0.8733E-02
 UW    =     5.000 UWSTAR=0.5523E-02
 Uniform density environment
 STRCND=  U         RHOAM =  999.8000

DISCHARGE PARAMETERS (metric units)
 BANK  =  RIGHT     DISTB =      4.10  Configuration:
 Rectangular channel geometry:
 B0    =     5.180 H0    =     1.070 A0    =0.5543E+01  AR    =      0.207
 SIGMA =     90.00  SLOPE =     26.00
 U0    =     0.193 Q0    =     1.070       =0.1070E+01
 RHO0  =  999.8000  DRHO0 =0.0000E+00  GP0   =0.0000E+00
 C0    =0.1000E+03  CUNITS=  X
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES (metric units)
 Q0    =0.1070E+01  M0    =0.2066E+00  J0    =0.0000E+00
 Associated length scales (meters)
 LQ    =      2.35  LM    =  99999.00  Lm    =      8.26  Lb    =      0.00
 LQ2D  =      3.40  LM2D  =  99999.00  Lm2D  =     41.89

NON-DIMENSIONAL PARAMETERS
 FR0   =  99999.00  FRCH  =  99999.00  R     =      3.51

FLOW CLASSIFICATION
 333333333333333333333333333333333333333333
 3  Flow class (CORMIX3)      =    SA2    3
 3  Applicable layer depth HS =     2.10  3
 333333333333333333333333333333333333333333

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+03  CUNITS=  X
 NTOX  =  1         CMC   =0.1000E+02  CCC   =  CSTD
 NSTD  =  1         CSTD  =0.1000E+01
 REGMZ =  1
 REGSPC=  1         XREG  =    500.00  WREG  =      0.00  AREG  =      0.00
 XINT  =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the WATER SURFACE and at center of discharge
      channel/outlet:      4.10 m  from the RIGHT bank/shore.
    X-axis points downstream
    Y-axis points to left as seen by an observer looking downstream
    Z-axis points vertically upward (in CORMIX3, all values Z = 0.00)
NSTEP =100 display intervals per module
------------------------------------------------------------------------------
------------------------------------------------------------------------------
BEGIN MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)

Profile definitions:
   BV = Gaussian 1/e (37%) vertical thickness
   BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
   S = hydrodynamic centerline dilution
   C = centerline concentration (includes reaction effects, if any)

       X        Y       Z        S       C       BV       BH
     0.36     1.32    0.00     1.0 0.100E+03   1.62     2.92
 Cumulative travel time =           7. sec

END OF MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)
------------------------------------------------------------------------------
------------------------------------------------------------------------------
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BEGIN MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Surface JET into a crossflow

Near-field limitation in bounded channel.
Profile definitions:
BV = Gaussian 1/e (37%) vertical thickness
BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
0.36	1.32	0.00	1.0	0.100E+03	1.61	2.92
0.52	1.40	0.00	1.0	0.996E+02	1.62	2.92
0.68	1.47	0.00	1.0	0.992E+02	1.62	2.93
0.84	1.55	0.00	1.0	0.988E+02	1.63	2.94
0.99	1.62	0.00	1.0	0.984E+02	1.64	2.95
1.15	1.70	0.00	1.0	0.980E+02	1.65	2.96
1.31	1.77	0.00	1.0	0.976E+02	1.66	2.97
1.47	1.85	0.00	1.0	0.973E+02	1.67	2.98
1.63	1.93	0.00	1.0	0.969E+02	1.68	2.98
1.80	2.00	0.00	1.0	0.965E+02	1.69	2.99
1.96	2.08	0.00	1.0	0.961E+02	1.70	3.00
2.12	2.15	0.00	1.0	0.958E+02	1.71	3.01
2.28	2.23	0.00	1.0	0.954E+02	1.72	3.02
2.45	2.31	0.00	1.1	0.950E+02	1.72	3.03
2.61	2.38	0.00	1.1	0.947E+02	1.73	3.04
2.77	2.46	0.00	1.1	0.943E+02	1.74	3.05
2.94	2.53	0.00	1.1	0.940E+02	1.75	3.05
3.11	2.61	0.00	1.1	0.936E+02	1.76	3.06
3.27	2.69	0.00	1.1	0.933E+02	1.77	3.07
3.44	2.76	0.00	1.1	0.929E+02	1.78	3.08
3.61	2.84	0.00	1.1	0.926E+02	1.79	3.09
3.77	2.91	0.00	1.1	0.922E+02	1.80	3.10
3.94	2.99	0.00	1.1	0.919E+02	1.80	3.11
4.11	3.07	0.00	1.1	0.915E+02	1.81	3.11
4.28	3.14	0.00	1.1	0.912E+02	1.82	3.12
4.45	3.22	0.00	1.1	0.909E+02	1.83	3.13
4.62	3.29	0.00	1.1	0.905E+02	1.84	3.14
4.79	3.37	0.00	1.1	0.902E+02	1.85	3.15
4.96	3.45	0.00	1.1	0.899E+02	1.86	3.16
5.14	3.52	0.00	1.1	0.896E+02	1.87	3.17
5.31	3.60	0.00	1.1	0.893E+02	1.88	3.17
5.48	3.67	0.00	1.1	0.889E+02	1.89	3.18
5.66	3.75	0.00	1.1	0.886E+02	1.89	3.19
5.83	3.82	0.00	1.1	0.883E+02	1.90	3.20
6.01	3.90	0.00	1.1	0.880E+02	1.91	3.21
6.18	3.98	0.00	1.1	0.877E+02	1.92	3.22
6.36	4.05	0.00	1.1	0.874E+02	1.93	3.23
6.53	4.13	0.00	1.1	0.871E+02	1.94	3.24
6.71	4.20	0.00	1.2	0.868E+02	1.95	3.24
6.89	4.28	0.00	1.2	0.865E+02	1.96	3.25
7.07	4.36	0.00	1.2	0.862E+02	1.97	3.26
7.24	4.43	0.00	1.2	0.859E+02	1.97	3.27
7.42	4.51	0.00	1.2	0.856E+02	1.98	3.28
7.60	4.58	0.00	1.2	0.853E+02	1.99	3.29
7.78	4.66	0.00	1.2	0.850E+02	2.00	3.30
7.97	4.74	0.00	1.2	0.847E+02	2.01	3.30
8.15	4.81	0.00	1.2	0.844E+02	2.02	3.31
8.33	4.89	0.00	1.2	0.841E+02	2.03	3.32
8.51	4.96	0.00	1.2	0.838E+02	2.04	3.33
8.69	5.04	0.00	1.2	0.836E+02	2.05	3.34
8.88	5.12	0.00	1.2	0.833E+02	2.05	3.35
9.06	5.19	0.00	1.2	0.830E+02	2.06	3.36
9.25	5.27	0.00	1.2	0.827E+02	2.07	3.37
9.43	5.34	0.00	1.2	0.825E+02	2.08	3.37
9.62	5.42	0.00	1.2	0.822E+02	2.09	3.38
9.80	5.50	0.00	1.2	0.819E+02	2.10	3.39
9.99	5.57	0.00	1.2	0.816E+02	2.11	3.40
10.18	5.65	0.00	1.2	0.814E+02	2.12	3.41
10.37	5.72	0.00	1.2	0.811E+02	2.13	3.42
10.56	5.80	0.00	1.2	0.809E+02	2.13	3.43
10.74	5.87	0.00	1.2	0.806E+02	2.14	3.43
10.93	5.95	0.00	1.2	0.803E+02	2.15	3.44
11.12	6.03	0.00	1.2	0.801E+02	2.16	3.45
11.32	6.10	0.00	1.3	0.798E+02	2.17	3.46
11.51	6.18	0.00	1.3	0.796E+02	2.18	3.47
11.70	6.25	0.00	1.3	0.793E+02	2.19	3.48
11.89	6.33	0.00	1.3	0.791E+02	2.20	3.49

12.08	6.41	0.00	1.3	0.788E+02	2.21	3.50
12.28	6.48	0.00	1.3	0.786E+02	2.21	3.50
12.47	6.56	0.00	1.3	0.783E+02	2.22	3.51
12.67	6.63	0.00	1.3	0.781E+02	2.23	3.52
12.86	6.71	0.00	1.3	0.778E+02	2.24	3.53
13.06	6.79	0.00	1.3	0.776E+02	2.25	3.54
13.25	6.86	0.00	1.3	0.773E+02	2.26	3.55
13.45	6.94	0.00	1.3	0.771E+02	2.27	3.56
13.65	7.01	0.00	1.3	0.769E+02	2.28	3.56
13.84	7.09	0.00	1.3	0.766E+02	2.29	3.57
14.04	7.17	0.00	1.3	0.764E+02	2.29	3.58
14.24	7.24	0.00	1.3	0.762E+02	2.30	3.59
14.44	7.32	0.00	1.3	0.759E+02	2.31	3.60
14.64	7.39	0.00	1.3	0.757E+02	2.32	3.61
14.84	7.47	0.00	1.3	0.755E+02	2.33	3.62
15.04	7.55	0.00	1.3	0.752E+02	2.34	3.63
15.24	7.62	0.00	1.3	0.750E+02	2.35	3.63
15.45	7.70	0.00	1.3	0.748E+02	2.36	3.64
15.65	7.77	0.00	1.3	0.746E+02	2.37	3.65
15.85	7.85	0.00	1.3	0.743E+02	2.37	3.66
16.06	7.92	0.00	1.3	0.741E+02	2.38	3.67
16.26	8.00	0.00	1.4	0.739E+02	2.39	3.68
16.47	8.08	0.00	1.4	0.737E+02	2.40	3.69
16.67	8.15	0.00	1.4	0.735E+02	2.41	3.69
16.88	8.23	0.00	1.4	0.732E+02	2.42	3.70
17.08	8.30	0.00	1.4	0.730E+02	2.43	3.71
17.29	8.38	0.00	1.4	0.728E+02	2.44	3.72
17.50	8.46	0.00	1.4	0.726E+02	2.44	3.73
17.71	8.53	0.00	1.4	0.724E+02	2.45	3.74
17.92	8.61	0.00	1.4	0.722E+02	2.46	3.75
18.12	8.68	0.00	1.4	0.720E+02	2.47	3.76
18.33	8.76	0.00	1.4	0.718E+02	2.48	3.76
18.55	8.84	0.00	1.4	0.716E+02	2.49	3.77
18.76	8.91	0.00	1.4	0.714E+02	2.50	3.78

Cumulative travel time = 46. sec
JET INTERACTS WITH THE BOTTOM within this region.

Some concentration build-up near bank/shore due to recirculation effects.
Find concentration and thickness values for the RECIRCULATION REGION
at end of MOD329!

END OF MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Because of the strong horizontal momentum flux of this discharge, severe
PLUME INTERACTION WITH BOTH BANKS occurs.
Consider a different discharge design with a reduced offshore momentum flux.

In the next prediction module, the plume centerline will be set
to follow the bank/shore.

A subsequent module (MOD381) will predict the properties of the
LATERALLY mixed plume with the given near-field dilution and will
compute a POSSIBLE UPSTREAM WEDGE INTRUSION.

BEGIN MOD381: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

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CORMIX3 PREDICTION FILE:
3333333333333333333333333333333333333333333333333333333333333333333333333333333333333333
                    CORNELL MIXING ZONE EXPERT SYSTEM
Subsystem CORMIX3:                                          Subsystem version:
 Buoyant Surface Discharges
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:         Glendale E2 Clinton PA Discharges at Hun
 Design case:
 FILE NAME:               cormix\sim\        .cx3
 Time of Fortran run:

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =     15.24  AS    =     24.84  QA    =      1.37
 HA    =      1.63  HD    =      2.10
 UA    =     0.055 F     =     0.202 USTAR =0.8733E-02
 UW    =     5.000 UWSTAR=0.5523E-02
 Uniform density environment
 STRCND=  U         RHOAM =  999.8000

DISCHARGE PARAMETERS (metric units)
 BANK  =  RIGHT     DISTB =      4.10  Configuration:
 Rectangular channel geometry:
 B0    =     5.180 H0    =     1.070 A0    =0.5543E+01  AR    =      0.207
 SIGMA =     90.00  SLOPE =     26.00
 U0    =     0.193 Q0    =     1.070       =0.1070E+01
 RHO0  =  999.8000  DRHO0 =0.0000E+00  GP0   =0.0000E+00
 C0    =0.1000E+03  CUNITS=  X
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES (metric units)
 Q0    =0.1070E+01  M0    =0.2066E+00  J0    =0.0000E+00
 Associated length scales (meters)
 LQ    =      2.35  LM    =  99999.00  Lm    =      8.26  Lb    =      0.00
 LQ2D  =      3.40  LM2D  =  99999.00  Lm2D  =     41.89

NON-DIMENSIONAL PARAMETERS
 FR0   =  99999.00  FRCH  =  99999.00  R     =      3.51

FLOW CLASSIFICATION
 333333333333333333333333333333333333333333
 3  Flow class (CORMIX3)      =    SA2    3
 3  Applicable layer depth HS =     2.10  3
 333333333333333333333333333333333333333333

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+03  CUNITS=  X
 NTOX  =  1         CMC   =0.1000E+02  CCC   =  CSTD
 NSTD  =  1         CSTD  =0.1000E+01
 REGMZ =  1
 REGSPC=  1         XREG  =    500.00  WREG  =      0.00  AREG  =      0.00
 XINT  =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the WATER SURFACE and at center of discharge
      channel/outlet:      4.10 m  from the RIGHT bank/shore.
    X-axis points downstream
    Y-axis points to left as seen by an observer looking downstream
    Z-axis points vertically upward (in CORMIX3, all values Z = 0.00)
NSTEP =100 display intervals per module
------------------------------------------------------------------------------
------------------------------------------------------------------------------
BEGIN MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)

Profile definitions:
   BV = Gaussian 1/e (37%) vertical thickness
   BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
   S = hydrodynamic centerline dilution
   C = centerline concentration (includes reaction effects, if any)

       X        Y       Z        S       C       BV       BH
     0.36     1.32    0.00     1.0 0.100E+03   1.62     2.92
 Cumulative travel time =           7. sec

END OF MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)
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BEGIN MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Surface JET into a crossflow

Near-field limitation in bounded channel.
Profile definitions:
BV = Gaussian 1/e (37%) vertical thickness
BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
0.36	1.32	0.00	1.0	0.100E+03	1.61	2.92
0.52	1.40	0.00	1.0	0.996E+02	1.62	2.92
0.68	1.47	0.00	1.0	0.992E+02	1.62	2.93
0.84	1.55	0.00	1.0	0.988E+02	1.63	2.94
0.99	1.62	0.00	1.0	0.984E+02	1.64	2.95
1.15	1.70	0.00	1.0	0.980E+02	1.65	2.96
1.31	1.77	0.00	1.0	0.976E+02	1.66	2.97
1.47	1.85	0.00	1.0	0.973E+02	1.67	2.98
1.63	1.93	0.00	1.0	0.969E+02	1.68	2.98
1.80	2.00	0.00	1.0	0.965E+02	1.69	2.99
1.96	2.08	0.00	1.0	0.961E+02	1.70	3.00
2.12	2.15	0.00	1.0	0.958E+02	1.71	3.01
2.28	2.23	0.00	1.0	0.954E+02	1.72	3.02
2.45	2.31	0.00	1.1	0.950E+02	1.72	3.03
2.61	2.38	0.00	1.1	0.947E+02	1.73	3.04
2.77	2.46	0.00	1.1	0.943E+02	1.74	3.05
2.94	2.53	0.00	1.1	0.940E+02	1.75	3.05
3.11	2.61	0.00	1.1	0.936E+02	1.76	3.06
3.27	2.69	0.00	1.1	0.933E+02	1.77	3.07
3.44	2.76	0.00	1.1	0.929E+02	1.78	3.08
3.61	2.84	0.00	1.1	0.926E+02	1.79	3.09
3.77	2.91	0.00	1.1	0.922E+02	1.80	3.10
3.94	2.99	0.00	1.1	0.919E+02	1.80	3.11
4.11	3.07	0.00	1.1	0.915E+02	1.81	3.11
4.28	3.14	0.00	1.1	0.912E+02	1.82	3.12
4.45	3.22	0.00	1.1	0.909E+02	1.83	3.13
4.62	3.29	0.00	1.1	0.905E+02	1.84	3.14
4.79	3.37	0.00	1.1	0.902E+02	1.85	3.15
4.96	3.45	0.00	1.1	0.899E+02	1.86	3.16
5.14	3.52	0.00	1.1	0.896E+02	1.87	3.17
5.31	3.60	0.00	1.1	0.893E+02	1.88	3.17
5.48	3.67	0.00	1.1	0.889E+02	1.89	3.18
5.66	3.75	0.00	1.1	0.886E+02	1.89	3.19
5.83	3.82	0.00	1.1	0.883E+02	1.90	3.20
6.01	3.90	0.00	1.1	0.880E+02	1.91	3.21
6.18	3.98	0.00	1.1	0.877E+02	1.92	3.22
6.36	4.05	0.00	1.1	0.874E+02	1.93	3.23
6.53	4.13	0.00	1.1	0.871E+02	1.94	3.24
6.71	4.20	0.00	1.2	0.868E+02	1.95	3.24
6.89	4.28	0.00	1.2	0.865E+02	1.96	3.25
7.07	4.36	0.00	1.2	0.862E+02	1.97	3.26
7.24	4.43	0.00	1.2	0.859E+02	1.97	3.27
7.42	4.51	0.00	1.2	0.856E+02	1.98	3.28
7.60	4.58	0.00	1.2	0.853E+02	1.99	3.29
7.78	4.66	0.00	1.2	0.850E+02	2.00	3.30
7.97	4.74	0.00	1.2	0.847E+02	2.01	3.30
8.15	4.81	0.00	1.2	0.844E+02	2.02	3.31
8.33	4.89	0.00	1.2	0.841E+02	2.03	3.32
8.51	4.96	0.00	1.2	0.838E+02	2.04	3.33
8.69	5.04	0.00	1.2	0.836E+02	2.05	3.34
8.88	5.12	0.00	1.2	0.833E+02	2.05	3.35
9.06	5.19	0.00	1.2	0.830E+02	2.06	3.36
9.25	5.27	0.00	1.2	0.827E+02	2.07	3.37
9.43	5.34	0.00	1.2	0.825E+02	2.08	3.37
9.62	5.42	0.00	1.2	0.822E+02	2.09	3.38
9.80	5.50	0.00	1.2	0.819E+02	2.10	3.39
9.99	5.57	0.00	1.2	0.816E+02	2.11	3.40
10.18	5.65	0.00	1.2	0.814E+02	2.12	3.41
10.37	5.72	0.00	1.2	0.811E+02	2.13	3.42
10.56	5.80	0.00	1.2	0.809E+02	2.13	3.43
10.74	5.87	0.00	1.2	0.806E+02	2.14	3.43
10.93	5.95	0.00	1.2	0.803E+02	2.15	3.44
11.12	6.03	0.00	1.2	0.801E+02	2.16	3.45
11.32	6.10	0.00	1.3	0.798E+02	2.17	3.46
11.51	6.18	0.00	1.3	0.796E+02	2.18	3.47
11.70	6.25	0.00	1.3	0.793E+02	2.19	3.48
11.89	6.33	0.00	1.3	0.791E+02	2.20	3.49

12.08	6.41	0.00	1.3	0.788E+02	2.21	3.50
12.28	6.48	0.00	1.3	0.786E+02	2.21	3.50
12.47	6.56	0.00	1.3	0.783E+02	2.22	3.51
12.67	6.63	0.00	1.3	0.781E+02	2.23	3.52
12.86	6.71	0.00	1.3	0.778E+02	2.24	3.53
13.06	6.79	0.00	1.3	0.776E+02	2.25	3.54
13.25	6.86	0.00	1.3	0.773E+02	2.26	3.55
13.45	6.94	0.00	1.3	0.771E+02	2.27	3.56
13.65	7.01	0.00	1.3	0.769E+02	2.28	3.56
13.84	7.09	0.00	1.3	0.766E+02	2.29	3.57
14.04	7.17	0.00	1.3	0.764E+02	2.29	3.58
14.24	7.24	0.00	1.3	0.762E+02	2.30	3.59
14.44	7.32	0.00	1.3	0.759E+02	2.31	3.60
14.64	7.39	0.00	1.3	0.757E+02	2.32	3.61
14.84	7.47	0.00	1.3	0.755E+02	2.33	3.62
15.04	7.55	0.00	1.3	0.752E+02	2.34	3.63
15.24	7.62	0.00	1.3	0.750E+02	2.35	3.63
15.45	7.70	0.00	1.3	0.748E+02	2.36	3.64
15.65	7.77	0.00	1.3	0.746E+02	2.37	3.65
15.85	7.85	0.00	1.3	0.743E+02	2.37	3.66
16.06	7.92	0.00	1.3	0.741E+02	2.38	3.67
16.26	8.00	0.00	1.4	0.739E+02	2.39	3.68
16.47	8.08	0.00	1.4	0.737E+02	2.40	3.69
16.67	8.15	0.00	1.4	0.735E+02	2.41	3.69
16.88	8.23	0.00	1.4	0.732E+02	2.42	3.70
17.08	8.30	0.00	1.4	0.730E+02	2.43	3.71
17.29	8.38	0.00	1.4	0.728E+02	2.44	3.72
17.50	8.46	0.00	1.4	0.726E+02	2.44	3.73
17.71	8.53	0.00	1.4	0.724E+02	2.45	3.74
17.92	8.61	0.00	1.4	0.722E+02	2.46	3.75
18.12	8.68	0.00	1.4	0.720E+02	2.47	3.76
18.33	8.76	0.00	1.4	0.718E+02	2.48	3.76
18.55	8.84	0.00	1.4	0.716E+02	2.49	3.77
18.76	8.91	0.00	1.4	0.714E+02	2.50	3.78

Cumulative travel time = 46. sec
JET INTERACTS WITH THE BOTTOM within this region.

Some concentration build-up near bank/shore due to recirculation effects.
Find concentration and thickness values for the RECIRCULATION REGION
at end of MOD329!

END OF MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Because of the strong horizontal momentum flux of this discharge, severe
PLUME INTERACTION WITH BOTH BANKS occurs.
Consider a different discharge design with a reduced offshore momentum flux.

In the next prediction module, the plume centerline will be set
to follow the bank/shore.

A subsequent module (MOD381) will predict the properties of the
LATERALLY mixed plume with the given near-field dilution and will
compute a POSSIBLE UPSTREAM WEDGE INTRUSION.

BEGIN MOD381: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

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CORMIX3 PREDICTION FILE:
3333333333333333333333333333333333333333333333333333333333333333333333333333333333333333
                    CORNELL MIXING ZONE EXPERT SYSTEM
Subsystem CORMIX3:                                          Subsystem version:
 Buoyant Surface Discharges
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:         Filterbed PA Discharge at Buffalo Bayou
 Design case:
 FILE NAME:               cormix\sim\        .cx3
 Time of Fortran run:

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =     93.00  AS    =    419.43  QA    =     57.04
 HA    =      4.51  HD    =      3.50
 UA    =     0.136  F     =     0.015 USTAR =0.5866E-02
 UW    =     5.000 UWSTAR=0.5525E-02
 Density stratified environment
 STRCND=  A         RHOAM = 1002.1000
 RHOAS =  999.2000  RHOAB = 1005.0000  RHOAEF= 1002.1000  E     =0.0000E+00

DISCHARGE PARAMETERS (metric units)
 BANK  =  RIGHT     DISTB =      2.20  Configuration:
 Circular discharge pipe:
 D0    =     1.830 A0    =     0.145
 Dimensions of equivalent rectangular discharge:
 B0    =     0.381 H0    =     0.380 A0    =0.1446E+00  AR    =      0.998
 SIGMA =     90.00  SLOPE =     40.00
 U0    =     7.398 Q0    =     1.070       =0.1070E+01
 RHO0  = 1002.1000  DRHO0 =0.0000E+00  GP0   =0.0000E+00
 C0    =0.1000E+03  CUNITS=  X
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES (metric units)
 Q0    =0.1070E+01  M0    =0.7916E+01  J0    =0.0000E+00
 Associated length scales (meters)
 LQ    =     0.38  LM    =  99999.00  Lm    =     20.69  Lb    =      0.00

NON-DIMENSIONAL PARAMETERS
 FR0   =  99999.00  FRCH  =  99999.00  R     =     54.40

FLOW CLASSIFICATION
 33333333333333333333333333333333333333
 3  Flow class (CORMIX3)      =    SA1    3
 3  Applicable layer depth HS =     3.50  3
 33333333333333333333333333333333333333

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+03  CUNITS=  X
 NTOX  =  1         CMC   =0.1000E+02  CCC   =  CSTD
 NSTD  =  1         CSTD  =0.1000E+01
 REGMZ =  1
 REGSPC=  1         XREG  =    500.00  WREG  =      0.00  AREG  =      0.00
 XINT  =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the WATER SURFACE and at center of discharge
      channel/outlet:      2.20 m  from the RIGHT bank/shore.
    X-axis points downstream
    Y-axis points to left as seen by an observer looking downstream
    Z-axis points vertically upward (in CORMIX3, all values Z = 0.00)
NSTEP =100 display intervals per module
------------------------------------------------------------------------------
------------------------------------------------------------------------------
BEGIN MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)

Profile definitions:
   BV = Gaussian 1/e (37%) vertical thickness
   BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
   S = hydrodynamic centerline dilution
   C = centerline concentration (includes reaction effects, if any)

       X        Y       Z        S       C       BV       BH
      0.02     1.44    0.00     1.0 0.100E+03   0.44     0.28
 Cumulative travel time =           0. sec

END OF MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)
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BEGIN MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Surface JET into a crossflow

Profile definitions:
BV = Gaussian 1/e (37%) vertical thickness
BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
0.02	1.44	0.00	1.0	0.100E+03	0.44	0.28
0.08	1.82	0.00	1.1	0.892E+02	0.48	0.32
0.14	2.20	0.00	1.2	0.806E+02	0.52	0.36
0.21	2.58	0.00	1.4	0.734E+02	0.56	0.41
0.28	2.97	0.00	1.5	0.675E+02	0.61	0.45
0.36	3.35	0.00	1.6	0.624E+02	0.65	0.49
0.44	3.73	0.00	1.7	0.580E+02	0.69	0.53
0.53	4.11	0.00	1.8	0.542E+02	0.73	0.57
0.62	4.49	0.00	2.0	0.509E+02	0.78	0.62
0.72	4.88	0.00	2.1	0.480E+02	0.82	0.66
0.82	5.26	0.00	2.2	0.453E+02	0.86	0.70
0.93	5.64	0.00	2.3	0.430E+02	0.90	0.74
1.05	6.02	0.00	2.4	0.409E+02	0.95	0.79
1.17	6.40	0.00	2.6	0.390E+02	0.99	0.83
1.30	6.79	0.00	2.7	0.372E+02	1.03	0.87
1.43	7.17	0.00	2.8	0.356E+02	1.07	0.91
1.57	7.55	0.00	2.9	0.341E+02	1.11	0.95
1.71	7.93	0.00	3.0	0.328E+02	1.16	1.00
1.86	8.31	0.00	3.2	0.315E+02	1.20	1.04
2.01	8.70	0.00	3.3	0.304E+02	1.24	1.08
2.17	9.08	0.00	3.4	0.293E+02	1.28	1.12
2.34	9.46	0.00	3.5	0.283E+02	1.32	1.16
2.51	9.84	0.00	3.7	0.274E+02	1.37	1.21
2.69	10.22	0.00	3.8	0.265E+02	1.41	1.25
2.87	10.61	0.00	3.9	0.257E+02	1.45	1.29
3.06	10.99	0.00	4.0	0.249E+02	1.49	1.33
3.25	11.37	0.00	4.1	0.242E+02	1.54	1.37
3.45	11.75	0.00	4.3	0.235E+02	1.58	1.42
3.65	12.13	0.00	4.4	0.229E+02	1.62	1.46
3.86	12.52	0.00	4.5	0.222E+02	1.66	1.50
4.07	12.90	0.00	4.6	0.217E+02	1.70	1.54
4.30	13.28	0.00	4.7	0.211E+02	1.75	1.58
4.52	13.66	0.00	4.9	0.206E+02	1.79	1.63
4.75	14.04	0.00	5.0	0.201E+02	1.83	1.67
4.99	14.42	0.00	5.1	0.196E+02	1.87	1.71
5.23	14.81	0.00	5.2	0.192E+02	1.91	1.75
5.48	15.19	0.00	5.3	0.187E+02	1.96	1.79
5.73	15.57	0.00	5.5	0.183E+02	2.00	1.84
5.99	15.95	0.00	5.6	0.179E+02	2.04	1.88
6.26	16.33	0.00	5.7	0.175E+02	2.08	1.92
6.53	16.72	0.00	5.8	0.172E+02	2.12	1.96
6.80	17.10	0.00	5.9	0.168E+02	2.17	2.00
7.08	17.48	0.00	6.1	0.165E+02	2.21	2.05
7.37	17.86	0.00	6.2	0.162E+02	2.25	2.09
7.66	18.24	0.00	6.3	0.159E+02	2.29	2.13
7.96	18.63	0.00	6.4	0.156E+02	2.33	2.17
8.26	19.01	0.00	6.5	0.153E+02	2.38	2.21
8.57	19.39	0.00	6.7	0.150E+02	2.42	2.26
8.89	19.77	0.00	6.8	0.147E+02	2.46	2.30
9.20	20.15	0.00	6.9	0.145E+02	2.50	2.34
9.53	20.54	0.00	7.0	0.142E+02	2.55	2.38
9.86	20.92	0.00	7.1	0.140E+02	2.59	2.42
10.20	21.30	0.00	7.3	0.138E+02	2.63	2.47
10.54	21.68	0.00	7.4	0.135E+02	2.67	2.51
10.89	22.06	0.00	7.5	0.133E+02	2.71	2.55
11.24	22.45	0.00	7.6	0.131E+02	2.76	2.59
11.60	22.83	0.00	7.8	0.129E+02	2.80	2.63
11.96	23.21	0.00	7.9	0.127E+02	2.84	2.68
12.33	23.59	0.00	8.0	0.125E+02	2.88	2.72
12.70	23.97	0.00	8.1	0.123E+02	2.92	2.76
13.08	24.36	0.00	8.2	0.121E+02	2.97	2.80
13.47	24.74	0.00	8.4	0.120E+02	3.01	2.84
13.86	25.12	0.00	8.5	0.118E+02	3.05	2.89
14.26	25.50	0.00	8.6	0.116E+02	3.09	2.93
14.66	25.88	0.00	8.7	0.115E+02	3.13	2.97
15.07	26.27	0.00	8.8	0.113E+02	3.18	3.01

15.48	26.65	0.00	9.0	0.112E+02	3.22	3.05
15.90	27.03	0.00	9.1	0.110E+02	3.26	3.10
16.32	27.41	0.00	9.2	0.109E+02	3.30	3.14
16.75	27.79	0.00	9.3	0.107E+02	3.34	3.18
17.19	28.18	0.00	9.4	0.106E+02	3.39	3.22
17.63	28.56	0.00	9.6	0.105E+02	3.43	3.26
18.08	28.94	0.00	9.7	0.103E+02	3.47	3.31
18.53	29.32	0.00	9.8	0.102E+02	3.51	3.35
18.99	29.70	0.00	9.9	0.101E+02	3.55	3.39

** CMC HAS BEEN FOUND **
The pollutant concentration in the plume falls below CMC value of 0.100E+02
in the current prediction interval.
This is the extent of the TOXIC DILUTION ZONE.

19.45	30.09	0.00	10.0	0.996E+01	3.60	3.43
19.92	30.47	0.00	10.2	0.984E+01	3.64	3.47
20.39	30.85	0.00	10.3	0.973E+01	3.68	3.52
20.87	31.23	0.00	10.4	0.961E+01	3.72	3.56
21.36	31.61	0.00	10.5	0.950E+01	3.76	3.60
21.85	32.00	0.00	10.6	0.940E+01	3.81	3.64
22.34	32.38	0.00	10.8	0.929E+01	3.85	3.68
22.84	32.76	0.00	10.9	0.919E+01	3.89	3.73
23.35	33.14	0.00	11.0	0.909E+01	3.93	3.77
23.86	33.52	0.00	11.1	0.899E+01	3.97	3.81
24.38	33.91	0.00	11.2	0.889E+01	4.02	3.85
24.90	34.29	0.00	11.4	0.880E+01	4.06	3.90
25.43	34.67	0.00	11.5	0.870E+01	4.10	3.94
25.97	35.05	0.00	11.6	0.861E+01	4.14	3.98
26.51	35.43	0.00	11.7	0.853E+01	4.18	4.02
27.05	35.82	0.00	11.8	0.844E+01	4.23	4.06
27.60	36.20	0.00	12.0	0.835E+01	4.27	4.11
28.16	36.58	0.00	12.1	0.827E+01	4.31	4.15
28.72	36.96	0.00	12.2	0.819E+01	4.35	4.19
29.29	37.34	0.00	12.3	0.811E+01	4.39	4.23
29.86	37.73	0.00	12.5	0.803E+01	4.44	4.27
30.44	38.11	0.00	12.6	0.795E+01	4.48	4.32
31.03	38.49	0.00	12.7	0.788E+01	4.52	4.36
31.62	38.87	0.00	12.8	0.780E+01	4.56	4.40
32.21	39.25	0.00	12.9	0.773E+01	4.60	4.44
32.81	39.64	0.00	13.1	0.766E+01	4.65	4.48

Cumulative travel time = 29. sec

Some concentration build-up near bank/shore due to recirculation effects.
Find concentration and thickness values for the RECIRCULATION REGION
at end of MOD329!

END OF MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

BEGIN MOD327: STRONGLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Profile definitions:
BV = Gaussian 1/e (37%) vertical thickness
BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
32.81	39.64	0.00	13.1	0.766E+01	11.30	10.91
34.41	40.22	0.00	13.5	0.742E+01	11.48	11.08
36.01	40.54	0.00	13.7	0.730E+01	11.57	11.18
37.60	40.78	0.00	13.9	0.721E+01	11.64	11.25
39.20	40.97	0.00	14.0	0.714E+01	11.70	11.31
40.80	41.14	0.00	14.1	0.708E+01	11.75	11.36
42.39	41.28	0.00	14.2	0.702E+01	11.80	11.40
43.99	41.41	0.00	14.3	0.697E+01	11.83	11.44
45.59	41.53	0.00	14.4	0.693E+01	11.87	11.47
47.18	41.64	0.00	14.5	0.689E+01	11.90	11.51
48.78	41.74	0.00	14.6	0.686E+01	11.93	11.54
50.38	41.84	0.00	14.7	0.682E+01	11.96	11.57
51.97	41.93	0.00	14.7	0.679E+01	11.99	11.59
53.57	42.02	0.00	14.8	0.676E+01	12.02	11.62
55.17	42.10	0.00	14.8	0.673E+01	12.04	11.64
56.76	42.18	0.00	14.9	0.671E+01	12.06	11.67
58.36	42.25	0.00	15.0	0.668E+01	12.09	11.69
59.96	42.32	0.00	15.0	0.666E+01	12.11	11.71
61.55	42.39	0.00	15.1	0.664E+01	12.13	11.73
63.15	42.46	0.00	15.1	0.661E+01	12.15	11.75
64.75	42.52	0.00	15.2	0.659E+01	12.17	11.77
66.35	42.58	0.00	15.2	0.657E+01	12.19	11.79

67.94	42.64	0.00	15.3	0.655E+01	12.20	11.81
69.54	42.70	0.00	15.3	0.653E+01	12.22	11.82
71.14	42.76	0.00	15.4	0.651E+01	12.24	11.84
72.73	42.81	0.00	15.4	0.650E+01	12.26	11.86
74.33	42.87	0.00	15.4	0.648E+01	12.27	11.87
75.93	42.92	0.00	15.5	0.646E+01	12.29	11.89
77.52	42.97	0.00	15.5	0.645E+01	12.30	11.91
79.12	43.02	0.00	15.6	0.643E+01	12.32	11.92
80.72	43.07	0.00	15.6	0.641E+01	12.33	11.94
82.31	43.12	0.00	15.6	0.640E+01	12.35	11.95
83.91	43.16	0.00	15.7	0.638E+01	12.36	11.96
85.51	43.21	0.00	15.7	0.637E+01	12.37	11.98
87.10	43.26	0.00	15.7	0.636E+01	12.39	11.99
88.70	43.30	0.00	15.8	0.634E+01	12.40	12.00
90.30	43.34	0.00	15.8	0.633E+01	12.41	12.02
91.89	43.39	0.00	15.8	0.632E+01	12.43	12.03
93.49	43.43	0.00	15.9	0.630E+01	12.44	12.04
95.09	43.47	0.00	15.9	0.629E+01	12.45	12.05
96.68	43.51	0.00	15.9	0.628E+01	12.46	12.07
98.28	43.55	0.00	16.0	0.627E+01	12.48	12.08
99.88	43.59	0.00	16.0	0.625E+01	12.49	12.09
101.48	43.63	0.00	16.0	0.624E+01	12.50	12.10
103.07	43.66	0.00	16.1	0.623E+01	12.51	12.11
104.67	43.70	0.00	16.1	0.622E+01	12.52	12.12
106.27	43.74	0.00	16.1	0.621E+01	12.53	12.14
107.86	43.77	0.00	16.1	0.620E+01	12.54	12.15
109.46	43.81	0.00	16.2	0.619E+01	12.55	12.16
111.06	43.84	0.00	16.2	0.618E+01	12.56	12.17
112.65	43.88	0.00	16.2	0.617E+01	12.57	12.18
114.25	43.91	0.00	16.2	0.616E+01	12.58	12.19
115.85	43.95	0.00	16.3	0.615E+01	12.59	12.20
117.44	43.98	0.00	16.3	0.614E+01	12.60	12.21
119.04	44.01	0.00	16.3	0.613E+01	12.61	12.22
120.64	44.05	0.00	16.4	0.612E+01	12.62	12.23
122.23	44.08	0.00	16.4	0.611E+01	12.63	12.24
123.83	44.11	0.00	16.4	0.610E+01	12.64	12.25
125.43	44.14	0.00	16.4	0.609E+01	12.65	12.26
127.02	44.17	0.00	16.5	0.608E+01	12.66	12.27
128.62	44.20	0.00	16.5	0.607E+01	12.67	12.28
130.22	44.23	0.00	16.5	0.606E+01	12.68	12.28
131.82	44.26	0.00	16.5	0.605E+01	12.69	12.29
133.41	44.29	0.00	16.5	0.604E+01	12.70	12.30
135.01	44.32	0.00	16.6	0.603E+01	12.71	12.31
136.61	44.35	0.00	16.6	0.603E+01	12.72	12.32
138.20	44.38	0.00	16.6	0.602E+01	12.72	12.33
139.80	44.41	0.00	16.6	0.601E+01	12.73	12.34
141.40	44.44	0.00	16.7	0.600E+01	12.74	12.35
142.99	44.47	0.00	16.7	0.599E+01	12.75	12.35
144.59	44.49	0.00	16.7	0.599E+01	12.76	12.36
146.19	44.52	0.00	16.7	0.598E+01	12.77	12.37
147.78	44.55	0.00	16.7	0.597E+01	12.77	12.38
149.38	44.57	0.00	16.8	0.596E+01	12.78	12.39
150.98	44.60	0.00	16.8	0.596E+01	12.79	12.39
152.57	44.63	0.00	16.8	0.595E+01	12.80	12.40
154.17	44.65	0.00	16.8	0.594E+01	12.81	12.41
155.77	44.68	0.00	16.9	0.593E+01	12.81	12.42
157.36	44.71	0.00	16.9	0.593E+01	12.82	12.43
158.96	44.73	0.00	16.9	0.592E+01	12.83	12.43
160.56	44.76	0.00	16.9	0.591E+01	12.84	12.44
162.15	44.78	0.00	16.9	0.590E+01	12.85	12.45
163.75	44.81	0.00	17.0	0.590E+01	12.85	12.46
165.35	44.83	0.00	17.0	0.589E+01	12.86	12.46
166.95	44.86	0.00	17.0	0.588E+01	12.87	12.47
168.54	44.88	0.00	17.0	0.588E+01	12.87	12.48
170.14	44.90	0.00	17.0	0.587E+01	12.88	12.49
171.74	44.93	0.00	17.1	0.586E+01	12.89	12.49
173.33	44.95	0.00	17.1	0.586E+01	12.90	12.50
174.93	44.98	0.00	17.1	0.585E+01	12.90	12.51
176.53	45.00	0.00	17.1	0.584E+01	12.91	12.51
178.12	45.02	0.00	17.1	0.584E+01	12.92	12.52
179.72	45.05	0.00	17.1	0.583E+01	12.92	12.53
181.32	45.07	0.00	17.2	0.582E+01	12.93	12.53
182.91	45.09	0.00	17.2	0.582E+01	12.94	12.54
184.51	45.11	0.00	17.2	0.581E+01	12.94	12.55
186.11	45.14	0.00	17.2	0.581E+01	12.95	12.56
187.70	45.16	0.00	17.2	0.580E+01	12.96	12.56
189.30	45.18	0.00	17.3	0.579E+01	12.96	12.57
190.90	45.20	0.00	17.3	0.579E+01	12.97	12.57
192.49	45.22	0.00	17.3	0.578E+01	12.98	12.58

```
 Cumulative travel time =        1203. sec

 Some concentration build-up near bank/shore due to recirculation effects.
   Find concentration and thickness values for the RECIRCULATION REGION
   at end of MOD329!

END OF MOD327: STRONGLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE
------------------------------------------------------------------------------
------------------------------------------------------------------------------
BEGIN MOD329: STRONGLY DEFLECTED PLUME WITH LEESIDE RECIRCULATION ZONE

 This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

 The near-shore RECIRCULATION REGION extends back to the discharge location:
    Concentration C within that region:        0.289E+01
    Layer thickness BV within that region:    12.98

END OF MOD329: STRONGLY DEFLECTED PLUME WITH LEESIDE RECIRCULATION ZONE
------------------------------------------------------------------------------
------------------------------------------------------------------------------
** End of NEAR-FIELD REGION (NFR) **
------------------------------------------------------------------------------

The initial plume WIDTH values in the next far-field module will be
  CORRECTED by a factor  0.65 to conserve the mass flux in the far-field!
------------------------------------------------------------------------------
BEGIN MOD341: BUOYANT AMBIENT SPREADING

 Plume is ATTACHED to RIGHT bank/shore.
   Plume width is now determined from RIGHT bank/shore.
```

```
CORMIX3 PREDICTION FILE:
3333333333333333333333333333333333333333333333333333333333333333333333333333333333333333
                    CORNELL MIXING ZONE EXPERT SYSTEM
Subsystem CORMIX3:                                          Subsystem version:
 Buoyant Surface Discharges
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:         Filterbed PA Discharge at Buffalo Bayou
 Design case:
 FILE NAME:               cormix\sim\        .cx3
 Time of Fortran run:

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =     93.00  AS    =    419.43  QA    =     57.04
 HA    =      4.51  HD    =      4.40
 UA    =     0.136 F     =     0.015 USTAR =0.5866E-02
 UW    =     5.000 UWSTAR=0.5525E-02
 Density stratified environment
 STRCND=  A         RHOAM = 1002.1000
 RHOAS =  999.2000  RHOAB = 1005.0000  RHOAEF= 1002.1000  E     =0.0000E+00

DISCHARGE PARAMETERS (metric units)
 BANK  =  RIGHT     DISTB =     15.24  Configuration:
 Rectangular channel geometry:
 B0    =     1.830 H0    =     0.380 A0    =0.6954E+00  AR    =     0.208
 SIGMA =     90.00  SLOPE =     40.00
 U0    =     1.539 Q0    =     1.070       =0.1070E+01
 RHO0  = 1002.1000  DRHO0 =0.0000E+00  GP0   =0.0000E+00
 C0    =0.1000E+03  CUNITS=  X
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES (metric units)
 Q0    =0.1070E+01  M0    =0.1646E+01  J0    =0.0000E+00
 Associated length scales (meters)
 LQ    =     0.83  LM    =  99999.00  Lm    =     9.43  Lb    =     0.00

NON-DIMENSIONAL PARAMETERS
 FR0   =  99999.00  FRCH  =  99999.00  R     =    11.31

FLOW CLASSIFICATION
 333333333333333333333333333333333333333333
 3  Flow class (CORMIX3)      =    SA1    3
 3  Applicable layer depth HS =     4.40  3
 333333333333333333333333333333333333333333

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+03  CUNITS=  X
 NTOX  =  1         CMC   =0.1000E+02  CCC   =  CSTD
 NSTD  =  1         CSTD  =0.1000E+01
 REGMZ =  1
 REGSPC=  1         XREG  =    500.00  WREG  =     0.00  AREG  =     0.00
 XINT  =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the WATER SURFACE and at center of discharge
      channel/outlet:     15.24 m  from the RIGHT bank/shore.
    X-axis points downstream
    Y-axis points to left as seen by an observer looking downstream
    Z-axis points vertically upward (in CORMIX3, all values Z = 0.00)
NSTEP =100 display intervals per module
------------------------------------------------------------------------------
------------------------------------------------------------------------------
BEGIN MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)

Profile definitions:
   BV = Gaussian 1/e (37%) vertical thickness
   BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
   S = hydrodynamic centerline dilution
   C = centerline concentration (includes reaction effects, if any)

       X        Y       Z        S       C       BV       BH
     0.20     2.44    0.00     1.0 0.100E+03   0.57     1.03
 Cumulative travel time =           2. sec

END OF MOD301: DISCHARGE MODULE (FLOW ESTABLISHMENT)
------------------------------------------------------------------------------
------------------------------------------------------------------------------
```

BEGIN MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Surface JET into a crossflow

Profile definitions:
BV = Gaussian 1/e (37%) vertical thickness
BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
0.20	2.44	0.00	1.0	0.100E+03	0.57	1.03
0.28	2.56	0.00	1.0	0.983E+02	0.58	1.04
0.36	2.68	0.00	1.0	0.967E+02	0.60	1.06
0.44	2.80	0.00	1.1	0.951E+02	0.61	1.07
0.53	2.92	0.00	1.1	0.936E+02	0.62	1.08
0.61	3.04	0.00	1.1	0.921E+02	0.64	1.10
0.69	3.16	0.00	1.1	0.907E+02	0.65	1.11
0.78	3.27	0.00	1.1	0.893E+02	0.67	1.12
0.87	3.39	0.00	1.1	0.879E+02	0.68	1.14
0.95	3.51	0.00	1.2	0.866E+02	0.69	1.15
1.04	3.63	0.00	1.2	0.854E+02	0.71	1.16
1.13	3.75	0.00	1.2	0.841E+02	0.72	1.17
1.22	3.87	0.00	1.2	0.829E+02	0.73	1.19
1.32	3.99	0.00	1.2	0.818E+02	0.75	1.20
1.41	4.11	0.00	1.2	0.806E+02	0.76	1.21
1.51	4.22	0.00	1.3	0.795E+02	0.77	1.23
1.60	4.34	0.00	1.3	0.785E+02	0.79	1.24
1.70	4.46	0.00	1.3	0.774E+02	0.80	1.25
1.80	4.58	0.00	1.3	0.764E+02	0.81	1.27
1.90	4.70	0.00	1.3	0.754E+02	0.83	1.28
2.00	4.82	0.00	1.3	0.745E+02	0.84	1.29
2.10	4.94	0.00	1.4	0.735E+02	0.85	1.31
2.20	5.06	0.00	1.4	0.726E+02	0.87	1.32
2.31	5.17	0.00	1.4	0.717E+02	0.88	1.33
2.41	5.29	0.00	1.4	0.708E+02	0.89	1.35
2.52	5.41	0.00	1.4	0.700E+02	0.91	1.36
2.63	5.53	0.00	1.4	0.692E+02	0.92	1.37
2.74	5.65	0.00	1.5	0.683E+02	0.93	1.38
2.85	5.77	0.00	1.5	0.676E+02	0.95	1.40
2.96	5.89	0.00	1.5	0.668E+02	0.96	1.41
3.07	6.01	0.00	1.5	0.660E+02	0.97	1.42
3.18	6.13	0.00	1.5	0.653E+02	0.99	1.44
3.30	6.24	0.00	1.5	0.646E+02	1.00	1.45
3.42	6.36	0.00	1.6	0.639E+02	1.01	1.46
3.53	6.48	0.00	1.6	0.632E+02	1.03	1.48
3.65	6.60	0.00	1.6	0.625E+02	1.04	1.49
3.77	6.72	0.00	1.6	0.618E+02	1.05	1.50
3.89	6.84	0.00	1.6	0.612E+02	1.07	1.52
4.01	6.96	0.00	1.7	0.605E+02	1.08	1.53
4.14	7.08	0.00	1.7	0.599E+02	1.09	1.54
4.26	7.19	0.00	1.7	0.593E+02	1.11	1.55
4.39	7.31	0.00	1.7	0.587E+02	1.12	1.57
4.51	7.43	0.00	1.7	0.581E+02	1.13	1.58
4.64	7.55	0.00	1.7	0.576E+02	1.15	1.59
4.77	7.67	0.00	1.8	0.570E+02	1.16	1.61
4.90	7.79	0.00	1.8	0.564E+02	1.17	1.62
5.03	7.91	0.00	1.8	0.559E+02	1.19	1.63
5.16	8.03	0.00	1.8	0.554E+02	1.20	1.65
5.30	8.14	0.00	1.8	0.548E+02	1.21	1.66
5.43	8.26	0.00	1.8	0.543E+02	1.23	1.67
5.57	8.38	0.00	1.9	0.538E+02	1.24	1.69
5.70	8.50	0.00	1.9	0.533E+02	1.25	1.70
5.84	8.62	0.00	1.9	0.529E+02	1.27	1.71
5.98	8.74	0.00	1.9	0.524E+02	1.28	1.73
6.12	8.86	0.00	1.9	0.519E+02	1.29	1.74
6.26	8.98	0.00	1.9	0.515E+02	1.31	1.75
6.41	9.09	0.00	2.0	0.510E+02	1.32	1.76
6.55	9.21	0.00	2.0	0.506E+02	1.33	1.78
6.70	9.33	0.00	2.0	0.501E+02	1.34	1.79
6.84	9.45	0.00	2.0	0.497E+02	1.36	1.80
6.99	9.57	0.00	2.0	0.493E+02	1.37	1.82
7.14	9.69	0.00	2.0	0.489E+02	1.38	1.83
7.29	9.81	0.00	2.1	0.485E+02	1.40	1.84
7.44	9.93	0.00	2.1	0.481E+02	1.41	1.86
7.59	10.05	0.00	2.1	0.477E+02	1.42	1.87
7.74	10.16	0.00	2.1	0.473E+02	1.44	1.88
7.90	10.28	0.00	2.1	0.469E+02	1.45	1.90
8.05	10.40	0.00	2.1	0.465E+02	1.46	1.91

8.21	10.52	0.00	2.2	0.462E+02	1.48	1.92
8.37	10.64	0.00	2.2	0.458E+02	1.49	1.94
8.53	10.76	0.00	2.2	0.454E+02	1.50	1.95
8.69	10.88	0.00	2.2	0.451E+02	1.52	1.96
8.85	11.00	0.00	2.2	0.447E+02	1.53	1.97
9.01	11.11	0.00	2.3	0.444E+02	1.54	1.99
9.18	11.23	0.00	2.3	0.441E+02	1.56	2.00
9.34	11.35	0.00	2.3	0.437E+02	1.57	2.01
9.51	11.47	0.00	2.3	0.434E+02	1.58	2.03
9.68	11.59	0.00	2.3	0.431E+02	1.60	2.04
9.85	11.71	0.00	2.3	0.428E+02	1.61	2.05
10.01	11.83	0.00	2.4	0.425E+02	1.62	2.07
10.19	11.95	0.00	2.4	0.422E+02	1.64	2.08
10.36	12.06	0.00	2.4	0.419E+02	1.65	2.09
10.53	12.18	0.00	2.4	0.416E+02	1.66	2.11
10.71	12.30	0.00	2.4	0.413E+02	1.67	2.12
10.88	12.42	0.00	2.4	0.410E+02	1.69	2.13
11.06	12.54	0.00	2.5	0.407E+02	1.70	2.14
11.24	12.66	0.00	2.5	0.404E+02	1.71	2.16
11.42	12.78	0.00	2.5	0.401E+02	1.73	2.17
11.60	12.90	0.00	2.5	0.398E+02	1.74	2.18
11.78	13.01	0.00	2.5	0.396E+02	1.75	2.20
11.96	13.13	0.00	2.5	0.393E+02	1.77	2.21
12.14	13.25	0.00	2.6	0.390E+02	1.78	2.22
12.33	13.37	0.00	2.6	0.388E+02	1.79	2.24
12.51	13.49	0.00	2.6	0.385E+02	1.81	2.25
12.70	13.61	0.00	2.6	0.383E+02	1.82	2.26
12.89	13.73	0.00	2.6	0.380E+02	1.83	2.28
13.08	13.85	0.00	2.6	0.378E+02	1.85	2.29
13.27	13.97	0.00	2.7	0.375E+02	1.86	2.30
13.46	14.08	0.00	2.7	0.373E+02	1.87	2.32
13.66	14.20	0.00	2.7	0.371E+02	1.89	2.33
13.85	14.32	0.00	2.7	0.368E+02	1.90	2.34

Cumulative travel time = 13. sec

Some concentration build-up near bank/shore due to recirculation effects.
Find concentration and thickness values for the RECIRCULATION REGION
at end of MOD329!

END OF MOD317: WEAKLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

BEGIN MOD327: STRONGLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE

Profile definitions:
BV = Gaussian 1/e (37%) vertical thickness
BH = Gaussian 1/e (37%) horizontal half-width, normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
13.85	14.32	0.00	2.7	0.368E+02	4.56	5.62
15.57	14.77	0.00	2.9	0.349E+02	4.69	5.76
17.29	14.98	0.00	2.9	0.341E+02	4.76	5.82
19.02	15.13	0.00	3.0	0.335E+02	4.80	5.86
20.74	15.25	0.00	3.0	0.331E+02	4.84	5.90
22.46	15.35	0.00	3.1	0.327E+02	4.87	5.93
24.18	15.44	0.00	3.1	0.324E+02	4.90	5.95
25.91	15.52	0.00	3.1	0.321E+02	4.92	5.98
27.63	15.60	0.00	3.1	0.318E+02	4.94	6.00
29.35	15.66	0.00	3.2	0.316E+02	4.96	6.02
31.07	15.73	0.00	3.2	0.314E+02	4.98	6.04
32.80	15.79	0.00	3.2	0.312E+02	5.00	6.06
34.52	15.84	0.00	3.2	0.310E+02	5.02	6.07
36.24	15.89	0.00	3.2	0.308E+02	5.03	6.09
37.96	15.94	0.00	3.3	0.307E+02	5.05	6.10
39.69	15.99	0.00	3.3	0.305E+02	5.06	6.12
41.41	16.04	0.00	3.3	0.303E+02	5.08	6.13
43.13	16.08	0.00	3.3	0.302E+02	5.09	6.14
44.85	16.12	0.00	3.3	0.301E+02	5.10	6.15
46.58	16.16	0.00	3.3	0.299E+02	5.11	6.17
48.30	16.20	0.00	3.4	0.298E+02	5.13	6.18
50.02	16.24	0.00	3.4	0.297E+02	5.14	6.19
51.74	16.28	0.00	3.4	0.296E+02	5.15	6.20
53.47	16.31	0.00	3.4	0.295E+02	5.16	6.21
55.19	16.35	0.00	3.4	0.294E+02	5.17	6.22
56.91	16.38	0.00	3.4	0.293E+02	5.18	6.23
58.63	16.41	0.00	3.4	0.292E+02	5.19	6.24
60.36	16.45	0.00	3.4	0.291E+02	5.20	6.25

62.08	16.48	0.00	3.5	0.290E+02	5.21	6.26
63.80	16.51	0.00	3.5	0.289E+02	5.22	6.27
65.52	16.54	0.00	3.5	0.288E+02	5.23	6.28
67.25	16.57	0.00	3.5	0.287E+02	5.24	6.29
68.97	16.60	0.00	3.5	0.286E+02	5.24	6.29
70.69	16.62	0.00	3.5	0.285E+02	5.25	6.30
72.41	16.65	0.00	3.5	0.284E+02	5.26	6.31
74.14	16.68	0.00	3.5	0.284E+02	5.27	6.32
75.86	16.70	0.00	3.5	0.283E+02	5.28	6.33
77.58	16.73	0.00	3.5	0.282E+02	5.28	6.33
79.30	16.75	0.00	3.6	0.281E+02	5.29	6.34
81.03	16.78	0.00	3.6	0.281E+02	5.30	6.35
82.75	16.80	0.00	3.6	0.280E+02	5.31	6.36
84.47	16.83	0.00	3.6	0.279E+02	5.31	6.36
86.19	16.85	0.00	3.6	0.278E+02	5.32	6.37
87.92	16.88	0.00	3.6	0.278E+02	5.33	6.38
89.64	16.90	0.00	3.6	0.277E+02	5.34	6.38
91.36	16.92	0.00	3.6	0.277E+02	5.34	6.39
93.08	16.94	0.00	3.6	0.276E+02	5.35	6.40
94.81	16.97	0.00	3.6	0.275E+02	5.36	6.40
96.53	16.99	0.00	3.6	0.275E+02	5.36	6.41
98.25	17.01	0.00	3.6	0.274E+02	5.37	6.42
99.97	17.03	0.00	3.7	0.273E+02	5.38	6.42
101.70	17.05	0.00	3.7	0.273E+02	5.38	6.43
103.42	17.07	0.00	3.7	0.272E+02	5.39	6.44
105.14	17.09	0.00	3.7	0.272E+02	5.39	6.44
106.86	17.11	0.00	3.7	0.271E+02	5.40	6.45
108.59	17.13	0.00	3.7	0.271E+02	5.41	6.45
110.31	17.15	0.00	3.7	0.270E+02	5.41	6.46
112.03	17.17	0.00	3.7	0.270E+02	5.42	6.46
113.75	17.19	0.00	3.7	0.269E+02	5.42	6.47
115.48	17.21	0.00	3.7	0.269E+02	5.43	6.48
117.20	17.23	0.00	3.7	0.268E+02	5.43	6.48
118.92	17.25	0.00	3.7	0.268E+02	5.44	6.49
120.64	17.26	0.00	3.7	0.267E+02	5.45	6.49
122.37	17.28	0.00	3.8	0.267E+02	5.45	6.50
124.09	17.30	0.00	3.8	0.266E+02	5.46	6.50
125.81	17.32	0.00	3.8	0.266E+02	5.46	6.51
127.53	17.33	0.00	3.8	0.265E+02	5.47	6.51
129.26	17.35	0.00	3.8	0.265E+02	5.47	6.52
130.98	17.37	0.00	3.8	0.264E+02	5.48	6.52
132.70	17.39	0.00	3.8	0.264E+02	5.48	6.53
134.42	17.40	0.00	3.8	0.263E+02	5.49	6.53
136.15	17.42	0.00	3.8	0.263E+02	5.49	6.54
137.87	17.44	0.00	3.8	0.262E+02	5.50	6.54
139.59	17.45	0.00	3.8	0.262E+02	5.50	6.55
141.31	17.47	0.00	3.8	0.262E+02	5.51	6.55
143.04	17.49	0.00	3.8	0.261E+02	5.51	6.56
144.76	17.50	0.00	3.8	0.261E+02	5.52	6.56
146.48	17.52	0.00	3.8	0.260E+02	5.52	6.57
148.20	17.53	0.00	3.8	0.260E+02	5.53	6.57
149.93	17.55	0.00	3.9	0.260E+02	5.53	6.58
151.65	17.56	0.00	3.9	0.259E+02	5.54	6.58
153.37	17.58	0.00	3.9	0.259E+02	5.54	6.59
155.09	17.59	0.00	3.9	0.258E+02	5.54	6.59
156.82	17.61	0.00	3.9	0.258E+02	5.55	6.59
158.54	17.62	0.00	3.9	0.258E+02	5.55	6.60
160.26	17.64	0.00	3.9	0.257E+02	5.56	6.60
161.98	17.65	0.00	3.9	0.257E+02	5.56	6.61
163.71	17.67	0.00	3.9	0.256E+02	5.57	6.61
165.43	17.68	0.00	3.9	0.256E+02	5.57	6.62
167.15	17.70	0.00	3.9	0.256E+02	5.58	6.62
168.87	17.71	0.00	3.9	0.255E+02	5.58	6.62
170.60	17.73	0.00	3.9	0.255E+02	5.58	6.63
172.32	17.74	0.00	3.9	0.255E+02	5.59	6.63
174.04	17.75	0.00	3.9	0.254E+02	5.59	6.64
175.76	17.77	0.00	3.9	0.254E+02	5.60	6.64
177.49	17.78	0.00	3.9	0.254E+02	5.60	6.65
179.21	17.79	0.00	3.9	0.253E+02	5.61	6.65
180.93	17.81	0.00	4.0	0.253E+02	5.61	6.65
182.65	17.82	0.00	4.0	0.253E+02	5.61	6.66
184.38	17.83	0.00	4.0	0.252E+02	5.62	6.66
186.10	17.85	0.00	4.0	0.252E+02	5.62	6.67

Cumulative travel time = 1280. sec

Some concentration build-up near bank/shore due to recirculation effects.
Find concentration and thickness values for the RECIRCULATION REGION
at end of MOD329!

```
END OF MOD327: STRONGLY DEFLECTED JET (3-D) WITH LEESIDE RECIRCULATION ZONE
------------------------------------------------------------------------------
------------------------------------------------------------------------------
BEGIN MOD329: STRONGLY DEFLECTED PLUME WITH LEESIDE RECIRCULATION ZONE

 This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

 The near-shore RECIRCULATION REGION extends back to the discharge location:
    Concentration C within that region:        0.126E+02
    Layer thickness BV within that region:     5.62

END OF MOD329: STRONGLY DEFLECTED PLUME WITH LEESIDE RECIRCULATION ZONE
------------------------------------------------------------------------------
------------------------------------------------------------------------------
** End of NEAR-FIELD REGION (NFR) **
------------------------------------------------------------------------------

The initial plume WIDTH values in the next far-field module will be
  CORRECTED by a factor  0.65 to conserve the mass flux in the far-field!
------------------------------------------------------------------------------
BEGIN MOD341: BUOYANT AMBIENT SPREADING

 Plume is ATTACHED to RIGHT bank/shore.
   Plume width is now determined from RIGHT bank/shore.
```

Appendix 9: USEPA R6 Validation Worksheets

EPA Region 6
Data Review and Validation Requirements
Dredged Material Disposal Evaluation

Project: Houston Ship Channel Expansion Channel Improvement - North of Morgan's Point

Project Initiation Date: 2 October 2018

Project Sampling Dates:

Begin: 2 October 2018

End: 6 October 2018

Final Report Date: 22 May 2019

Final Review Date: 22 May 2019

I certify the review in this document conforms to all applicable regulatory and project-specific requirements.

QA Officer Jennifer Anderson

Project Review

The following sections must be completed prior to field sampling or laboratory analysis:

The SAP/QAPP was prepared and submitted for approval by the Corps of Engineers District Office and EPA Region 6.

Submitted by:
Date submitted:

The SAP/QAPP was approved by the Corps of Engineers District Office and EPA Region 6.

Approved by:

Any deviations from District-approved protocols for sampling or analysis were clearly stated to the District and approved by the District office and EPA Region 6.

Laboratory Information

Use one sheet for each laboratory that will perform analytical work for this project.

Laboratory Name/Identification: CEERD-EL-EPC (ERDC)

Is lab NELAC certified? Yes/No If Yes, please supply certification number N

Can lab meet the QC requirements below as specified in the SAP/QAPP?

Yes/No	
Y	Analytical requirement
Y	Instrumentation
Y	MDL's
Y	Precision and accuracy
Y	Required turnaround time

Note below any requirements the laboratory is unable to meet:

Our subcontracted labs are NELAP certified. We consulted with each lab in advance to ensure that the objectives and limits found in the SAP could be met.

Laboratory Information

Use one sheet for each laboratory that will perform analytical work for this project.

Laboratory Name/Identification: Air Water & Soil Laboratories, Inc.

Is lab NELAC certified? (Yes)/No If Yes, please supply certification number 460021

Can lab meet the QC requirements below as specified in the SAP/QAPP?

Yes/No	
Y	Analytical requirement
Y	Instrumentation
Y	MDL's
Y	Precision and accuracy
Y	Required turnaround time

Note below any requirements the laboratory is unable to meet.

Laboratory Information

Use one sheet for each laboratory that will perform analytical work for this project.

Laboratory Name/Identification: Alpha Analytical

Is lab NELAC certified? Yes/No If Yes, please supply certification number DOD (L2474) TX (T104704419)

Can lab meet the QC requirements below as specified in the SAP/QAPP?

Yes/No	
Y	Analytical requirement
Y	Instrumentation
Y	MDL's
Y	Precision and accuracy
Y	Required turnaround time

Note below any requirements the laboratory is unable to meet.

Sample Custody

Was all required information on the chain-of-custody form:

(Yes/No)	
Y	Did chain of custody forms accompany samples to subcontract lab?
Y	Is the project identification on the chain of custody?
N	Are the analyses requested printed on the sample containers?
Y	Were all samples correctly identified?
↓	Were the analyses correctly identified on the chain of custody or an attached document listed on the chain of custody?
↓	Were sample dates and times listed on the chain of custody?
↓	Were the chains of custody signed by both the relinquisher and receiver of the samples?
N	Was the carrier identified on the chain of custody?
↓	If more than one chain of custody was needed for samples, are the chains of custody clearly numbered?
↓	Were samples packed on wet ice, with an expected receipt temperature of 4 ± 2°C?
N	Were any sample conditions or irregularities (broken bottles, improper temperature) noted on the chain of custody or accompanying paperwork?
Y	Was the chain of custody submitted as part of the report to the primary contractor?
↓	Were all requested analyses performed?
↓	Was adequate sample volume provided to the contractor lab?
↓	If any anomalous behavior of the samples was found, was it noted in the lab case narrative?

Additional sample custody issues or deficiencies:

Analytical Review Summary

Were all raw data included in the final report?

(Yes/No)

~	Prep logs
	Analytical logs
	Data reduction logs
↓	Calculations
Y	Data report
Y	QC Package

Verify that samples were prepared according to the method specified.

	10% check
Y	100% check

Verify that samples were analyzed according to the method specified.

	10% check
	100% check

Verify that data were properly transferred from run to data report.

	10% check
Y	100% check

Verify that QC was calculated and within limits and complete the QC forms provided in this package.

	10% check
Y	100% check

Additional data quality issues:

List of Acronyms

CCV	continuing calibration verification
IC	initial calibration
ICB	initial calibration blank
ICV	initial calibration verification
IS	internal standard
LCS/DLCS	laboratory control sample/duplicate laboratory control sample
LDR	linear dynamic range
LFB	laboratory fortified blank
MB	method blank
MDL	method detection limit
MN	*Macoma nasuta*
MS/MSD	matrix spike/matrix spike duplicate
NV	*Neanthes virens*
RL	reporting limit
SAP/QAPP	Sampling and Analysis Plan/Quality Assurance Project Plan
RIA	EPA Region 6 - Regional Implementation Manual
SRM	standard reference material

Work Order: 18J0402

Batches:
B18K112 (6020)
B18K187 (6020)
B18J213 (6010)
B18J233 (7474)
B18K112 (7199M)

Project Identification: ~~HSC-SMP~~ HSC-NMP
Reviewed by: Jenifer Nefelaev
Review Date: 5/21/19

Parameter: Metals (e.g. Silver, Arsenic)
List Metals Analyzed: CrVI, CrIII, Se, Sb, Ag, Ba, Be, Cd, Cr(Total), Cu, Pb, Ni, Ag, Th, Zn, Hg, Sb

Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used: USEPA 6020, 6010, 7474, 7199M

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL	N Y	B18K112-BLK1 Ag 0.192 mg/kg RL=0.1 mg/kg B18K087-BLK1 Ba 2.4 mg/kg RL=0.1 mg/kg For the rest of the batches.
MS/MSD	1 set per 20 samples or per batch	70 - 130% for spike limits 30% RSD for precision	N Y	B18K112-MSD1 Sb 54.4%. B18L042-MSD1 Cr(VI) 0.48%. RPD 97.5% B18K112-MS1 Sb 55.3%. B18L042-MSD2 Cr(VI) 23.6%. RPD B18L042-MS1 Cr(VI) 1.21%. B18L042-MS2 Cr(VI) 23.8%. For the rest of the batches
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision	N Y	B18K087-DUP1 Se-46.1%. B18K112-DUP1 Ag RPD 33.7%. For the rest of the batches
SRM	1 per 20 samples or 1 per batch up to 20 samples	70 - 130% Recovery	N Y	B18K B18J233-SRM1 Hg ~~170~~ 173%. For the rest of the batches
LCS/LFB	1 per 20 samples or 1 per batch up to 20 samples	70 - 130% Recovery	Y	For all batches

Project Identification: HSC-NMP
Reviewed by: Jennifer Nakhaev
Review Date: 5/21/19

Parameter: Metals (e.g. Silver, Arsenic)

List Metals Analyzed:

Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

ICV	Immediately following calibration curve	90 - 110% Recovery	Y	For all batches
CCV	Minimum - check calibration at middle and end of each batch or 1 per 10 analyses, whichever is greater	90 - 110% Recovery	N Y	B18K087-~~CCV1~~ CCV4 Se ~~RPD 46.1%~~ 89.1%. B18K112-CCV2 Ag 88.3%. " -CCV3 Ag 86.6%. For the rest of the batches
LDR	Verify LDR once per quarter for ICP analyses and one time for mercury analysis		Y	For ~~the rest~~ all of the batches
IC	Verify initial calibration for AA and mercury analysis performed daily	cc > 0.9950 for all calibrations	Y	For all of the batches

Project Identification: HSC-NMP
Reviewed by: Jennifer McLaren
Review Date: 5/21/19

Parameter: Metals (e.g. Silver, Arsenic)

List Metals Analyzed:

Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

MDL	Verify MDL study once per year for each analyte of interest	Updated annually	Y	For all of the batches
ICB	Immediately after initial calibration	No analyte should be detected > RL	Y	For all of the batches

Work Order: 18J0401 Site Wat~~er~~

Site Waters Batches:
B18K085 (6020)
B18J140 (7474)
B18K086 (6020)
B18K100 (7010)
B18L036 (7199M)

Elutriates Batches:
B18K085 (6020)
B18K016 (7474)
B18K101 (7010)
B18L043 (7199M)

Project Identification: HSC-NMP
Reviewed by: Jennifer Nakhaei
Review Date: 5/21/19

Parameter: Metals (e.g. Silver, Arsenic)

List Metals Analyzed: Sb, As, Ba, Be, Cd, Cr(total), Cu, Pb, Ni, Ag, Th, Zn, Cr(VI), Cr III, Hg, Se

Matrix: ☐ Sediment ☑ Water/Elutriate ☐ Tissue

Analytical Method Used: USEPA 6020, 6010, 7474, 7199M

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL	Y	For all batches
MS/MSD/MST	1 set per 20 samples or per batch	70 - 130% for spike limits	N	B18K085-M502 Zn 57.9%
		30% RSD for precision	Y	For all other batches
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision	N	~~B18K085-DUP1~~ B18K086-DUP1 Sb 72.3>RPD
			Y	For all ~~other~~ batches
SRM	1 per 20 samples or 1 per batch up to 20 samples	70 - 130% Recovery	Y	For all batches
LCS/LFB	1 per 20 samples or 1 per batch up to 20 samples	70 - 130% Recovery	Y	For all batches

Project Identification: HSC - MMP
Reviewed by: Jenifer Netcher
Review Date: 5/21/19

Parameter: Metals (e.g. Silver, Arsenic)

List Metals Analyzed:

Matrix: ☐ Sediment ☑ Water/Elutriate ☐ Tissue

Analytical Method Used: USEPA 6020, 6010, 7474

ICV	Immediately following calibration curve	90 - 110% Recovery	Y	For all batches
CCV	Minimum - check calibration at middle and end of each batch or 1 per 10 analyses, whichever is greater	90 - 110% Recovery	Y	For all batches
LDR	Verify LDR once per quarter for ICP analyses and one time for mercury analysis		Y	For all batches
IC	Verify initial calibration for AA and mercury analysis performed daily	cc > 0.9950 for all calibrations	Y	For all batches

Project Identification: HSC-NMP

Reviewed by: Jennifer Nietchaev

Review Date: 5/21/19

Parameter: Metals (e.g. Silver, Arsenic)

List Metals Analyzed: ~~USEPA~~

Matrix: ☐ Sediment ☑ Water/Elutriate ☐ Tissue

Analytical Method Used: USEPA 6020, 6010, 7474

MDL	Verify MDL study once per year for each analyte of interest	Updated annually	Y	for all batches
ICB	Immediately after initial calibration	No analyte should be detected > RL		for all batches

HN pest sed

Project Identification: Houston North

Reviewed by: Allyson Wooley

Review Date: 5/18/19

Parameter: ☑ PAHs & PCP ☒ Pesticides ☐ PCBs

Matrix: ☒ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used: 8081 18J0402 ~~B18K~~ B18J145 18K0025

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL	Y	
MS/MSD/MST BS, BSD	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision	N	endrin aldehyde: BS1 25.4%, BSD1 42.3%, rpd = 50 endosulfan II: MS1 22.6%, MSD1 22.7% b BHC: unable to quantify due to interference peaks
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision	~~Y~~ N	44 DDE: rpd 47.1
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider	Y	
ICV	Immediately following calibration curve	80 - 120% Recovery	N	Toxaphene ICV pattern does not match pattern of cal stds, no usable data
CCV	At the beginning of every 12 hours of analysis	<15% Difference	N	See next page

Project Identification: Houston North

Reviewed by: Allyson Wooley

Review Date: 5/18/19

Parameter: ☑ PAHs & PCP ☒ Pesticides ☐ PCBs

Matrix: ☒ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used: 8081

Surrogates	Every sample	30 - 150%	N	pcb 198: 159% 18J0402-02
Internal Standard	Every sample	30 - 150%	NA	
IC	Verify after each initial calibration	<20% RSD for each analyte	Y	
MDL	Verify MDL study once per year for each analyte of interest	Updated annually	Y	
ICB	Immediately after initial calibration	No analyte should be detected > RL	Y	

CCV 3: 44DDT 117%
aBHC 120%
dBHC 121%
dieldrin 117%
endosulfan I 117%
endosulf sulfate 116%
endrin 121%
gBHC 121%
g chlordane 116%
heptachlor 119%

CCV6: endosulfan I 117%

CCV8: aBHC 120%
achlordane 118%
dBHC 118%
dieldrin 116%
endosulfan I 126%
gBHC 123%
t nonachlor 118%

Project Identification: Houston North

Reviewed by: Allyson Wooley

Review Date: 5/18/19

Parameter: ☑ PAHs & PCP ☒ Pesticides ☐ PCBs

Matrix: ☑ Sediment ☒ Water/Elutriate ☐ Tissue

Analytical Method Used: 8081 18J0401 18J0403 B18J159, B18J226 18K0002

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL	Y	
MS/MSD/MST	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision	Y	
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision	Y	
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider	N	
ICV	Immediately following calibration curve	80 - 120% Recovery	N	dBHC 127%. No toxaphene ICV, pattern of 2nd source standard did not match pattern of calibration stds.
CCV	At the beginning of every 12 hours of analysis	<15% Difference	N	CCV7: 44DDT 83.3%, oxychlordane 82.9%.

Project Identification: Houston North

Reviewed by: Allyson Wooley

Review Date: 5/18/19

Parameter: ☑ PAHs & PCP ☒ Pesticides ☐ PCBs

Matrix: ☑ Sediment ☒ Water/Elutriate ☐ Tissue

Analytical Method Used:

Surrogates	Every sample	30 - 150%	Y	
Internal Standard	Every sample	30 - 150%	NA	
IC	Verify after each initial calibration	<20% RSD for each analyte	Y	
MDL	Verify MDL study once per year for each analyte of interest	Updated annually	Y	
ICB	Immediately after initial calibration	No analyte should be detected > RL	Y	

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Project Identification: Houston North

Reviewed by: Allyson Wooley

Review Date: 5/18/19

Parameter: ☑ PAHs & PCP ☐ Pesticides ☒ PCBs

Matrix: ☒ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used: 8082 18J0402

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL	Y	
MS/MSD/~~MST~~ BS, BSD	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision	N	pcb 18, 44, 52 not determined, sample concentration greater than spike concentration for ms/msd ms3: pcb 28 @ 47.7%.
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision	N	dup1 - pcb 28 rpd 52.2
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider	Y	
ICV	Immediately following calibration curve	80 - 120% Recovery	Y	
CCV	At the beginning of every 12 hours of analysis	<15% Difference	N	2456TMX: ccv8 122%, ccvJ 142%, ccvI 119% pcb8: ccvJ 114%.

Project Identification: Houston North

Reviewed by: Allyson Wooley

Review Date: 5/18/19

Parameter: ☑ PAHs & PCP ☐ Pesticides ☒ PCBs

Matrix: ☒ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used: 8082 18J0402 B18J145 18K0025

Surrogates	Every sample	30 - 150%	N	2456TMX: BS3 14%, BSD3 10%.
Internal Standard	Every sample	30 - 150%	NA	
IC	Verify after each initial calibration	<20% RSD for each analyte	Y	
MDL	Verify MDL study once per year for each analyte of interest	Updated annually	Y	
ICB	Immediately after initial calibration	No analyte should be detected > RL	Y	

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Project Identification: Houston North
Reviewed by: Allyson Wooley
Review Date: 5/18/19

Parameter: ☑ PAHs & PCP ☐ Pesticides ☒ PCBs
Matrix: ☑ Sediment ☒ Water/Elutriate ☐ Tissue

Analytical Method Used: 8082 18J0403 18J0401

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL	Y	
MS/MSD~~/MST~~ BS, BSD	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision	Y	
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision	Y	
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider	N/A	not available
ICV	Immediately following calibration curve	80 - 120% Recovery	Y	
CCV	At the beginning of every 12 hours of analysis	<15% Difference	Y	

Project Identification: Houston North

Reviewed by: Allyson Wooley

Review Date: 5/18/19

Parameter: ☑ PAHs & PCP ☐ Pesticides ☒ PCBs

Matrix: ☑ Sediment ☒ Water/Elutriate ☐ Tissue

Analytical Method Used:

Surrogates	Every sample	30 - 150%	N	pcb 198: BS3 28.9%
Internal Standard	Every sample	30 - 150%	NA	
IC	Verify after each initial calibration	<20% RSD for each analyte	Y	
MDL	Verify MDL study once per year for each analyte of interest	Updated annually	Y	
ICB	Immediately after initial calibration	No analyte should be detected > RL	Y	

Work order: 18J0402

Batches:
WG1167101 (8270 SIM)
WG1167103 (8270-PCP)

Project Identification: HSC-NMP
Reviewed by: Jenifer Nakahara
Review Date: 5/21/19

Parameter: ☑ PAHs & PCP ☐ Pesticides ☐ PCBs
Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL	Y	
MS/MSD/MST	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision	N Y	WG1167101-4 MS naphthalene 46%. For the another batch
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RSD for precision	N	Duplicate was performed on the matrix spike
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider	N	replaced with LCS
ICV	Immediately following calibration curve	80 - 120% Recovery	Y	
CCV	At the beginning of every 12 hours of analysis	<15% Difference	Y	

Project Identification: HSC-NMP
Reviewed by: Jennifer Nothaer
Review Date: 5/21/19

Parameter: ☑ PAHs & PCP ☐ Pesticides ☐ PCBs
Matrix: ☑ Sediment ☐ Water/Elutriate ☐ Tissue

Analytical Method Used:

Surrogates	Every sample	30 - 150%	Y	
Internal Standard	Every sample	30 - 150%	Y	
IC	Verify after each initial calibration	<20% RSD for each analyte	Y	
MDL	Verify MDL study once per year for each analyte of interest	Updated annually	Y	
ICB	Immediately after initial calibration	No analyte should be detected > RL	Y	

Work Orders: 18J0401 Site Water
18J0403 Elutriate

Project Identification: HSC-NMP
Reviewed by: Jenifer Nettheim
Review Date: 5/21/19

Site Water Batches:
WG1167814 (8270-PCP)
WG1173490 (8270-PCP)
WG1167722 (PAH SIM)
WG1173002 (PAH SIM)

Elutriate Batches:
WG1175682 (8270-PCP)
WG1175786 (PAH SIM)

Parameter: ☑ PAHs & PCP ☐ Pesticides ☐ PCBs
Matrix: ☐ Sediment ☑ Water/Elutriate ☐ Tissue

Analytical Method Used:

QC Measurement	Frequency	Acceptance Criteria	Criteria Met (Y/N)	Review Comments
MB	1 per 20 samples or 1 per batch up to 20 samples	No analyte should be detected > RL	Y	
MS/MSD/MST	1 set per 20 samples or per batch	50 - 150% for spike limits 30% for precision	Y N	~~WG1175786-4 Acenaphthene 36%.~~ For all other batches WG1175786-4 Acenaphthene 36%. MS/MSD was not performed for PCP
Duplicate	1 per 20 samples or 1 per batch up to 20 samples	30% RPD for precision	N	
SRM	1 per 20 samples or 1 per batch up to 20 samples	Within limits specified by provider	N	replaced with LCS
ICV	Immediately following calibration curve	80 - 120% Recovery	Y	
CCV	At the beginning of every 12 hours of analysis	<15% Difference	Y	

Project Identification:

Reviewed by:

Review Date:

Parameter: ☑ PAHs & PCP ☐ Pesticides ☐ PCBs
Matrix: ☐ Sediment ☑ Water/Elutriate ☐ Tissue

Analytical Method Used:

Surrogates	Every sample	30 - 150%	N	WG117349O-1 PCP surrogate (phenol-d5) 23%. WG117349O-2 PCP surrogate (phenol-d5) 24%. WG116781 4-3 PCP surrogate (phenol-d5) 28%. 1870401-01,-03,-04,-05,-06,-07,-08,-09,-10,-11,-13,-14,-15 phenol-d5 22%, 18%, 12%, 18%, 18%, 15%, 12%, 18%, 19%. 1870401-15 phenol-d5 16%.
Internal Standard	Every sample	30 - 150%	Y	
IC	Verify after each initial calibration	<20% RSD for each analyte	Y	
MDL	Verify MDL study once per year for each analyte of interest	Updated annually	Y	
ICB	Immediately after initial calibration	No analyte should be detected > RL	Y	

WG117349O-02 phenol-d5 28%. 1870403-08 phenol-d5 25%. 1870403-12 phenol-d5 26%.
" -03 " 22%. " -09 " 24%.
" -06 " 29%. " -10 " 26%.
" -07 " 26%. " -11 " 23%.