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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 5 of 6: Appendix 7, Tier III Biological Testing Report)

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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

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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

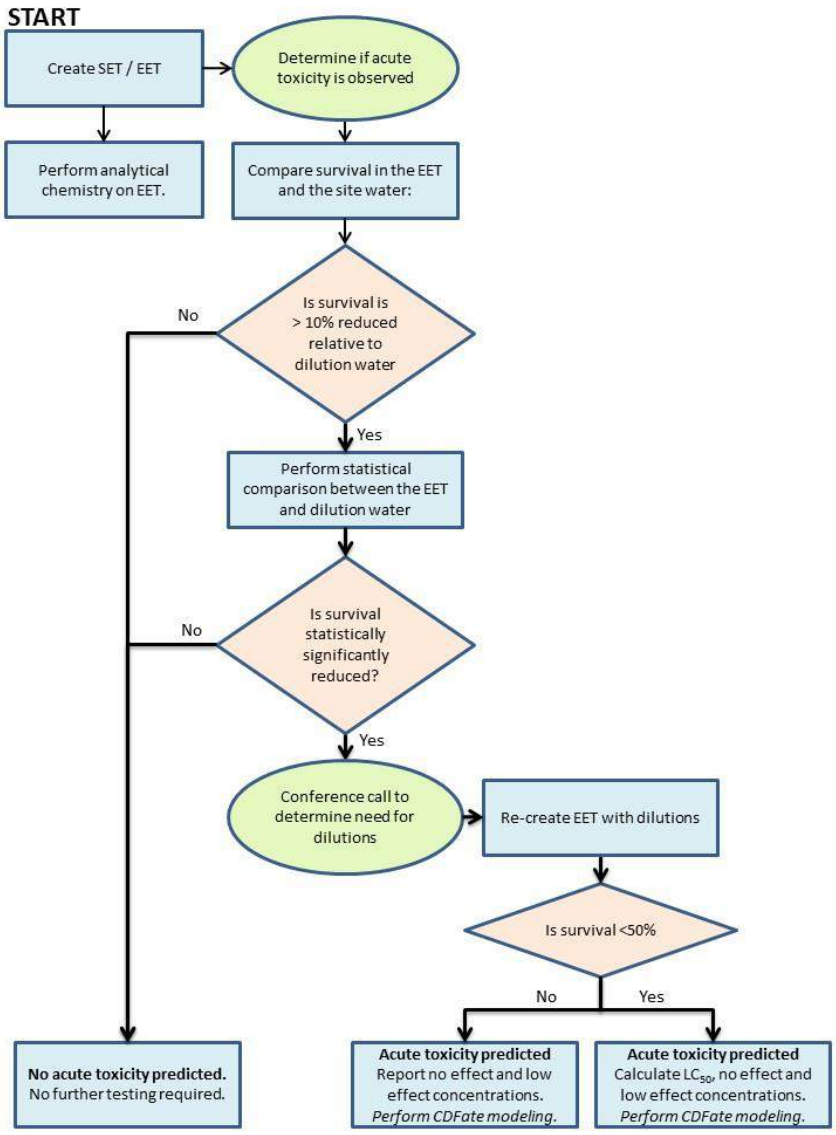
Water quality during bioassay testing was measured using either a Yellow Springs Instruments (YSI) Model 556 multiprobe system (Yellow Springs, OH) or a Thermo Scientific Orion Star™ A329 (Thermo Orion Electron Corp., Beverly, MA) for temperature, salinity, pH, and Dissolved Oxygen (D.O.). Total ammonia-N 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

Boardman GD, Starbuck SM, Hudgins DB, Li X, Kuhn DD. 2004. Toxicity of ammonia to three marine fish and three marine invertebrates. *Environmental Toxicology* 19:134-142.

Kennedy AJ, Lotufo GR, Steevens JA. 2015. Review of Dredging Elutriate Application Factors: Relevance to Acute-to-Chronic Protection, Contaminant, and Endpoint Specificity," ERDC/EL TR-15-10, U.S. Army Engineer Research and Development Center, Vicksburg, MS. http://el.erdc.usace.army.mil/elpubs/pdf/trel15-10.pdf.

Li X. 1997. The toxicity of ammonia to Atlantic silverside (*Menidia menidia*) and ghost shrimp (*Palaemonetes pugio*). M.S. Thesis, Virginia Tech.

Melby N, Kennedy AJ, Farrar JD, Bednar AJ, Moore D, Lehmann W. 2018. Toxicity reduction (and identification) for dredging evaluations: methods for sediment elutriate bioassays. TN-DOER-R26. U.S. Army Research and Development Center, Vicksburg, MS. https://usace.contentdm.oclc.org/digital/collection/p266001coll1/id/7860/

Miller DC, Poucher S, Cardin JA, Hansen D. 1990. The acute and chronic toxicity of ammonia to marine fish and a mysid. *Archives of Environmental Contamination and Toxicology* 19:40-48.

US Environmental Protection Agency (US EPA). 1999. *1999 update of ambient water quality criteria for ammonia*. EPA/822/R-99/014. US Environmental Protection Agency, Washington, DC.

US Environmental Protection Agency (EPA). 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, 4th edition. EPA-821-R-02-012, Office of Water, Washington, D.C.

US Environmental Protection Agency (US EPA). 2009. *Draft 2009 update: Aquatic life ambient water quality criteria for ammonia – freshwater*. EPA/822/D-09/0001. US Environmental Protection Agency, Washington, DC.

US Environmental Protection Agency (US EPA)/Army Corps of Engineers (ACE), 1998. Evaluation of Material Proposed for Discharge to Waters of the US –Testing Manual (Inland Testing Manual). EPA/823/B-98/004. US Environmental Protection Agency, Washington, DC.

US Environmental Protection Agency (US EPA)/Army Corps of Engineers (ACE), 2003. Regional Implementation Agreement for Testing and Reporting Requirements for Ocean Disposal if Dredged Material Off the Louisiana and Texas Coasts Under Section 103 of the Marine Protection, Research and Sanctuaries Act.

US Army Corps of Engineers (USACE). 2003. Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities – Testing Manual. ERDC/EL TR-03-1, U.S. Army Engineer Research and Development Center, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199. http://www.dtic.mil/docs/citations/ADA422448

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 clay; strong PAH odor
" 2of3 CTA	2	
" 3of3 CTA	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	E 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-09A	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- 02 A	2 gallons	
HSCNew-NMP 02 C	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: 607		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 04C	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; bleach 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													

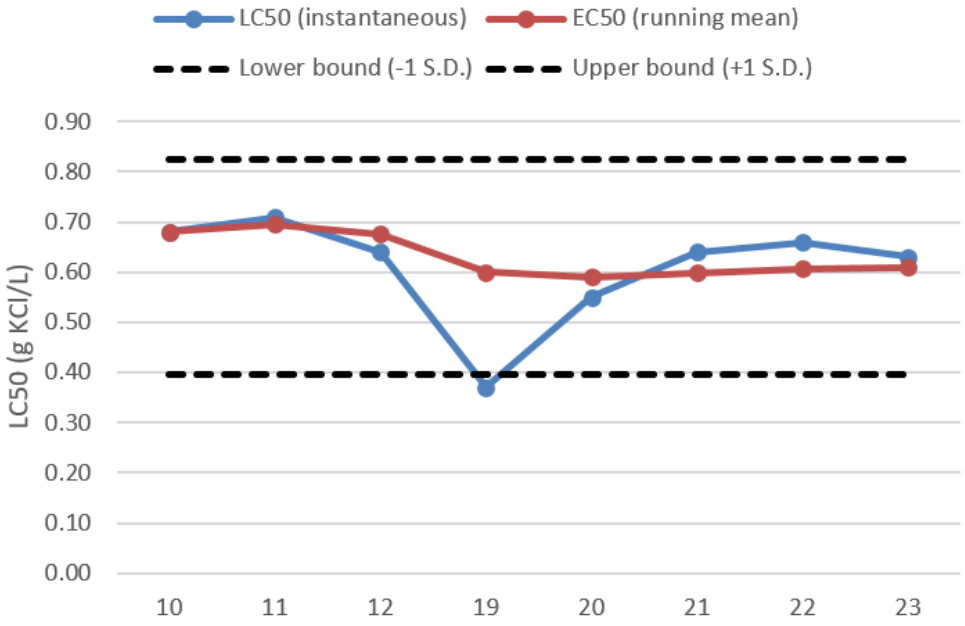
Conc-gm/L	1	2	3
Control	1.0000	1.0000	1.0000
0.0625	1.0000	1.0000	1.0000
0.125	1.0000	0.8000	1.0000
0.25	1.0000	1.0000	1.0000
0.5	0.9000	0.8000	0.9000
1	0.0000	0.0000	0.0000

			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



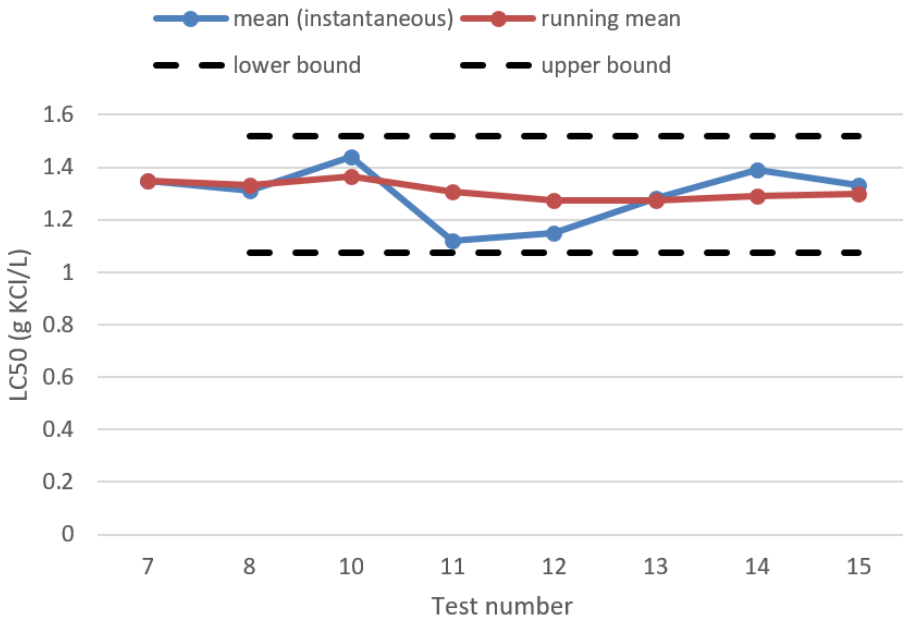
5.3.2 Menidia beryllina

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

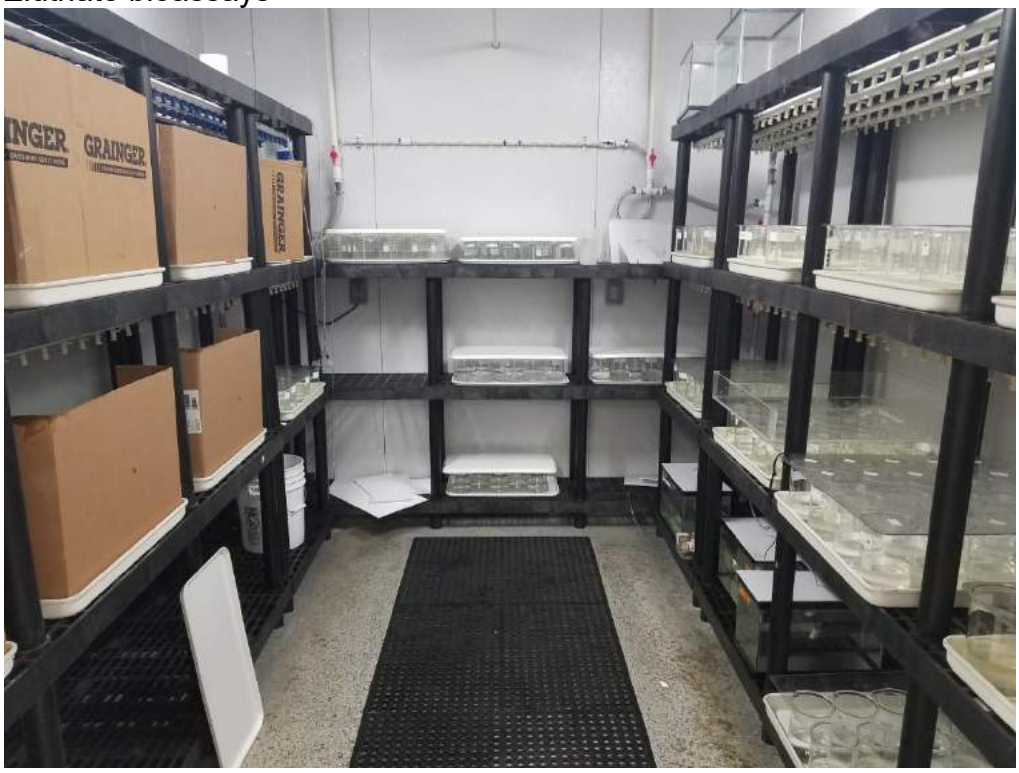
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.821144	0.868	-1.07553	-0.10824
Bartlett's Test indicates equal variances (p = 0.63)	1.743436	11.34487		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	50	100	70.71068	2

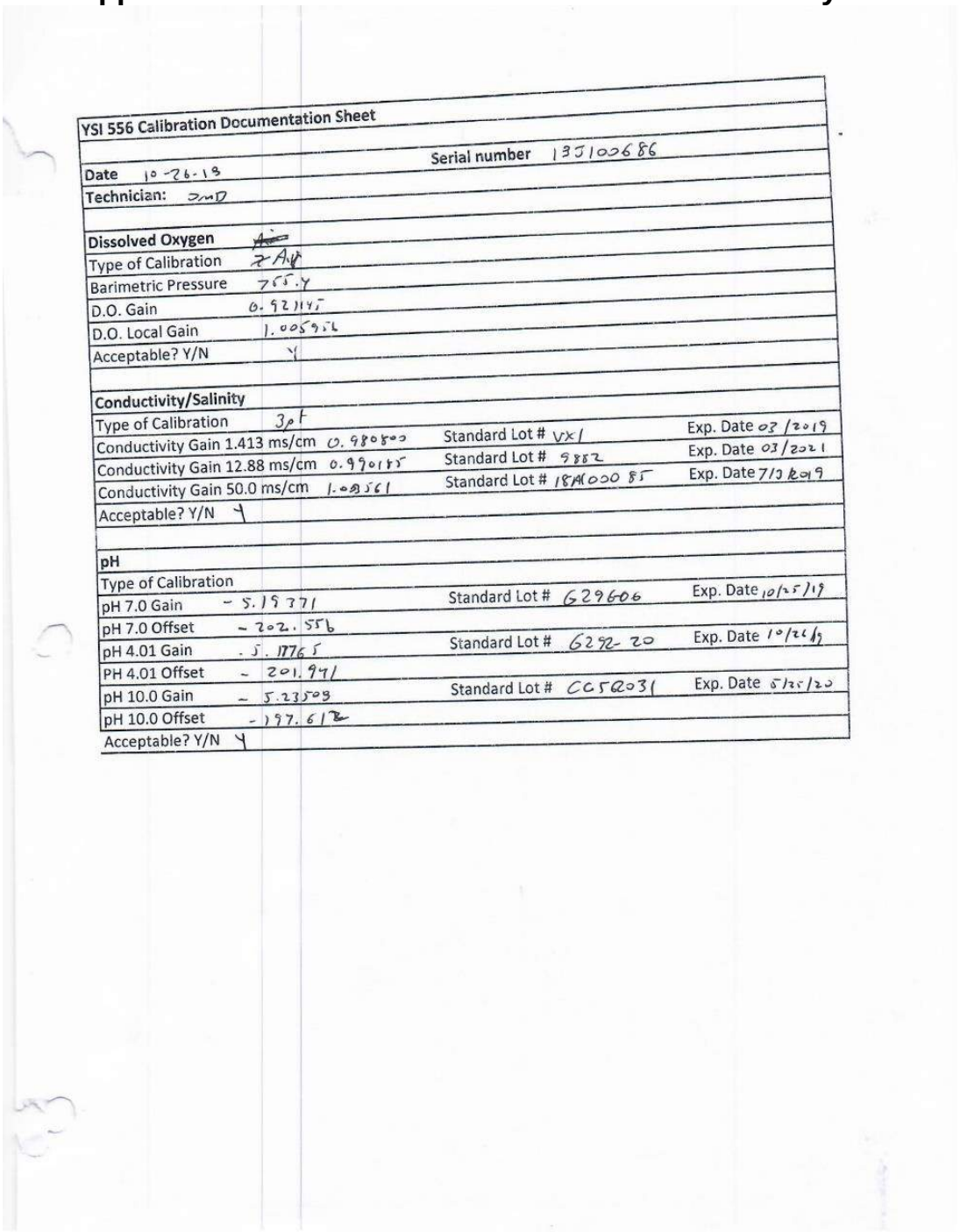
5.6 Appendix F. Laboratory Photographs

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	~~Air~~		
Type of Calibration	ZAir		
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	1.003561	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 adjustor			
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
Laboratory: FRDC
Test Species: Menidia beryllina
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	21.6	29.2	7.61	11.31	AR	Box 2.2 (5 fish t-35)
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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23												
24												

* Taken immediately upon receiving

Reviewed by Lauren May on 29 March 19

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	7.20	12.05	MK	Box 2 of 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												
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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
12-23-19	JMD	Reference Toxicant solution Log Mendida bayllena
		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 off 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	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:		1340	1059	1203	1350	1284	1139	754	1000	0810	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 NR	10	19.34	21.7	21.4	21.2	21.0	29.92	29.7	29.8	30.1	29.5	7.98	7.84	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	1.43	1.32
	B	10	10	10	10	10					20.3					30.8					7.93					6.31		
	C	10	10	10	10	10					20.3					31.1					7.94					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/MB	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 VR
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	19.56	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					29.2					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	4					20.3					30.6					7.99					6.13		
	E	10	10	10	8	7					20.32					30.6					7.94					6.22		
Initials:			AH/VR	MB	NM	TB	MB	VR	JL	NM	NM	JL	VR	JL	NM	NM	NM	VR	JL	NM	NM	NM	VR	JL	NM	NM	NM	JM-13	JM-13
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~~ 714 JL	1000	1320	0844	1145	~~707~~ 714 JL	1000	1320	0844	1145	~~707~~ 718 JL	1000	1320	0844	1145	~~707~~ 714 JL	1000	1320	0844	1400	1400
Initials (QA):			VR	RB	VR	RB	RB																						

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	8.71
	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	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
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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	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	19.98	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	6.44	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	MKS	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:		10/29	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:		1600	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):		VR	RB	SC	SC	VR																						

Reviewed by Lauren May on 29March19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP
Site ID: 7
Test Species: Mbahia.
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	~~8.36~~ 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 ppm	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	~~8~~ 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	dNB	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	RB	SC	RB	RB																						

Reviewed by Lauren May on 29March19

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	~~10~~ 9	9	9					19.0					30.7					~~7.96~~ 7.95				6.30	6.34		
	C	10	10	10	10	10					19.0					30.6					7.96					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	~~9~~ 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	~~10~~ 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	~~10~~ 8	8	8					19.0					31.7					7.93					6.35		
	C	10	10	~~10~~ 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	12	~~6~~ 6	6	6					19.0					31.0					7.93					6.03		
Initials:		MB/TB	MB	NM	NM	MB	VR	JL	NM	NM	TM	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		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	JL	JL	RB																						

Lauren Maf
29 March 19

ELUTRIATE TOXICITY TEST SHEET

Project: HSC NMP — Test Initiation Date: 10/29/18 Time: 1410

Site ID: 9 — Test Termination Date: 11/2/18 Time: 1300

Test Species: A. bahia — Page 1 of 1

Exposure duration: 96h — 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	8	8					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					30.6					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					30.6					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	9	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 29 March 19

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					19.2					36.6					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					19.2					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					7.84					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					6.15		
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	1291	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	30.0	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:			MA/AH/TB	MB	NM	TB	AK	VR	JC	NM	NM	TM	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)				
			24 h	48 h	72 h	96 h	0 h	24 h	48 h	72 h	96 h
control	A	10	10	10	10	10	20.57	21.1	20.7	20.7	20.7
	B	10	9	9	8	8					20.6
	C	10	10	10	10	10					20.6
	D	10	10	10	10	10					20.6
	E	10	10	10	10	10					20.6
	A										
	B										
	C										
	D										
	E										
	A										
	B										
	C										
	D										
	E										
	A										
	B										
	C										
	D										
	E										
Initials:		JL/TB/NK	TB	p/m	NM	MS	VR	JC	NM	NM	JC
Date:		10/29	10/30	10/31	11/1	11-2	10/29	10/30	10/31	11/1	11/2
Time:		1410	1000	1259	1338	1317	1200	711	1000	1316	0833
Initials (QA):		VR	RB	JC	KB	VR					

Conc.	Repl.	Salinity (ppt)					pH (SU)					D.O. (mg/L)					Ammonia (mg/L))	
		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	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					30.5					7.72					6.38		
	C					30.6					7.73					6.14		
	D					30.5					7.75					6.23		
	E					30.5					7.75					6.36		
	A																	
	B																	
	C																	
	D																	
	E																	
	A																	
	B																	
	C																	
	D																	
	E																	
	A																	
	B																	
	C																	
	D																	
	E																	
Initials:		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	11/2
Time:		1200	711	1000	1316	0833	1200	711	1000	1316	0833	1200	711	1000	1316	0833	1400	1400

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	6.48	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~~ 8.28					6.62		
	E	10 11	10	10	8	8					19.4					30.9					~~8.28~~ 8.28					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	~~7~~ 8	4	4	4					19.8					30.4					8.28					6.74		
	C	10	10 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
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	SC	NM	SL	NM	VR	JC	NM	JL	TB	VR	JC	NM	SL	NM	VR	JC	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:			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	SL	RB	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					6.19		
Initials:			AK TB	NM	NM	TB	AK	VR	JC	NM	JC	TB	VR	JC	NM	JC	TD	VR	JC	NM	JC	TB	VR	JC	NM	JC	TB	2nd	AWB
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	NM	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					7.95					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	1114	1206	1148	957	1000	1118	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	9/10	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	6.65	4.70	3.81
	B	10	10	10	10/9	9/10					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	7.93	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/TB	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	6.69	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~~ 21				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	+20	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	JL	NM	VR	JC	NM	JL	NA	VR	JL	NM	JL	NM	VR	JC	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:		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	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~~ 19.7	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	1030	10/31	11/1	11/2	10/29	1030	10/31	11/1	11/2	10/29	1030	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	30.6	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					7.98					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 NM, 9/0	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	9	5					20.3					30.3					8.17					6.42		
	E	10 11 NM	11	10	8 10 TB	8					20.3					30.3					8.17					6.38		
Initials:		AK TB	NM	VR	TB	NM	VR	JC	NM	JC	TB	VR	SC	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 29 March 19

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	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
Page | 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	20.85	20.8	20.8	20.8	20.6	30.18	30.3	30.3	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					20.8					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	SC	N/M	VR	JC	NM	SL	N/M	VR	SC	NM	JL	N/M	VR	JC	NM	SL	N/M	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	1530	1314	1159	944	1000	1145	1240	1159	944	1000	1145	1240	1159	944	100	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

* Bulk sediment includes (3) thermalogs

CHAIN OF CUSTODY RECORD

USACE ERDC Laboratories, 3909 Halls Ferry Road, Vicksburg, MS 39180

Houston Ship Channel North of Morgan's Point

Sampling Company: EL, CEERD-EP-R

ERDC: EL, CEERD-EP-R

POC: Project Manager: Cheryl Montgomery

Address: 696 Virginia Road, Concord, MA 01742

Email: cheryl.montgomery@usace.army.mil

Phone: W: 978-318-8644, C: 781-530-6317

POC: Dan Farrar

Address: 3909 Halls Ferry Road Bldg 6099, Vicksburg, MS 39180

Email: daniel.farrar@usace.army.mil

Phone: W: 601-634-2116, M: 601-529-6042

Page ____

Additional Notes:

	Sample Name	Date	Time	Depth	Media	# of containers	Station	1 12L HDPE Cubitainer, Pre-filtered Hold Time: 48 hours: DOC	Dissolved Aluminum	Dissolved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/ Furans, OC Pests, PAH/PCP, PCBs, SVOC	2 40 ml Clear VOA w/HCl Hold Time: 7 days: TPH high-level	2 L HDPE Cubitainer, non-filtered Hold Time: 48 hours: TOC	Total Hg and Se	TSS	Bulk Sediment*	3 40 ml Clear VOA w/HCl Hold Time: 7 days: VOC	125 ml HDPE pre-filtered Hold Time: 24 HOURS: Cr II and VI	Terra Core Kit: Hold Time: 14 days: VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ HCl)	Sediment: TPH (1 4 oz clear glass jar Hold Time: 14 days)
1	HSCNew-NMP-06	10-4-18	0750	NA	Sed	8												X	X		X	X	X	X
2	HSCNew-NMP-05	10-4-18	1215	1		8												X	X		X	X	X	X
3	HSCNew-NMP-04	10-5-18	0940	1		8												X	X		X	X	X	X
4	HSCNew-NMP-03	10-5-18	1430			8												X	X		X	X	X	X
5	HSCNew-NMP-02	10-6-18	0920			8												X	X		X	X	X	X
6	HSCNew-NMP-01	10-6-18	1220			8												X	X		X	X	X	X
7	HSCNew-NMP-03-DUP	10-5-18	1710			8												X	X		X	X	X	X
8	HSCNew-NMP-EB18	10-6-18	1414	1	H_2O	11		X	X	X	X	X	X		X	X	X				X	X	X	
9	HSCNew-NMP-02-SED-DUP	10-6-18	0920	1	Sed	5															X	X	X	
10																								
11																								
12																								
13																								
14																								
15																								
Total																								

Field Duplicate

1 Identify sample for matrix comparison to ERDC. Samples have been properly packed and are intact.

Signature: _____ Date: 10-4-18

2 Identify those samples for transfer to ERDC.

Signature: _____ Date: 10/9/18

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	Additional Notes:
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 5008, Vicksburg, MS 39180	
Email:	Email: [illegible]	[illegible]	
Phone: 281-703-0257	Phone: W: 978-318-8644, C: 781-630-8317	W: 601-634-2118, M: 601-529-6042	

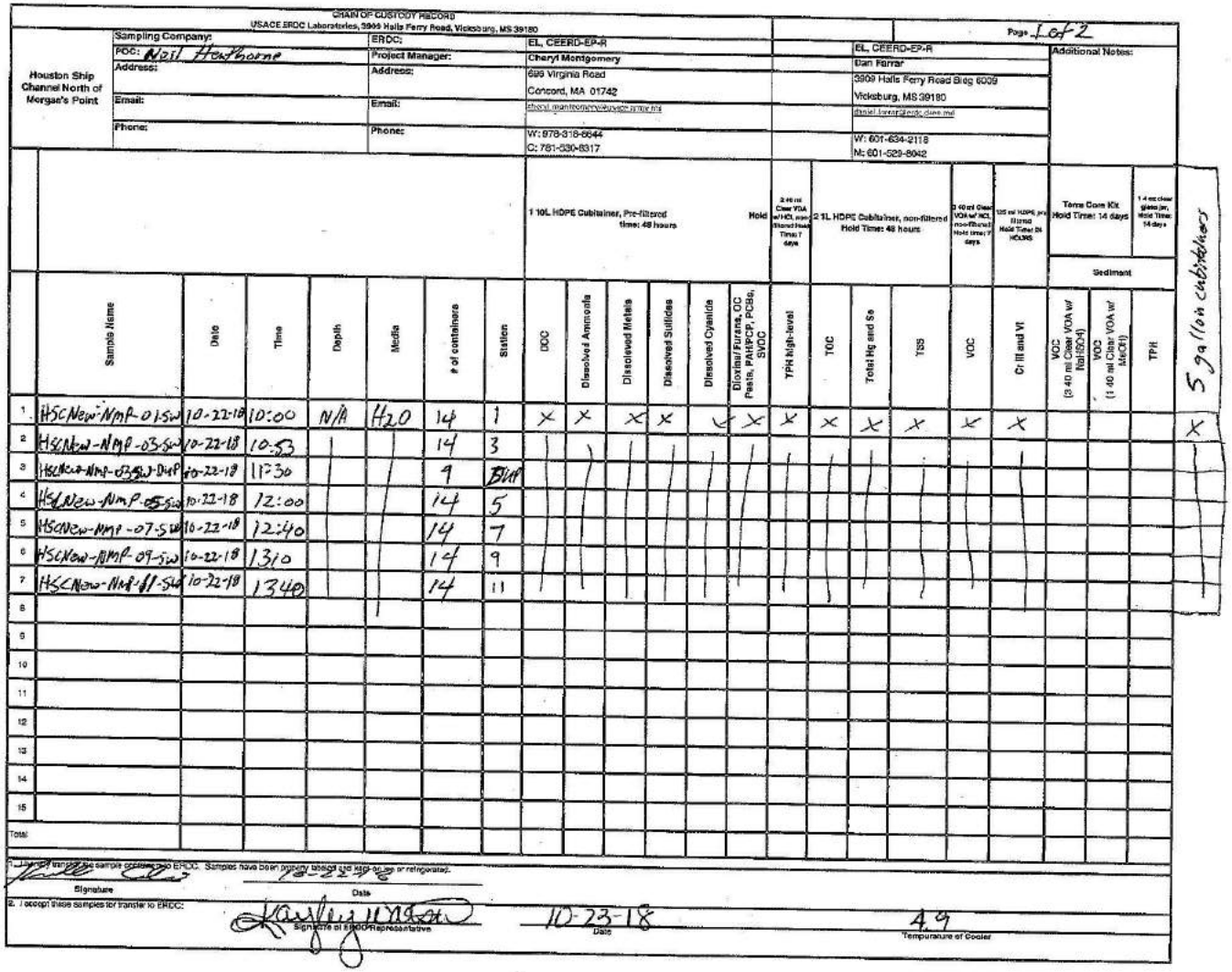
Container / hold time groups: 1 10L HDPE Cubitainer, Pre-filtered, Hold time: 48 hours (DOC, Dissolved Ammonia, Dissolved Metals, Dissolved Sulfides, Dissolved Cyanide, Dioxins/Furans, OC Pests, PAH/PCP, PCBs, SVOC); 2 40 ml Clear VOA w/HCL non-filtered, Hold Time: 7 days (TPH high-level); 2 1L HDPE Cubitainer, non-filtered, Hold Time: 48 hours (TOC, Total Hg and Se, TSS); 2 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); Terra Core Kit, Hold Time: 14 days (Sediment: VOC, VOC); 1 4 oz clear glass jar, Hold Time: 14 days (Sediment: TPH); Bulk Sediment, 3 two gallon Buckets (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	sediment
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 Hns 10-6-18 — Date

2. I accept these samples for transfer to ERDC:
N. [signature] 10-6-18 [signature] Signature of ERDC Representative

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:	ERDC:	EL, CEERD-EP-R	EL, CEERD-EP-R	Additional Notes:
	POC: Neil Hawthorne	Project Manager:	Cheryl Montgomery	Dan Ferrar	
	Address:	Address:	696 Virginia Road	3909 Halls Ferry Road Bldg 6039	
			Concord, MA 01742	Vicksburg, MS 39180	
	Email:	Email:	cheryl.montgomery@usace.army.mil	daniel.ferrar@erdc.dren.mil	
	Phone:	Phone:	W: 978-318-8644	W: 601-634-2118	
			C: 781-330-8317	M: 601-529-8042	

	Sample Name	Date	Time	Depth	Media	# of containers	Station	1 10L HDPE Cubitainer, Pre-filtered time: 48 hours: DOC	Dissolved Ammonia	Dissolved Metals	Dissolved Sulfides	Dissolved Cyanide	Dioxins/ Furans, OC Pests, PAH/PCP, PCBs, SVOC	Hold: 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	2 40 ml Clear VOA w/ HCl, non-filtered Hold time: 7 days: VOC	125 ml HDPE jar, filtered Hold Time: 28 HOURS: Cr III and VI	Terra Core Kit Hold Time: 14 days (Sediment): VOC (3 40 ml Clear VOA w/ NaHSO4)	VOC (1 40 ml Clear VOA w/ MeOH)	1 4 oz clear glass jar, Hold Time: 14 days: TPH	5 gallon containers
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	13:10			14	9																
7	HSCNew-NMP-11-SW	10-22-18	13:40			14	11																
8																							
9																							
10																							
11																							
12																							
13																							
14																							
15																							
Total																							

1. I relinquish the samples accepted by ERDC. Samples have been properly placed 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 — Temperature 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 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: 601-634-2116 M: 601-529-8042

Additional Notes:

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
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1. Relinquished the samples contained herein 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: Kayley Watson — Signature of ERDC Representative — Date: 10-23-18 — Temperature of Cooler: 4.9