# Sampling and Analysis Plan – Private Dredging
# USACE Galveston District

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## 1.0 OBJECTIVES

The objectives of this maintenance dredging application and testing are:

a) Collect sediment samples which adequately characterize the project dredged materials for maintenance dredging project as described below in Section 2;
b) Analyze the dredged material samples chemically and physically in order to provide information to determine if the sediments are contaminated;
c) Document the field sampling and results of physical and chemical analyses and quality control measures;
d) Collect sufficient data to determine whether unacceptable adverse impacts would result from dredging and dredged material placement operations (upland placement or open water).

## 2.0 OVERVIEW

For all third party dredging projects:

a) The entire costs of testing, evaluation, and reporting under these guidelines will be paid for by the applicant and should be conducted by qualified firms;
b) The applicant will provide information regarding the volume of dredged material, dredging and disposal methods, scale drawings indicating the dredging location(s), disposal area(s), and sample locations;
c) Dredged material samples shall be selected to be representative of dredge footprint materials;
d) Coordination and review of the dredging project approach by the Galveston District is strongly recommended before plans are implemented.

## 3.0 APPROACH

Site water and sediment samples will be collected from the Applicant's dredge site for the purpose of conducting testing to characterize the material that will be excavated during the maintenance dredging project. Sampling locations will be selected such that the sediment collection locations are evenly distributed over the dredge footprint, with bias towards areas of highest usage and activity. Testing requirements will depend upon the history of the site, the surrounding area, past dredging information and the placement options desired by the applicant. Data needed for the evaluation will consist of chemical analyses of sediment, water, and elutriate samples. Collection of the physical parameters required includes grain-size analyses, percent solids, pH, temperature, and salinity. In limited instances, bioassays such as toxicity, survival and bioaccumulation would be needed to determine suitability of material prior to placement. The applicant is responsible for contacting the US Army Corps of Engineers, Galveston District (Galveston District) to determine whether or not special requirements exist for your project area and if modifications to this testing protocol are required.

Previously constructed projects that require dredging to previously authorized depths will be classified as maintenance projects as opposed to virgin cuts that would be classified as new work projects. However, if a lengthy time has passed between dredging events or a substantial amount of material has accumulated, a more stringent protocol for testing may be required to adequately assess the material to be removed. An example would include a basin that has been abandoned for 20 years. The Galveston District reserves the right to determine the appropriate protocol to be utilized based on the site conditions.

Sampling of dredged material will be required prior to the start of every dredging event. Data will be valid for a two-year period from the time of sampling.

The applicant is directed to four primary resource documents for background:

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

## 4.0 SAMPLE COLLECTION

### 4.1 Overview

All sample collections and chemical analyses will be conducted according to appropriate existing standard procedures. The following sections provide a synoptic overview of factors to consider during sample collection. The Applicant should consult with their analytical provider to ensure sufficient sample volumes are collected to meet both project and quality control requirements (Section 5.2 (d) and (g)).

### 4.2 Sample Sites

Sample collection must be accomplished by qualified personnel at the agreed upon locations that have been selected to be spatially representative of the material to be dredged. Samples will be taken at representative locations; locations will be selected such that the sediment collection locations are evenly distributed over the dredge footprint, with bias towards portion areas of highest usage and activity. To ensure that representative maintenance dredged materials are sampled, sample locations where depths are already at or below project depth will not be selected. Recent bathymetry survey data (collected within the last 2 years) should be utilized in choosing sample locations.

Sampling frequency and sampling technique will be determined by the volume of dredged material. For projects with volumes up to and including 30,000 cubic yards (CY), a minimum of three (3) ponar grab samples, one (1) surface water and one (1) elutriate sample will be collected. For larger volume projects (>30,000 CY) an additional one (1) grab sample will be collected for every 20,000 for a minimum of 4 grabs, 2 surface water and 2 elutriate. Projects larger than 100,000 CY will be dealt with on a case-by-case basis and may require coordination with the USACE to determine the most appropriate sample frequency. Composite samples are ONLY acceptable at individual sample locations if multiple grabs are required to obtain sufficient volume. Debris will be discarded from the sample but will be done in such a manner as to not compromise or change the nature of the sample so that it remains representative of the location. All appropriate sample disposal methods should be used while sampling.

The applicant must know in advance of field collection what samples and what volumes or depths of

samples are to be collected. The applicant is directed to contact their analytical provider to ensure that sufficient sample volumes are collected for both project samples and field QC (see Section 5.2 (d) and (g)). Compliance with these procedures shall be documented in the field. If the samples cannot be collected at the specified location, the position will be adjusted the least amount possible, to meet all requirements. Satellite positions of each collection site will be recorded and reported on the field data sheets.

Table 1 provides a generic example of how to summarize proposed sampling:

a) Each sample will be assigned a unique identifier;
b) Each sample will have precise GPS coordinates recorded;
c) Environmental media (surface water, sediment) to be collected at each location will be indicated;
d) Nature of the sample (e.g. composited because grabs were required to obtain sufficient volume or not composited) will be indicated;
e) Tests and analyses to be run for each sample will be indicated;

Figures 1A and 1B provide examples of dredge footprints with sampling locations. The figure must clearly indicate the area to be dredged and the sample locations within this area so that sample representativeness can be evaluated. Figure 1A shows a reach, while Figure 1B shows a basin and bank removal. For bank removal or smaller areas, hatching must be added as on overlay layer so that the distribution of the sampling locations over the proposed dredging footprint can be seen. Samples and analyses must be representative of the dredge area both chemically and spatially and be consistent with surrounding land use history and site usage history.

### 4.3 Water Samples

Prior to sample collection, all containers and sampling equipment will be cleaned according to protocols described in Plumb (1981), or other appropriate guidance manuals cited in Section 4.1. Care must be taken to avoid contamination to sampling devices from the boat deck, or other surfaces. Powderless latex or nitrile gloves shall be worn during sample collection and sample handling.

Water samples are to be collected using a suitable non-contaminating pump, such as a metal-free bilge pump. Food-grade hoses, dedicated on a per sample basis, will also be used. The initial pumped water equaling AT LEAST FIVE TIMES THE HOSE VOLUME will be discarded. It is recommended that water be collected from the approximate middle of the water column. The water sample will then be collected into laboratory supplied pre-cleaned bottles. Polyethylene or glass bottles with appropriate acid preservatives will be used for metals analyses. Also, water samples to be analyzed for metals, other than mercury and selenium, will be filtered through a clean 0.45µm filter prior to dispensing into containers with acid preservatives. TPH water samples that are to be analyzed by TCEQ Method 1005 may also be filtered through a clean 0.45 µm filter prior to dispensing into containers with appropriate preservatives. Water samples to be analyzed for mercury and selenium only must not be filtered AT ALL prior to dispensing into containers with acid preservatives. Pre-cleaned brown glass bottles will be used for organics analyses. Bottles will be filled completely, avoiding the presence of any air bubbles in the sample bottle.

Field data will be described as collected at the time of sampling, including but not limited to: date, time, water depth, station (or sample) name and GPS coordinates.

For sites with dredged material volume less than 30,000 CY, one (1) site water sample will be collected. For larger sites, one (1) water samples will be collected for every additional 20,000 CY, with a minimum of 2. Water samples will also undergo chemical analysis and will be compared to the elutriate data.

### 4.4 Sediment Samples

Prior to sample collection, all containers and sampling equipment will be cleaned according to protocols described in Plumb (1981), or other appropriate guidance manuals cited in Section 4.1. Care must be taken to avoid contamination to sampling devices from the boat deck, or other surfaces. Powderless latex or nitrile gloves should be worn during sample collection and sample handling. Sediment samples will be collected by ponar, core, or dredge, as determined by the depth of material to be dredged and approved by Galveston District.

Effort will be made to sample "least contaminated" material first in order to minimize cross contamination of samples by sampling equipment. Equipment must be cleaned (decontaminated) between sample locations to minimize cross contamination possibilities. Direct body contact with the samples will be avoided.

At each sample station, the water depth to the top of sediment will be determined. This may be done using a fathometer, lead line, or other depth-measuring device. Depths recorded must be corrected to MLT or applicable local datum either through the use of a tide gauge or tide table.

Prior to collection at each sample site, the ponar shall be rinsed with deionized water, then ambient water. The sample shall then be collected and deposited into a clean stainless steel pan. The sediment sample will be characterized. If multiple grabs are required at an individual sampling location to obtain sufficient volume, the individual grabs for that location (and only that location) will be composited and mixed thoroughly to homogenize prior to subsampling. Site-wide composition of samples is not permitted without presentation of and concurrence with a technically defensible rationale by the USACE in advance of sampling.

Using clean stainless steel equipment, the sample that is to undergo chemical analyses will be homogenized (i.e. mixed thoroughly) and then placed into a laboratory provided pre-cleaned glass jar with preservatives, if required for the type of analysis. The jar is to be completely filled so as to avoid head space. The lid will be tightly secured, and the sample jar placed into an ice chest, containing sufficient cushioning material to prevent breakage.

Field data will be described at the time of sampling and will include but not be limited to: date, time, water depth adjusted to MLT, sample appearance, odor, stratification, texture, salinity, water temperature, pH, GPS coordinates (easting/northing), and photos.

For projects with volumes up to and including 30,000 cubic yards (CY), a minimum of three (3) grab samples will be collected. For larger volume projects (>30,000 CY) an additional one (1) grab sample will be collected for every 20,000 CY for a minimum of 4 grabs. Composite samples are ONLY acceptable at individual sample locations if multiple grabs are required to obtain sufficient volume.

Debris will be discarded from the sample but will be done in such a manner as to not compromise or change the nature of the sample so that it remains representative of the location.

Sediment from all the samples collected will be homogenized into one representative sample to be used as the sediment for the elutriate test. **The applicant is strongly advised to contact their analytical provider to confirm sample volume requirements are met for all analyses**.

#### 4.4.1 Bulk Samples

No samples will be taken from areas already at or below project depth. All samples will be retrieved and examined for appearance, odor, horizons etc. Multiple samples may need to be taken at an individual sampling location to obtain sufficient volume; should this circumstance arise, samples will be taken and composited until sufficient sample volume for all analyses has been retrieved. The sample will be thoroughly mixed so as to be homogenized before material for individual analyses is taken.

#### 4.4.2 Elutriate

For projects up to and including 30,000 CY, one standard elutriate test will be performed for the site. For projects greater than 30,000 CY, one additional elutriate sample will be collected for each additional 20,000 CY or part thereof. Site water will be collected to facilitate the mixing for this test.

#### 4.4.3 Bioassay Samples

If water quality standards are exceeded in the elutriate sample(s), toxicity testing may be required.

### 4.5 Sample Preservation and Storage

A suitable method for preservation and shipment of water and sediment samples must be used and documented. USEPA SW-846 provides guidance as do the references cited in Section 4.1. Immediately after collection, the samples must be stored at 2°C to 4°C, never frozen. Analyses are to be performed within the recommended holding times, as described in the referenced guidance documents. The applicant should verify and confirm all sample handling, storage and preservation requirements with the analytical facility performing their project analyses. Table 2 summarizes recommended procedures for sample collection, preservation and storage.

### 4.6 Chain of Custody

Appropriate Chain of Custody protocols will be followed. Guidance can be found in the references cited in Section 4.1 as well as Plumb (1981). Applicants shall discuss chain of custody forms with the analytical facility performing their project analyses.

## 5.0 ANALYSES

### 5.1 Physical and Chemical Analyses

Each of the samples shall undergo the analyses agreed upon with Galveston District; these samples would at a minimum be 3 bulk sediment, 3 grain-size, 1 water and 1 elutriate sample with the potential for bioassays, if required. All analyses must be performed within the holding period described in the referenced guidance documents and outlined in Section 3.5 (see also Table 2). Sediment sample data will be reported as dry weight.

All chemical analyses shall be performed by a qualified laboratory (NELAP or similar accreditation).

In order to simplify and streamline the application process, COCs have been divided into two categories: (1) common COC and parameters and (2) special land use/history COCs and parameters. It is the expectation of the Galveston District that most third party dredging applicants will fall into the first category; however, justification such as previous dredging analyses results, land use etc. must be provided to support the contention that the special list of analytes does not apply to your application. Common COCs and parameters to be analyzed in each medium (surface water/elutriate, sediment, soil) along with target detection limits (TDLs) and/or screening criteria/benchmarks are listed in Tables 3 through 6; Tables 7 through 10 present similar information for special land use/history COCs and parameters.

The applicant will discuss which analytical method will achieve the required target detection limits with the laboratory responsible for performing their analyses and must document and justify the analytical method utilized in the testing report produced for this project. Tables 3 through 10 provide suggested methods but any analytical method performed by a laboratory accredited by an accrediting authority recognized by the National Environmental Laboratory Accreditation Program (NELAP) is acceptable, provided the TDLs are less than the most stringent criteria.

For chlorinated pesticides in water, USACE recognizes that the listed TDLs may be difficult to reach; however, the applicant and their analytical provider must attempt to meet them. If in spite of best efforts, minor exceedances of these TDLs are noted for analytes in either surface water or elutriate analyses, USACE SWG will initiate a more detailed review of chlorinated pesticide sediment data before making a final decision on the suitability of the sediment for placement. Additional details regarding the use of screening benchmarks can be found below in Section 5.3, as well as the Galveston District's Private Marine Dredging Application Report Outline Guidance document.

### 5.2 Laboratory Quality Control

The Laboratory Quality Control program must include, but not be limited to:

a) Accreditation Status - The laboratory shall have current accreditation status, consistent with standards adopted by the National Environmental Laboratory Accreditation Conference (NELAC);
b) Method Blanks - Shall be performed at a frequency of one per batch of samples, per matrix type, per sample extraction or preparation method;
c) 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;
d) Matrix Spikes – Shall be performed 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;
e) Matrix Spike Duplicates – Shall be analyzed at a minimum of 1 in 20 samples per matrix type, per sample extraction or preparation method;
f) 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;
g) Field Equipment Blanks – Analysis shall be performed at a frequency of one per batch of samples collected;
h) Instrumentation - Calibration of instrumentation and performance of periodic instrument checks shall be made according to manufacturer and EPA recommendations, and appropriate SOPs;
i) Performance Evaluations - Participation in performance evaluation and method studies available from EPA, 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;
j) Test Substance Purity - Each new shipment or lot of solvent, reagent or adsorbent will be evaluated for purity in accordance with appropriate SOPs;
k) Standards - Standards will be prepared and verified in accordance with appropriate SOPs;
l) QC limits and Controls - Calculation of QC limits and preparation of control charts will be performed in accordance with appropriate SOPs;
m) 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.

### 5.3 Chemical Testing and Screening of Data

The applicant should check with their analytical provider to ensure that the methods and/or detection limits can be met. The analytical data from dredging must be evaluated for potential impacts to aquatic

receptors by screening surface water, elutriate and sediment. Once removed from an aquatic environment, sediment is considered to be soil and must be screened against risk-based soil screening benchmarks for possible future uses and exposures to both human and terrestrial ecological receptors. The applicant must ensure that the analytical method is able to achieve the sensitivity necessary to pass the most stringent of the criteria for each analyte. Additional information on screening analytical data can be found in the US ACE Galveston District's report writing guidance document for third party dredging.

In order to simplify and streamline the application process, COCs have been divided into two categories: (1) common COC and parameters and (2) special land use/history COCs and parameters. It is the expectation of the Galveston District that most third party dredging applicants will fall into the first category, however, justification must be provided to support this.

### 5.3.1 Chemical Testing and Screening – Common COCs and Parameters

Common COCs and parameters to be analyzed in each medium (surface water/elutriate, sediment, soil) along with target detection limits (TDLs) are listed in Tables 3 through 6. When more than one screening benchmark is presented in the table, the order of criteria selection (highest priority to lowest priority) should be:

a) Surface water and elutriate (Table 3): (1) TSWQS (marine – acute); (2) US EPA WQS (marine – acute); (3) NOAA (marine – acute); and (4) US EPA Region 6.
b) Sediment (Table 4): (1) NOAA (marine ER-L); and (2) US EPA R6 (marine).
c) Soil – Human (Table 5): TCEQ-TRRP.
d) Soil – Ecological (terrestrial) (Table 6): (1) TCEQ; and (2) US EPA EcoSSLs.

### 5.3.2 Chemical Testing and Screening - Special Land Use/History COCs and Parameters

In some instances, additional analyses will be required because of historical releases, surrounding land use history (industries such as shipyard fabrication and scrap metal operations), recent releases, land use changes, and/or flow conditions (example slackwater channel). Special land use/history COCs and parameters along with TDLs and/or screening criteria/benchmarks are listed in Tables 7 through 10. Screening criteria prioritization is the same as noted above in Section 5.3.1.

Failure to screen below criteria and benchmarks does not automatically mean that placement of dredged sediments will be denied; however, should exceedances of criteria occur, further evaluation, such as bioassays maybe required. Additional guidance on this is provided in the report writing guidance document.

## 6.0 DELIVERABLES

Deliverables shall include both hard copy and electronic versions of reports and data as outlined below.

A report compliant with the "Private Dredging Report Outline" provided by Galveston District shall be submitted at completion of the dredge material characterization. The report will include a description of the proposed project, sampling procedures, testing, evaluations of field observations and chemical analytical data and the conclusions reached. Submittal requirements include:

- One hard copy of the report and all accompanying figures and tables;
- One PDF electronic copy of the report and all accompanying figures and tables;
- PDF files of all laboratory reports for chemical and physical analyses/characterization;
- Laboratory Electronic Data Deliverables (EDDs) in Excel format ONLY.

## 7.0 REFERENCES

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