FINAL REPORT FOR
CANAVERAL HARBOR, FLORIDA
MAINTENANCE DREDGING 103 EVALUATION-2000
TRIDENT ACCESS CHANNEL (TAC) SHOAL AREA
SAMPLING AND TESTING FOR
EXTENSION OF EPA CONCURRENCE

DELIVERY ORDER 0056
CONTRACT DACW17-97-D-0001

OCTOBER 2000

SUBMITTED TO:

U.S. Department of the Army
Corps of Engineers, Jacksonville District
P.O. Box 4970
Jacksonville, Florida 32232-0019

SUBMITTED BY:

PPB Environmental Laboratories, Inc.
6821 S.W. Archer Road
Gainesville, Florida 32608

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Executive Summary

EXECUTIVE SUMMARY

During the period July 25 and 26, 2000, five sample stations in Canaveral Harbor, Florida, were sampled as part of the Canaveral Harbor 2000 Maintenance Dredging 103 Evaluation. This evaluation is a follow-up to an evaluation for ocean disposal of dredged material done for Canaveral Harbor in March and May 2000. This additional testing was requested by the U.S. Naval Ordnance Testing Unit at Canaveral, Florida.

The elutriate test results indicated that after 96 hours of exposure to elutriates from the Canaveral Harbor area, there were no significant differences in the survivorship of *Mysidopsis bahia* between the control water (0% elutriate) or the control sediment (100% elutriate) and survival in samples from stations E-CH00-1/2, E-CH00-3/4, and E-CH00-5-Duplicate. However, survival of *M. bahia* was significantly different for station E-CH00-5. Survival of *Menidia beryllina* in the control water (0% elutriate) was significantly different (P=0.05) from survival for stations E-CH00-1/2, E-CH00-5, and E-CH00-5-Duplicate. These samples were also significantly different from the control sediment (100% elutriate). There were no significant differences (P=0.05) in the fertilization of the sea urchin, *Lytechinus variegatus,* gametes between the control water (0% elutriate) or control sediment (100% elutriate) and all the different elutriate concentrations from all the sample stations tested.

The sediment test results indicated that after 10 days of exposure to sediments from the Canaveral Harbor area, there was a significant difference (P=0.05) in the survival of *Mysidopsis bahia* between the control sediment and sediment from station E-CH00-5. Survival of *Mysidopsis bahia* in the field reference sediment was not significantly different (P=0.05) from survivorship for any of the sample stations.

After 10 days of exposure to sediments from the Canaveral Harbor area, there were significant differences (P=0.05) in the survival of *L. plumulosus* between the laboratory control sediment and sample stations E-CH00-1/2, E-CH00-5, and E-CH00-5-Duplicate. There were no significant differences (P=0.05) in the survivorship of *L. plumulosus* between the field reference sediment and any of the site sediments.

Finally, at the termination of the 10-day bioaccumulation tests, adequate mass of *Macoma nasuta* and *Nereis virens* tissues were available for use in chemical analyses.

Overall, although some site samples were different from laboratory controls, very few differences were observed between reference and site sediments, indicating little toxicity compared to prevailing site conditions.

1

Introduction

1.0 INTRODUCTION

This report presents the results of our physical, chemical, and biological analysis of sediment and water samples from Canaveral Harbor as part of the 2000 Maintenance Dredging 103 Evaluation. Elutriate bioassay data and sediment bioassay data are included. Sediment samples were collected during the period July 25 and 26, 2000 at five sample stations. These samples were composited such that three samples were prepared for testing. Also presented are data from an area reference station consisting of two substations located near the Canaveral ODMDS.

2

Methods and Materials

2.0 METHODS AND MATERIALS

2.1 Sample Collection Techniques

All sediment samples were collected either as grab samples or as cores using a vibracoring device. Details are as follows:

Station	Sediment Collection Technique
E-CH00-1	Van Veen Grabs
E-CH00-2	Van Veen Grabs
E-CH00-3	Van Veen Grabs
E-CH00-4	Van Veen Grabs
E-CH00-5	Van Veen Grabs
RS-CH00-1	Van Veen Grabs
RS-CH00-2	Van Veen Grabs

Sediment samples were properly labeled, iced, and then transported to the laboratory via surface transportation.

Station locations are shown in the enclosed site maps (see Figures 1 and 2).

2.2 *In Situ* Field Measurements

Hydrographic measurements for water temperature, pH, water depth, turbidity, dissolved oxygen, turbidity, salinity, and conductivity were made using a Hydrolab Scout 2 and a Hach Model 2100P turbidimeter. Field observations were made concerning sea state, tidal cycle, and weather.

2.3 Sediment Analyses

After thorough mixing of each entire sediment sample (to maximize homogeneity), portions of the sample were prepared and shipped to Environmental Science and Engineering, Inc. for bioassay testing and to LAW Engineering, Inc. for physical testing. All testing was performed in accordance with published procedures.

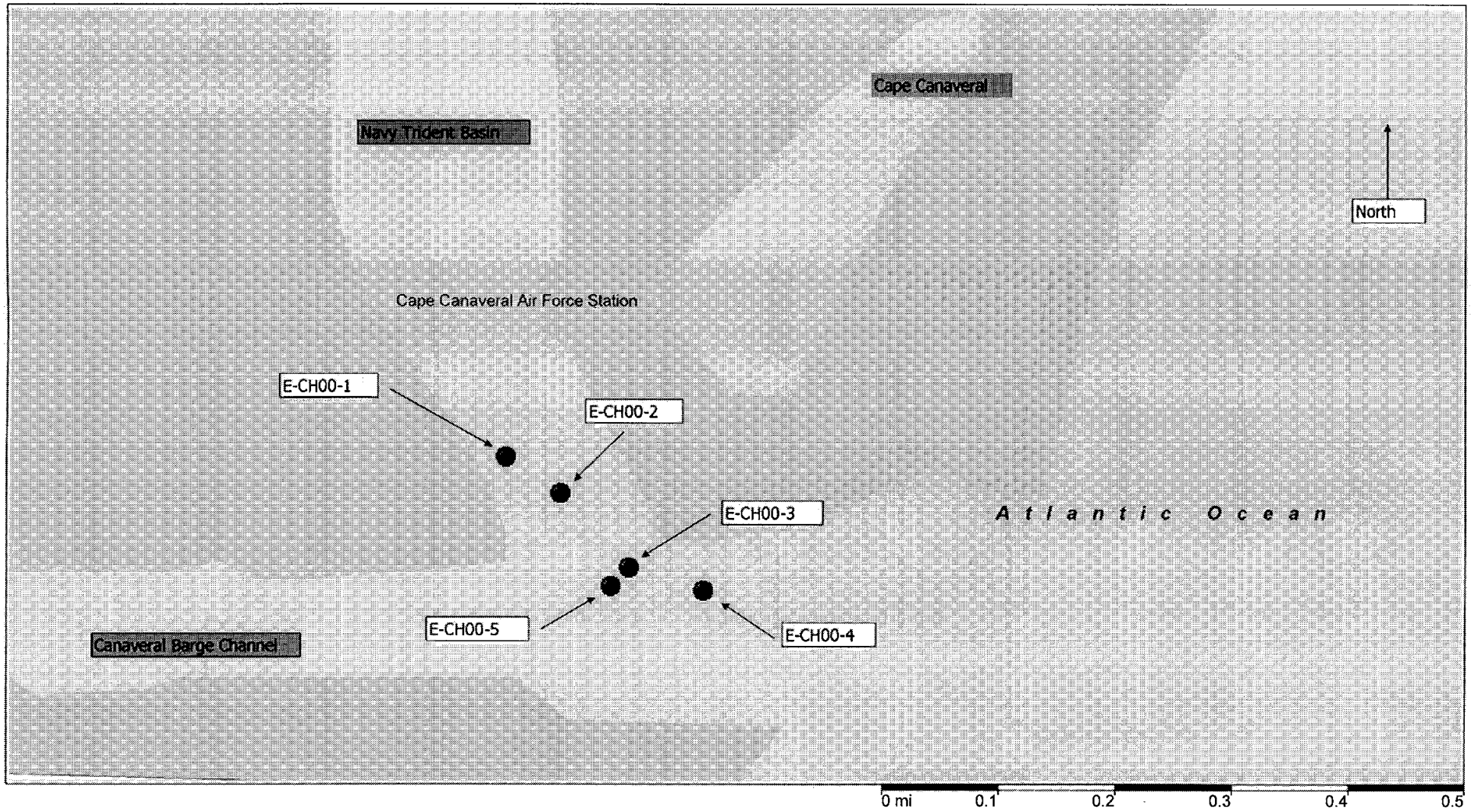

Figure 1. Canaveral Harbor Stations Sampled July 25 and 26, 2000

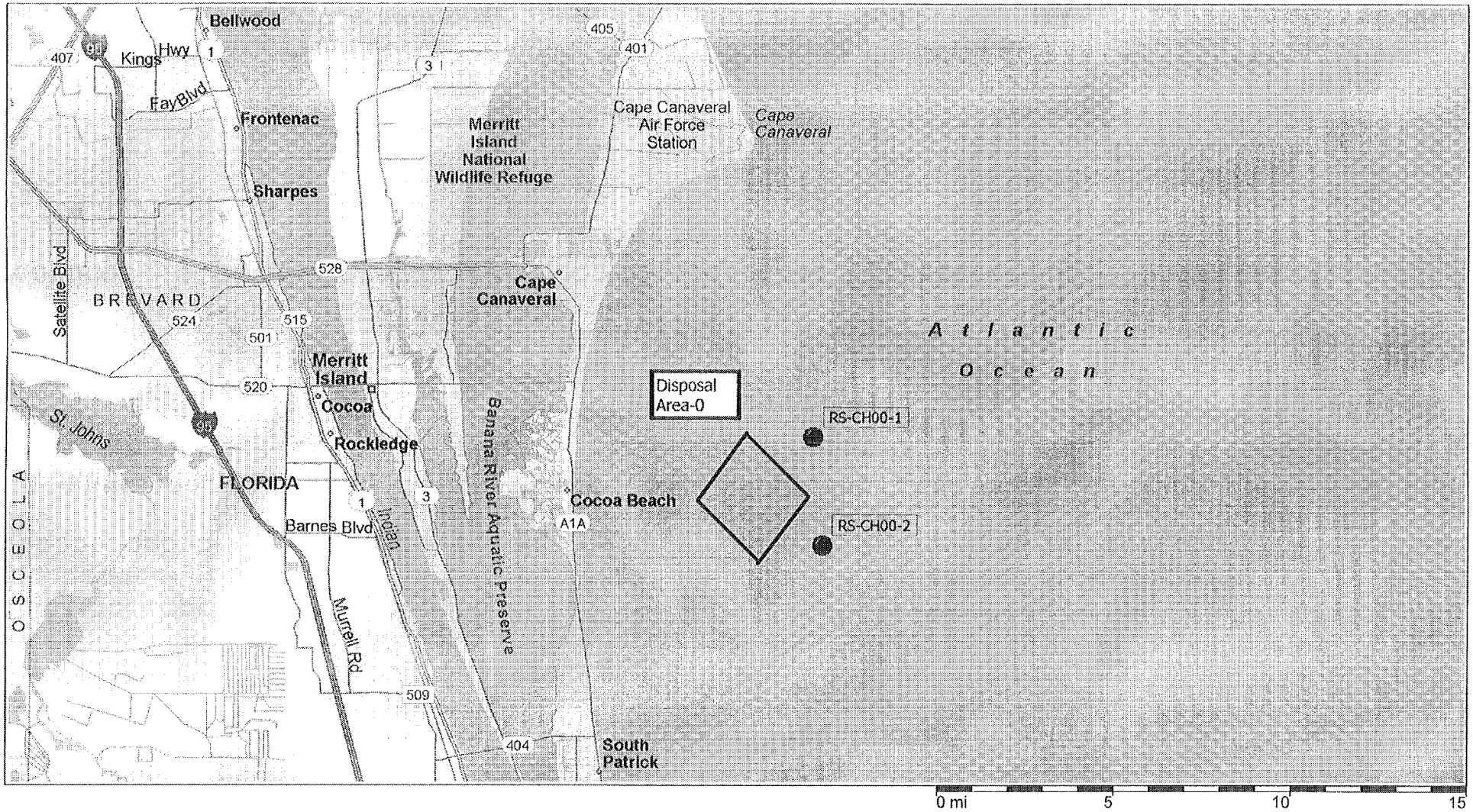

Figure 2. Canaveral Harbor Reference Stations Sampled July 26, 2000

2.4 Bioassays

2.4.1 GENERAL PROCEDURES

Elutriate bioassays were conducted on sediments collected from the Canaveral Harbor area to determine the potential impact of dissolved and suspended contaminants on organisms exposed to the elutriate after conducting an initial mixing period. The test organisms used for the elutriate tests included the inland silverside, *Menidia beryllina*, the mysid shrimp, *Mysidopsis bahia* (a crustacean), and gametes of the sea urchin, *Lytechinus variegatus*.

Sediment bioassays were conducted to determine the effects of the site contaminants on the infaunal amphipod, *Leptocheirus plumulosus* and the mysid shrimp, *Mysidopsis bahia*. Sediment bioaccumulation tests were also conducted with the polychaete, *Nereis virens* and the bivalve, *Macoma nasuta*.

All bioassays were conducted in accordance with the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers Standard Testing Manual entitled: *Evaluation of Dredged Material for Proposed Ocean Disposal - Testing Manual* (USEPA-503/8-91/001, February, 1991).

The test samples (three site sediments, one duplicate sediment, and one reference sediment) were collected July 24 and 25, 2000 and were received at the ESE Toxicology Laboratory on July 27, 2000. Samples received at the ESE Toxicology Laboratory were identified as E-CH00-1/2, E-CH00-3/4, E-CH00-5, E-CH00-5-Duplicate, and E-CH00-Reference. Control sediment (approximately 10 gallons) was collected by ESE personnel from the Atlantic Ocean near Marineland, Florida, on July 22, 2000 for use in the control exposures of the bioassay tests. The same control sediment was used for all the bioassay tests. All samples were stored in a refrigerator at 4 ± 2°C until used, and unused portions of test samples were stored similarly during the testing period. Sample chain-of-custody and other traffic information is provided in Appendix A-1.

Test sediments were received in quantities of approximately 5 gallons each. Prior to use in testing, sediments were thoroughly homogenized in their original containers and sifted or hand-sorted to remove any organic debris, small rocks, and indigenous organisms.

2.4.2 ELUTRIATE BIOASSAY PROCEDURES

Two of the test species used for the elutriate bioassays, *M. beryllina* and *M. bahia*, were received from Aquatic Indicators, St. Augustine, Florida. *M. beryllina* were 10 days and *M. bahia* were 2 days old at test initiation. Gravid adult sea urchins, *L. variegatus*, were received from Gulf Specimen Company, Panacea, Florida.

The elutriate bioassays were conducted at the ESE Toxicology Laboratory from August 1 through 5, 2000 for *M. bahia* and *M. beryllina*, and on August 4, 2000 for *L. variegatus* with laboratory control sediment and sediments from the three sample stations plus the duplicate site sample.

Natural filtered seawater collected from the Atlantic Ocean, near Marineland, Florida, was used as dilution and laboratory control water. The seawater was adjusted to a salinity of 25 parts per thousand (ppt) prior to use in preparing the three different elutriate concentrations for the *M. beryllina* and *M. bahia* tests. The salinity for the sea urchin test was maintained at 28 ± 1 ppt. Five replicates each of the three elutriate concentrations (10%, 50%, and 100%) of the three site sediments, the duplicate site sediment, and laboratory control sediment were tested. The laboratory control water was also tested as 0% elutriate. Elutriates were not prepared from the field reference sample. The *M. beryllina* tests were conducted in 600-mL beakers containing 300 mL of elutriate or control solution and the *M. bahia* tests were conducted in 340-mL crystallizing dishes containing 200 mL of elutriate or control solution. Ten organisms were placed in each of the five replicate test chambers. *M. bahia* were fed three drops per replicate of brine shrimp nauplii (*Artemia* sp.) twice daily to prevent cannibalism. Twenty-milliliter (20-mL) glass scintillation vials were used as test vessels for the sea urchin tests. All tests were performed at a temperature of 20 ± 1°C and under ambient laboratory illumination (~740 lux).

Elutriates were prepared by mixing 1 part of sediment to 4 parts of water to achieve a sediment-to-water ratio of 1:4 by volume. The mixtures were mechanically stirred for 30 minutes at room temperature on a magnetic stirrer, with additional mixing by hand every 10 minutes. The mixtures were allowed to settle for at least 1 hour and then the supernatant was siphoned off as the 100% elutriate. Dilutions of the 100% elutriate were made to obtain the 50% and 10% elutriates on a volume-to-volume basis.

Water quality parameters measured daily during the 96-hour *M. bahia* and *M. beryllina* tests and at test initiation of the sea urchin tests, were D.O., pH, temperature, and salinity. Dissolved oxygen was measured with a YSI Model 55 DO meter, temperature was measured with a VWR thermocouple, pH was measured with an Orion Model SA 290A pH meter, and salinity was measured with an Aquatic Eco-systems CL893 refractometer. All instruments were calibrated daily before use. Survival counts were performed daily and at test conclusion for the *M. beryllina* and *M. bahia* elutriate tests.

L. variegatus eggs and sperm were obtained from adults by injecting approximately 1.0 mL of 0.5-M KCl solution into the mouth region. Sperm were collected neat and the eggs were collected in dilution water. The eggs were washed three times with seawater, allowing eggs to settle for 30 minutes between rinses. Approximately 5 million sperm cells were added to 5 mL of elutriate and incubated for 60 minutes at 20°C. Approximately 2,000 eggs were then added to each vial, allowing fertilization to take place. Development was halted after 20 minutes by the addition of 2 mL 10% buffered formalin. Fertilization was then quantified by the presence or absence of a fertilization membrane using a Sedgwick-Rafter counting chamber and a compound microscope. The fertilization membrane appeared as a "halo" around the sea urchin egg. For each test replicate, a total of 100 eggs were counted and any damaged eggs were not included in the counts.

ANOVAs were used to compare mean survivorship or fertilization in the control sediment (100% elutriate) or the control elutriate (0% elutriate) versus the 100% elutriate from each of the Canaveral Harbor site sediments. Median lethal concentration (LC_{50}) values for survival of *M. bahia* and *M. beryllina* and egg fertilization for *L. variegatus* were calculated, if necessary. The LC_{50} is defined as the concentration of elutriate or reference toxicant that kills or inhibits 50% of the exposed test organisms under the specified conditions of exposure. The LC_{50} values for all of the sediment elutriates with less than 50% mortality (or fertilization) were estimated as greater than 100% in accordance with EPA guidelines (EPA/503/8-91/001).

2.4.3 SEDIMENT BIOASSAY PROCEDURES

Two test species were used for the sediment bioassays, *Leptocheirus plumulosus* and *M. bahia*. Juvenile *L. plumulosus* (2-4 mm in length, with no mature males) were obtained from Aquatic Research Organisms, Hampton, Hew Hampshire, and *M. bahia* (4 days old at test initiation) were obtained from Aquatic Indicators, Inc. (St. Augustine, FL).

The 10-day sediment tests with *L. plumulosus* and *M. bahia* were conducted from July 28 through August 7, 2000, with a daily photoperiod of 16-hour light and 8-hour dark cycle under fluorescent lighting conditions (~840 lux) for the duration of the tests.

The sediment tests were conducted at the ESE Toxicology Laboratory using five replicates each for the: (1) laboratory control sediment, (2) one duplicate site sediment, (3) one reference sediment, and (4) three site sediments from Canaveral Harbor. Test chambers were 1.5-liter glass jars for the *L. plumulosus* test and 1.6-liter glass Carolina bowls for the *M. bahia* test. Twenty *M. bahia* or *L. plumulosus* were loaded in each of the five replicate test chambers at test initiation. All test chambers were aerated at approximately 60-80 bubbles per minute. Aeration was supplied to the test chambers using an oil-free laboratory air compressor (Aquatic Eco Systems, Inc., Clearwater, Florida) through flexible Tygon® tubing fitted with glass pipette tips. During testing, *M. bahia* were fed three drops per replicate of brine shrimp nauplii (*Artemia* sp.) twice daily to prevent cannibalism, and *L. plumulosus* were not fed for the duration of the 10-day exposure period.

Water quality parameters measured daily during the 10-day *M. bahia* and *L. plumulosus* sediment tests were D.O., pH, temperature, ammonia, and salinity. Dissolved oxygen was measured with a YSI Model 55 DO meter, temperature was measured with a VWR thermocouple, pH was measured with an Orion Model SA 290A pH meter, and salinity was measured with an Aquatic Eco Systems CL893 refractometer. Total ammonia was measured with a SA 290A meter equipped with an Orion 95-12 ammonia probe and light intensity was measured with a lux meter. All instruments were calibrated daily before use. Survival counts were performed at test termination for all *L. plumulosus* and *M. bahia* sediment tests.

Prior to test initiation (Day-1), natural seawater (salinity of 25 ppt for *M. bahia* and 28 ppt for *L. plumulosus*) and sediments were introduced to each test chamber at a ratio of 1 part sediment to 4 parts seawater and allowed to settle overnight. The overlying water was siphoned from each of the replicate test chambers after 24 hours and new overlying water was added. Water quality parameters were measured immediately prior to adding the test organisms. Water renewals were performed at 48-hour intervals immediately after taking water quality measurements. Water was siphoned from the test chambers and placed in a glass beaker to determine that inadvertent removal of test organisms had not occurred. Any test organisms siphoned out were immediately returned to their test chambers. Clean seawater was added back into the test chambers, taking care not to resuspend the sediment. Dead brine shrimp were removed from the *M. bahia* test chambers on a daily basis.

Sediment bioassay data was evaluated by a statistical comparison of mean survivorship in the sample station sediment relative to the field reference or laboratory control average survivorship using Dunnett's t-Test procedure (EPA/600/4-89/001). Data was first checked for normality and homogeneity of variance. If either of these assumptions was not met, the data was transformed using a square-root arcsine transformation or another transformation resulting in normalization prior to analysis by Dunnett's procedure.

2.5 Bioaccumulation Procedures

The polychaete, *N. virens*, and the bivalve, *M. nasuta* used in the bioaccumulation study were obtained from Aquatic Research Organisms, Hampton, New Hampshire.

The bioaccumulation tests were performed for 10 days (from July 28 through August 7, 2000) using five replicates of each site sediment including the reference and duplicate sediments, and the laboratory control without dilution. Each replicate test chamber was a 10-gallon aquarium to which 2 centimeters of sediment were added. Each of the exposure aquaria was filled with approximately 8 gallons natural seawater with a salinity of 25 ± 2 ppt. Twenty *N. virens* and 20 *M. nasuta* were then added to each test chamber (the two species were tested in separate tanks). Test organisms were not fed at any time during the testing period.

The tests were performed in a temperature-controlled room adjusted to maintain a constant test temperature of 18 ± 2°C, and under laboratory illumination (~1050 Lux). Aeration was provided to all the test chambers at approximately 100-120 bubbles per minute with the aid of an oil-free laboratory air compressor (Aquatic Eco Systems, Inc., Clearwater, Florida).

Water quality parameters measured daily during the 10-day sediment bioaccumulation tests were D.O., pH, temperature, and salinity. Dissolved oxygen was measured with a YSI Model 55 DO meter, temperature was measured with a VWR thermocouple, pH was measured with an Orion Model SA 290A pH meter, and salinity was measured with an Aquatic Eco Systems CL893 refractometer. All instruments were calibrated daily before use. Observations were made daily for organism behavior and mortality. Survival counts were performed at test termination for all of the bioaccumulation tests.

Renewals of the overlying water in the aquaria were performed three times per week. Water was siphoned from the aquaria through 11/16-inch (outside diameter) Tygon® tubing and the aquaria were refilled with seawater pumped from a holding tank through similar tubing. The Tygon® tubing, equipped with plastic pinch clamps and tipped with plastic T-joints, was connected to PVC pipes fitted with control valves to adjust the flow of water. Care was taken to ensure that the sediment in each tank was not disturbed during renewals.

After 10 days of exposure, test organisms from each replicate were removed from the aquaria and allowed to depurate in clean seawater for 24 hours. After depuration, organisms from each replicate were rinsed in deionized water, placed into Ziploc® bags, and stored in a freezer at -10 ± 2°C. Frozen *N. virens* and *M. nasuta* tissues were archived for shipment to PPB Environmental Laboratories, Inc., Gainesville, Florida, for chemical analyses (if required).

3

Results and Discussion

3.0 RESULTS AND DISCUSSION

3.1 Field Data

Results of water column measurements and field observations are presented in Tables 1 and 2. Sampling occurred on July 25 and 26, 2000 when water temperatures ranged from 21.5 to 27.4°C. Dissolved oxygen ranged from 5.22 to 6.57 mg/L, while the range for pH was 7.92 to 8.16. Turbidity ranged from 0.41 to 8.90 NTUs. Salinity and conductivity ranged from 35.9 to 37.0 ppt and from 54.1 to 55.7 mmhos/cm, respectively. Weather conditions were sunny, with calm to moderate winds. Sea state varied from calm to a light chop.

3.2 Bioassay Data

Test conditions for the elutriate bioassay tests, including temperature, DO and pH levels, were maintained at acceptable levels throughout the testing period. Salinities for the tests slightly exceeded the recommended test range; however, the test organisms did not appear to be affected by the salinity variation. Complete copies of the laboratory raw data are provided in Appendices A-2, A-3, and A-4 for *M. bahia*, *M. beryllina* and *L. variegatus*, respectively.

Mysidopsis bahia

Survivorship data from elutriate bioassays of control water (0% elutriate), control elutriate, and the three sample stations with duplicate are presented in Table 3. Survival of *M. bahia* was 90% in the control water (0% elutriate) and 94% in the elutriate control sediment (100% control elutriate). Test station sample survivorship ranged from 68% (sample station E-CH00-5, 100% elutriate) to 100% (10% elutriate from sample stations E-CH00-1/2 and E-CH00-5 10% elutriate) (Table 3).

Based on the results of the survival counts, there were no significant differences (P=0.05) in the survivorship of *M. bahia* between the control water (0% elutriate) or control sediment and sample stations E-CH00-1/2, E-CH00-3/4, and E-CH00-5-Duplicate for the different elutriate concentrations prepared from the site sediments (Table 4). However, there was a significant difference (P=0.05) in the survivorship of *M. bahia* between the control water (0% elutriate) or control sediment (100% elutriate) and survivorship in the different elutriate concentrations for sample station E-CH00-5 (Table 4).

Table 1. Results of *In Situ* Hydrographic Measurements at Canaveral Harbor on July 25 and 26, 2000

Station ID	Coordinates	Date and Time	Depth (feet)	Tidal Cycle	Sea State	Weather
RS-CH00-1	28°20'07.08"N 80°29'49.74"W	07/26/00 0945	48	Low	1-3 ft. swells	Sunny, wind from the east at 10 kts
RS-CH00-2	28°17'29.30"N 80°29'34.37"W	07/26/00 0845	53	Outgoing	1-3 ft. swells	Partly cloudy, light breeze
E-CH00-1	28°24'43.01"N 80°35'31.43"W	07/25/00 1610	43	Outgoing	Light chop	Overcast, wind from the south-southeast at 10 kts
E-CH00-2	28°24'40.89"N 80°35'29.73'W	07/25/00 1700	42	Outgoing	Calm	Heavy overcast, squall line to the west, wind south-southeast at 10 kts
E-CH00-3	28°24'36.99"N 80°35'26.08"W	07/26/00 1055	40	Incoming	Calm	Sunny, light breeze
E-CH00-4	28°24'35.83"N 80°35'21.57"W	07/26/00 1125	44	Incoming	Calm	Sunny, light breeze
E-CH00-5	28°24'36.52"N 80°35'26.95"W	07/26/00 1235	40	Incoming	Calm	Sunny, light breeze

Table 2. Depth Profile *In Situ* Data from Canaveral Harbor Collected July 25 and 26, 2000

Station ID	Sampling Depth (feet)	Temp (°C)	pH (Units)	Dissolved O_2 (ppm)	Salinity (ppt)	Conductivity (mmhos/cm)	Turbidity (NTU)
RS-CH00-1	2	26.7	7.95	5.92	36.0	54.3	0.88
	24	24.1	7.94	5.73	36.6	55.2	1.42
	45	22.0	7.97	6.17	37.0	55.6	2.36
RS-CH00-2	2	27.2	7.93	5.84	36.0	54.3	0.41
	25	23.9	7.93	5.89	36.6	55.1	0.70
	51	21.5	7.93	5.63	37.0	55.7	1.58
E-CH00-1	1	27.4	7.96	6.48	36.1	54.5	2.25
	22	25.1	7.96	5.50	36.8	55.3	2.32
	43	24.5	7.95	5.43	36.9	55.5	8.90
E-CH00-2	1	27.2	7.94	6.57	36.3	54.8	2.23
	21	25.6	7.92	5.53	36.8	55.5	2.67
	39	24.8	7.92	5.23	37.0	55.7	2.51
E-CH00-3	2	27.1	8.10	5.88	36.0	54.2	2.55
	19	24.3	8.15	5.23	36.6	55.2	2.65
	38	23.9	8.16	5.26	36.7	55.3	3.97
E-CH00-4	2	27.4	8.00	5.76	35.9	54.2	2.78
	22	24.9	8.03	5.24	36.5	55.0	2.74
	42	23.8	8.04	5.22	36.7	55.3	5.60
E-CH00-5	2	27.2	8.09	5.78	36.0	54.1	2.45
	19	24.9	8.14	5.27	36.5	55.0	2.74
	37	23.9	8.16	5.38	36.7	55.3	3.91

Table 3. 96-Hour *Mysidopsis bahia* Survival in Three Elutriate Concentrations Prepared from Sediments Collected from Canaveral Harbor, August 2000 (Page 1 of 2)

Sample	Replicate	Number of Survivors[a]
CONTROL	A	9
	B	9
	C	9
	D	10
	E	8
	Total	45
	Percent	90%

Sample	Replicate	Elutriate Concentration		
		10%	50%	100%
CONTROL SEDIMENT	A	9	10	9
	B	9	9	10
	C	10	9	9
	D	9	8	10
	E	10	10	9
	Total	47	46	47
	Percent	94%	92%	94%
E-CH00-1/2	A	10	9	9
	B	10	9	10
	C	10	10	10
	D	10	9	10
	E	10	10	9
	Total	50	47	48
	Percent	100%	94%	96%
E-CH00-3/4	A	9	9	10
	B	10	9	10
	C	9	9	9
	D	9	10	10
	E	10	10	10
	Total	47	47	49
	Percent	94%	94%	98%

Table 3. 96-Hour *Mysidopsis bahia* Survival in Three Elutriate Concentrations Prepared from Sediments Collected from Canaveral Harbor, August 2000 (Page 2 of 2)

Sample	Replicate	Elutriate Concentration		
		10%	50%	100%
E-CH00-5	A	10	9	8
	B	10	9	7
	C	10	7	6
	D	10	10	7
	E	10	8	6
	Total	50	43	34
	Percent	100%	86%	68%
E-CH00-5-Dup	A	9	9	9
	B	10	9	10
	C	10	10	9
	D	8	10	7
	E	9	9	9
	Total	46	47	44
	Percent	92%	94%	88%

a - Based upon 50 organisms exposed.

Table 4. Summary of ANOVA and Dunnett's Tests of Control Water (0% Elutriate) or Control Sediment (100% Elutriate) and Test Sediment (100% Elutriate) *Mysidopsis bahia* Survival for Canaveral Harbor, August 2000 (Page 1 of 2)

Mysidopsis bahia Control Water (0% Elutriate) vs. Other Samples

ANOVA for Differences Between Means

Source of Variation	df	Sum of Squares	Mean Square	F
Between Means	4	28.40	7.10	12.24
Within Means	20	11.60	0.58	
Total	24	40.00		

Critical F = 2.87 ($\alpha = 0.05$, df = 4, 20)
Since F is > Critical F reject H_o: all groups equal;
with $\alpha = 0.05$, and 4, 20 df.

Dunnett's Test

Critical T = 2.65

Sample ID	$\alpha = 0.05$	difference between means	T stat
Control Water (0% Elutriate)	–	–	–
E-CH00-1/2 (100%)	=	0.60	1.25
E-CH00-3/4 (100%)	=	0.80	1.66
E-CH00-5 (100%)	*	2.20	4.57
E-CH00-5-Dup (100%)	=	0.20	0.42

= Indicates no significant difference between the sample station and the control water
* Indicates a significant difference exists between the sample station and the control water

Table 4. Summary of ANOVA and Dunnett's Tests of Control Water (0% Elutriate) or Control Sediment (100% Elutriate) and Test Sediment (100% Elutriate) *Mysidopsis bahia* Survival for Canaveral Harbor, August 2000 (Page 2 of 2)

Mysidopsis bahia Control Sediment (100% Elutriate) vs. Other Samples

ANOVA for Differences Between Means

Source of Variation	df	Sum of Squares	Mean Square	F
Between Means	4	29.84	7.46	13.81
Within Means	20	10.80	0.54	
Total	24	40.64		

Critical F = 2.87 ($\alpha = 0.05$, df = 4, 20)
Since F is > Critical F reject H_o: all groups equal;
with $\alpha = 0.05$, and 4, 20 df.

Dunnett's Test

Critical T = 2.65

Sample ID	$\alpha = 0.05$	difference between means	T stat
Control Sediment (100% Elutriate)	–	–	–
E-CH00-1/2 (100%)	=	0.20	0.43
E-CH00-3/4 (100%)	=	0.40	0.86
E-CH00-5 (100%)	*	2.60	5.59
E-CH00-5-Dup (100%)	=	0.60	1.29

= Indicates no significant difference between the sample station and the control water
* Indicates a significant difference exists between the sample station and the control water

Menidia beryllina

Survivorship data from elutriate bioassays of control water (0% elutriate), control elutriate, three sample stations and one duplicate station are is presented in Table 5. Survivorship of *M. beryllina* was 92% in the control water (0% elutriate) and 90% in the control sediment (100% control) elutriate. Test station sample survivorship ranged from 44% (100% elutriate from sample stations E-CH00-1/2 and E-CH00-5 10% elutriate) to 100% (10% elutriate from sample station E-CH00-1/2 and 50% elutriate from station E-CH00-3/4) (Table 5).

Based on the results of the survival counts, there were significant differences (P=0.05) between the survivorship of *M. beryllina* in the control water (0% elutriate) or control sediment (100% elutriate) and survivorship in the 100% elutriate concentration prepared from the site sediments for E-CH00-1/2, E-CH00-5, and E-CH00-5-Duplicate (Table 6).

Lytechinus variegatus

Fertilization data from the elutriate bioassays of control sediment, three sample stations and one duplicate station are presented in Table 7. Fertilization of *L. variegatus* gametes was 79% in the control water (0% elutriate) and 73% in the 100% elutriate control sediment. Fertilization of *L. variegatus* gametes in the site samples ranged from 62% (100% elutriate from sample station E-CH00-5-Duplicate) to 79% (10% elutriate from sample station E-CH00-3/4) (Table 7).

There were no significant differences (P=0.05) in the fertilization of *L. variegatus* between either the control water (0% elutriate) or the 100% elutriate when compared to the sample stations tested (Table 8). Finally, there were no significant differences (P=0.05) in the fertilization of *L. variegatus* between the control sediment (100% elutriate) and the 100% elutriate concentrations from all of the sample stations tested (Table 8).

Table 5. 96-Hour *Menidia beryllina* Survival in Three Elutriate Concentrations Prepared from Sediments Collected from Canaveral Harbor, August 2000 (Page 1 of 2)

Sample	Replicate	Number of Survivors[a]
CONTROL	A	8
	B	8
	C	10
	D	10
	E	10
	Total	46
	Percent	92%

Sample	Replicate	Elutriate Concentration		
		10%	50%	100%
CONTROL SEDIMENT	A	10	9	8
	B	10	10	9
	C	8	10	8
	D	9	10	10
	E	10	9	10
	Total	47	48	45
	Percent	94%	96%	90%
E-CH00-1/2	A	10	10	3
	B	10	9	3
	C	10	7	5
	D	10	7	6
	E	10	9	5
	Total	50	42	22
	Percent	100%	84%	44%
E-CH00-3/4	A	10	10	9
	B	9	10	10
	C	10	10	10
	D	10	10	9
	E	10	10	9
	Total	38	50	47
	Percent	76%	100%	94%

Table 5. 96-Hour *Menidia beryllina* Survival in Three Elutriate Concentrations Prepared from Sediments Collected from Canaveral Harbor, August 2000 (Page 2 of 2)

Sample	Replicate	Elutriate Concentration		
		10%	50%	100%
E-CH00-5	A	4	5	6
	B	4	9	8
	C	5	4	6
	D	4	4	8
	E	5	4	6
	Total	22	26	34
	Percent	44%	52%	68%
E-CH00-5-Dup	A	9	10	4
	B	9	7	3
	C	10	9	6
	D	10	8	4
	E	9	9	6
	Total	47	43	23
	Percent	94%	86%	46%

a - Based upon 50 organisms exposed.

Table 6. Summary of ANOVA and Dunnett's Tests of Control Water (0% Elutriate) or Control Sediment (100% Elutriate) and Test Sediment (100% Elutriate) *Menidia beryllina* Survival for Canaveral Harbor, August 2000 (Page 1 of 2)

Menidia beryllina Control Water (0% Elutriate) vs. Other Samples

ANOVA for Differences Between Means

Source of Variation	df	Sum of Squares	Mean Square	F
Between Means	4	115.44	28.86	22.90
Within Means	20	25.20	1.26	
Total	24	140.64		

Critical F = 2.87 ($\alpha = 0.05$, df = 4, 20)
Since F is > Critical F reject H_o: all groups equal;
with $\alpha = 0.05$, and 4, 20 df.

Dunnett's Test

Critical T = 2.65

Sample ID	$\alpha = 0.05$	difference between means	T stat
Control Water (0% Elutriate)	–	–	–
E-CH00-1/2 (100%)	*	4.80	6.76
E-CH00-3/4 (100%)	=	0.20	0.28
E-CH00-5 (100%)	*	2.40	3.38
E-CH00-5-Dup (100%)	*	2.40	6.48

= Indicates no significant difference between the sample station and the control water
* Indicates a significant difference exists between the sample station and the control water

Table 6. Summary of ANOVA and Dunnett's Tests of Control Water (0% Elutriate) or Control Sediment (100% Elutriate) and Test Sediment (100% Elutriate) *Menidia beryllina* Survival for Canaveral Harbor, August 2000 (Page 2 of 2)

Menidia beryllina Control Sediment (100% Elutriate) vs. Other Samples

ANOVA for Differences Between Means

Source of Variation	df	Sum of Squares	Mean Square	F
Between Means	4	110.96	27.74	22.74
Within Means	20	24.40	1.22	
Total	24	135.36		

Critical F = 2.87 ($\alpha = 0.05$, df = 4, 20)
Since F is >Critical F reject H_o: all groups equal;
with $\alpha = 0.05$, and 4, 20 df.

Dunnett's Test

Critical T = 2.65

Sample ID	$\alpha = 0.05$	difference between means	T stat
Control Sediment (100% Elutriate)	–	–	–
E-CH00-1/2 (100%)	*	4.60	6.58
E-CH00-3/4 (100%)	=	0.40	0.57
E-CH00-5 (100%)	*	2.20	3.15
E-CH00-5-Dup (100%)	*	4.40	6.30

= Indicates no significant difference between the sample station and the control water
* Indicates a significant difference exists between the sample station and the control water

Table 7. Sea Urchin, *L. variegatus*, Fertilization Test Counts and Percentages in Three Elutriate Concentrations Prepared from Sediments Collected from Canaveral Harbor, August 2000 (Percent Fertilization in Parenthesis) (Page 1 of 2)

Sample ID	Replicate[a]	No. Fertilized		
CONTROL[b]	A	80		
	B	68		
	C	88		
	Totals	236		
		(79%)		
	Replicate	Concentrations[c]		
		10%	50%	100%
CONTROL SEDIMENT	A	73	70	68
	B	84	90	71
	C	79	85	81
	Totals	236	245	220
		(79%)	(82%)	(73%)
STATION E-CH00-1/2	A	63	74	60
	B	81	69	71
	C	76	82	66
	Totals	220	225	197
		(73%)	(75%)	(66%)
STATION E-CH00-3/4	A	82	78	62
	B	69	76	80
	C	87	70	82
	Totals	238	224	224
		(79%)	(75%)	(75%)

Table 7. Sea Urchin, *L. variegatus*, Fertilization Test Counts and Percentages in Three Elutriate Concentrations Prepared from Sediments Collected from Canaveral Harbor, August 2000 (Percent Fertilization in Parenthesis) (Page 2 of 2)

	Replicate	Concentrations[c]		
STATION E-CH00-5	A	68	61	52
	B	77	72	69
	C	65	59	73
	Totals	210	192	194
		(70%)	(64%)	(65%)
STATION E-CH00-5-Dup	A	71	59	60
	B	65	63	71
	C	69	75	56
	Totals	205	197	187
		(68%)	(66%)	(62%)

[a] One hundred eggs counted per replicate
[b] Control: filtered natural seawater
[c] Percent concentrations of elutriate

Table 8. Summary of ANOVA and Dunnett's Tests of Seawater Control (0% Elutriate) or Control Sediment (100% Elutriate) and Test Sediment (100% Elutriate) *L. variegatus* Survival for Canaveral Harbor, August 2000 (Page 1 of 2)

Lytechinus variegatus Seawater Control (0% Elutriate) vs. Other Samples

ANOVA for Differences Between Means

Source of Variation	df	Sum of Squares	Mean Square	F
Between Means	4	599.07	149.77	1.71
Within Means	10	875.33	87.53	
Total	14	1474.40		

Critical F = 3.48 ($\alpha = 0.05$, df = 4, 10)
Since F is < Critical F fail to reject H_o: all groups equal;
with $\alpha = 0.05$, and 4, 10 df.

Dunnett's Test

Critical T = 2.89

Sample ID	$\alpha = 0.05$	difference between means	T Stat
Seawater Control (0% Elutriate)	–	–	–
E-CH00-1/2 (100%)	=	13.00	1.70
E-CH00-3/4 (100%)	=	4.00	0.52
E-CH00-5 (100%)	=	14.00	1.83
E-CH00-5-Dup (100%)	=	16.33	2.14

= Indicates no significant difference between the sample station and the control water
* Indicates a significant difference exists between the sample station and the control water

Table 8. Summary of ANOVA and Dunnett's Tests of Seawater Control (0% Elutriate) or Control Sediment (100% Elutriate) and Test Sediment (100% Elutriate) *L. variegatus* Survival for Canaveral Harbor, August 2000 (Page 2 of 2)

Lytechinus variegatus Control Sediment (100% Elutriate) vs. Other Samples

ANOVA for Differences Between Means

Source of Variation	df	Sum of Squares	Mean Square	F
Between Means	4	364.40	91.10	1.19
Within Means	10	765.33	76.53	
Total	14	1129.73		

Critical F = 3.48 ($\alpha = 0.05$, df = 4, 10)
Since F is < Critical F fail to reject H_o: all groups equal;
with $\alpha = 0.05$, and 4, 10 df.

Dunnett's Test

Critical T = 2.89

Sample ID	$\alpha = 0.05$	difference between means	T Stat
Control Sediment (100% Elutriate)	–	–	–
E-CH00-1/2 (100%)	=	7.67	1.07
E-CH00-3/4 (100%)	=	1.33	0.19
E-CH00-5 (100%)	=	8.67	1.21
E-CH00-5-Dup (100%)	=	11.00	1.54

= Indicates no significant difference between the sample station and the control water
* Indicates a significant difference exists between the sample station and the control water

Median Lethal Concentration

Exposure of *M. bahia* to elutriates prepared from sediments from the three sample stations and one duplicate station resulted in less than 50% mortality in all of the elutriate bioassays. Consequently, the LC_{50} values for the *M. bahia* tests were all estimated to be greater than 100%, in accordance with EPA/503/8-91/001 (Table 9).

Exposure of *M. beryllina* to elutriates prepared from station E-CH00-3/4 sediment resulted in less than 50% mortality, therefore the LC_{50} value is greater than 100% (Table 9). Exposure to elutriates prepared from sample stations E-CH00-1/2 and E-CH00-5-Duplicate resulted in mortality of *M. beryllina* greater than 50% and consequently LC_{50} values of greater than 92 and 95% were determined (Table 9). Mortality of *M. beryllina* exposed to elutriates from station E-CH00-5 did not follow a dose response sufficient to enable calculation of an LC_{50} value in accordance with EPA/503/8-91/001 (Table 9).

Exposure of *L. variegatus* gametes to elutriates prepared from sediments from the three sample stations and one duplicate station resulted in greater than 50% fertilization rates in all of the elutriates tested. Consequently, the LC_{50} values for the *L. variegatus* tests were all estimated to be greater than 100%, in accordance with EPA/503/8-91/001 (Table 9).

Reference Toxicant Tests

Monthly reference toxicant tests were conducted to determine the general health of each test species. The reference toxicant for the *M. bahia* and *M. beryllina* tests was sodium dodecyl sulfate (SDS) with a test duration of 48 hours. The reference toxicant for the sea urchin tests was copper sulfate ($CuSO_4$) with a duration of 80 minutes and was performed concurrently with the fertilization tests. The 48-hour LC_{50} results for *M. bahia* was 18.36 mg SDS/L (95% confidence limits of 14.54 to 23.18 mg SDS/L) and that for *M. beryllina* was 3.08 mg SDS/L (95% confidence limits of 2.58 to 3.67 mg SDS/L). Finally, the reference toxicant LC_{50} for the sea urchin was 125.34 μg $CuSO_4$/L (95% confidence limits of 118.18 to 132.93 μg $CuSO_4$/L). The LC_{50} values were within historical ESE values and indicate that the test organisms were within their normal sensitivity ranges. The reference toxicant data sheets and the LC_{50} calculations for the elutriate tests are presented in Appendix A-5.

Table 9. LC_{50} (*Mysidopsis bahia*, *Menidia beryllina* and *Lytechinus variegatus*) Values[a] for Elutriate Bioassays Conducted on Canaveral Harbor Sediments, August 2000

Sample ID	*Mysidopsis bahia*	*Menidia beryllina*	*Lytechinus variegatus*
Control Sediment	>100%	>100%	>100%
Station E-CH00-1/2	>100%	> 92%	>100%
Station E-CH00-3/4	>100%	>100%	>100%
Station E-CH00-5	>100%	[b]	>100%
Station E-CH00-5-Dup	>100%	> 95%	>100%

[a] LC_{50} values recorded as greater than 100% had greater than 50% survivorship.

[b] Did not exhibit dose response.

3.2.1 SEDIMENT BIOASSAY DATA

Sediment bioassay test conditions, including temperature, DO, and pH were maintained at acceptable levels throughout the testing period. Salinity variations for the sediment tests slightly exceeded the recommended test range, however the test organisms did not appear to be affected by the salinity variation. A combination of frequent overlying water renewals were used to bring the salinity to acceptable levels. Ammonia was detected in the various samples in varying concentrations ranging from non-detect (<0.1 mg/L as nitrogen), to a maximum concentration of 0.8 mg/L as nitrogen in samples E-CH00-1/2, E-CH00-5, and E-CH00-5- Duplicate in the *M. bahia* exposure. The relevant laboratory raw data pertaining to the sediment tests are provided in Appendices A-6 and A-7 for *M. bahia* and *L. plumulosus*, respectively.

Mysidopsis bahia

M. bahia survivorship was 96% in the laboratory control sediment and 86% in the field reference sediment (Table 10). Survivorship of *M. bahia* in site sediments ranged from 78% (Station E-CH00-5) to 85% (Station E-CH00-5-Duplicate). *M. bahia* survivorship between replicates was relatively uniform and surviving *M. bahia* appeared healthy at test termination.

Statistical analysis using Dunnett's test indicated that the survival of *M. bahia* in the laboratory control sediment was significantly different (P=0.05) from survival in sample E-CH00-5 (Table 9). Survival of *M. bahia* in the remaining site sediments were not significantly different (P=0.05) from the control sediment. Survival for the site sediments was not significantly different than survival of *M. bahia* exposed to the field reference sediment (Table 11).

Leptocheirus plumulosus

L. plumulosus survivorship was 94% and 79%, respectively, in the laboratory control and field reference sediments (Table 12). Survivorship of *L. plumulosus* in the site sediments ranged from 53% (Station E-CH00-5-Duplicate) to 92% (Station E-CH00-3/4). Surviving *L. plumulosus* appeared healthy at the termination of the tests.

Statistical analysis using Dunnett's test indicated that the survival of *L. plumulosus* in the laboratory control sediment was significantly different (P=0.05) from survival in samples E-CH00-1/2, E-CH00-5, and E-CH00-5-Duplicate. There were, however, no significant differences (P=0.05) in the survivorship of *L. plumulosus* between the field reference sediment and any of the site sediments (Table 13).

Table 10. 10-Day Sediment *Mysidopsis bahia* Survival, Canaveral Harbor Sediments, August 2000 (Page 1 of 2)

Sample	Replicate	Number of Survivors[a]
CONTROL SEDIMENT	A	20
	B	19
	C	20
	D	18
	E	19
	Total	96
	Percent	96%
E-CH00-1/2	A	14
	B	16
	C	17
	D	16
	E	18
	Total	81
	Percent	81%
E-CH00-3/4	A	19
	B	15
	C	13
	D	18
	E	19
	Total	84
	Percent	84%
E-CH00-5	A	17
	B	16
	C	19
	D	14
	E	12
	Total	78
	Percent	78%

Table 10. 10-Day Sediment *Mysidopsis bahia* Survival, Canaveral Harbor Sediments, August 2000 (Page 2 of 2)

Sample	Replicate	Number of Survivors[a]
E-CH00-5-Dup	A	19
	B	20
	C	14
	D	17
	E	15
	Total	85
	Percent	85%
RS-CH00	A	16
	B	20
	C	17
	D	16
	E	17
	Total	86
	Percent	86%

a - Based upon 100 organisms exposed

Table 11. Summary of ANOVA and Dunnett's Tests of Control Sediment or Reference Sediment and Test Sediment Survival for Canaveral Harbor Sediment Bioassays of *Mysidopsis bahia*, August 2000 (Page 1 of 2)

Mysidopsis bahia Control Sediment vs. Other Samples

ANOVA for Differences Between Means

Source of Variation	df	Sum of Squares	Mean Square	F
Between Means	5	37.60	7.52	1.70
Within Means	24	106.40	4.43	
Total	29	144.00		

Critical F = 2.62 ($\alpha = 0.05$, df = 5, 24)
Since F is < Critical F fail to reject H_o: all groups equal;
with $\alpha = 0.05$, and 5, 24 df.

Dunnett's Test

Critical T = 2.70

Sample ID	$\alpha = 0.05^a$	difference between means	T-Stat
Control Sediment	–	–	–
E-CH00-1/2 (100%)	=	3.0	2.25
E-CH00-3/4 (100%)	=	2.4	1.80
E-CH00-5 (100%)	*	3.6	2.70
E-CH00-5-Dup (100%)	=	2.2	1.65
RS-CH00	=	2.0	1.50

= Indicates no significant difference between the sample station and the control water
* Indicates a significant difference exists between the sample station and the control water

Table 11. Summary of ANOVA and Dunnett's Tests of Control Sediment or Reference Sediment and Test Sediment Survival for Canaveral Harbor Sediment Bioassays of *Mysidopsis bahia*, August 2000 (Page 2 of 2)

Mysidopsis bahia Reference Sediment vs. Other Samples

ANOVA for Differences Between Means

Source of Variation	df	Sum of Squares	Mean Square	F
Between Means	4	8.56	2.14	0.41
Within Means	20	103.60	5.18	
Total	24	112.16		

Critical F = 2.87 ($\alpha = 0.05$, df = 4, 20)
Since F is < Critical F fail to reject H_o: all groups equal;
with $\alpha = 0.05$, and 4, 20 df.

Dunnett's Test

Critical T = 2.65

Sample ID	$\alpha = 0.05$	difference between means	T-Stat
Reference Sediment	–	–	–
E-CH00-1/2 (100%)	=	1.00	0.69
E-CH00-3/4 (100%)	=	0.40	0.28
E-CH00-5 (100%)	=	1.60	1.11
E-CH00-5-Dup (100%)	=	0.20	0.14

= Indicates no significant difference between the sample station and the control water
* Indicates a significant difference exists between the sample station and the control water

Table 12. 10- Day Sediment *Leptocheirus plumulosus* Survival, Canaveral Harbor Sediments, August 2000 (Page 1 of 2)

Sample	Replicate	Number of Survivors[a]
CONTROL SEDIMENT	A	17
	B	20
	C	20
	D	19
	E	18
	Total	94
	Percent	94%
E-CH00-1/2	A	20
	B	18
	C	8
	D	5
	E	10
	Total	61
	Percent	61%
E-CH00-3/4	A	20
	B	20
	C	13
	D	20
	E	19
	Total	92
	Percent	92%
E-CH00-5	A	10
	B	11
	C	17
	D	10
	E	13
	Total	61
	Percent	61%

Table 12. 10- Day Sediment *Leptocheirus plumulosus* Survival, Canaveral Harbor Sediments, August 2000 (Page 2 of 2)

Sample	Replicate	Number of Survivors[a]
E-CH00-5-Dup	A	12
	B	13
	C	8
	D	10
	E	10
	Total	53
	Percent	53%
RS-CH00	A	19
	B	17
	C	16
	D	19
	E	8
	Total	79
	Percent	79%

a - Based upon 100 organisms exposed

Table 13. Summary of ANOVA and Dunnett's Tests of Control Sediment or Reference Sediment and Test Sediment Survival for Canaveral Harbor Sediment Bioassays of *Leptocheirus plumulosus*, August 2000 (Page 1 of 2)

Leptocheirus plumulosus Control Sediment vs. Other Samples

ANOVA for Differences Between Means

Source of Variation	df	Sum of Squares	Mean Square	F
Between Means	5	305.07	61.01	4.24
Within Means	24	345.60	14.40	
Total	29	650.67		

Critical F = 2.62 ($\alpha = 0.05$, df = 5, 24)
Since F is > Critical F reject H_o: all groups equal;
with $\alpha = 0.05$, and 5, 24 df.

Dunnett's Test

Critical T = 2.70

Sample ID	$\alpha = 0.05$	difference between means	T-Stat
Control Sediment	--	–	--
E-CH00-1/2 (100%)	*	6.6	2.75
E-CH00-3/4 (100%)	=	0.4	0.17
E-CH00-5 (100%)	*	6.6	2.75
E-CH00-5-Dup (100%)	*	8.2	3.42
RS-CH00	=	3.0	1.25

0Table 13. Summary of ANOVA and Dunnett's Tests of Control Sediment or Reference Sediment and Test Sediment Survival for Canaveral Harbor Sediment Bioassays of *Leptocheirus plumulosus*, August 2000 (Page 2 of 2)

Leptocheirus plumulosus Reference Sediment vs. Other Samples

ANOVA for Differences Between Means

Source of Variation	df	Sum of Squares	Mean Square	F
Between Means	4	202.56	50.64	2.99
Within Means	20	338.80	16.94	
Total	24	541.36		

Critical F = 2.87 ($\alpha = 0.05$, df = 4, 20)
Since F is > Critical F reject H_o: all groups equal;
with $\alpha = 0.05$, and 4, 20 df.

Dunnett's Test

Critical T = 2.65

Sample ID	$\alpha = 0.05$	difference between means	T-Stat
Reference Sediment	--	--	--
E-CH00-1/2 (100%)	=	3.6	1.38
E-CH00-3/4 (100%)	=	2.6	1.00
E-CH00-5 (100%)	=	3.6	1.38
E-CH00-5-Dup (100%)	=	5.2	2.00

Reference Toxicant Tests

Reference toxicant tests were conducted on each species tested in the sediment tests. The reference toxicant used for *M. bahia* was SDS and the duration of the test was 48 hours. The reference toxicant used for *L. plumulosus* was cadmium chloride ($CdCl_2$), measured as Cd, for a duration of 96 hours. The 48-hour LC_{50} results for *M. bahia* was 18.36 mg SDS/L (95% confidence limits of 14.54 to 23.18 mg SDS/L) and the 96-hour LC_{50} results for *L. plumulosus* was 2.09 mg Cd/L (95% confidence limits of 1.62 to 2.69 mg Cd/L). The LC_{50} values were within historical ESE values and indicated that the test organisms were within their normal sensitivity ranges. The reference toxicant data sheets and LC_{50} calculations for the sediment tests are presented in Appendix A-8.

3.3 Bioaccumulation Data

The bioaccumulation test conditions, including temperature, DO, pH, and salinity, were maintained at acceptable levels throughout the 10-day testing period. The laboratory raw data are provided in Appendices A-9 and A-10.

Macoma nasuta

Data for the survival of *M. nasuta* in the bioaccumulation tests are presented in Table 14. *M. nasuta* survivorship in the laboratory control and field reference sediments was 84% and 64%, respectively. Survival of *M. nasuta* in the site sediments ranged from 52% (sample station E-CH00-1/2) to 76% (sample station E-CH00-3/4) (Table 14). Adequate mass of *M. nasuta* tissue was available for chemical analyses for all of the samples, if required.

Nereis virens

Data for the survival of *N. virens* in the bioaccumulation tests are also presented in Table 14. *N. virens* survivorship in the laboratory control and field reference sediments was 97% and 98%, respectively. Survival of *N. virens* in the site sediments ranged from 95% (sample stations E-CH00-1/2 and E-CH003-4) to 99% (sample stations E-CH00-5 and E-CH00-5-Duplicate) (Table 14). Adequate mass of *N. virens* tissue was available for chemical analyses for all samples, if required.

3.4 Physical Testing Data

Results of physical testing for specific gravity, percent solids, grain size analysis, Atterburg limits, and settling rates are presented in Appendix B.

Table 14. Survivorship of *Macoma nasuta* and *Nereis virens* During 10-Day Bioaccumulation Bioassays with Sediments from Canaveral Harbor, August 2000 (Page 1 of 2)

Sample ID	Replicate[a]	*Macoma nasuta*	*Nereis virens*
Control Sediment	A	12	20
	B	19	20
	C	16	20
	D	18	19
	E	19	18
	Total[b]	84	97
RS-CH00	A	14	20
	B	14	20
	C	13	20
	D	13	19
	E	10	19
	Total[b]	64	98
Station E-CH00-1/2	A	6	18
	B	13	20
	C	10	19
	D	10	18
	E	13	20
	Total[b]	52	95
Station E-CH00-3/4	A	16	17
	B	16	20
	C	17	19
	D	16	20
	E	11	19
	Total[b]	76	95

Table 14. Survivorship of *Macoma nasuta* and *Nereis virens* During 10-Day Bioaccumulation Bioassays with Sediments from Canaveral Harbor, August 2000 (Page 2 of 2)

Sample ID	Replicate[a]	*Macoma nasuta*	*Nereis virens*
Station E-CH00-5	A	12	20
	B	11	20
	C	17	20
	D	18	19
	E	10	20
	Total	68	99
Station E-CH00-5-Dup	A	15	20
	B	16	19
	C	13	20
	D	12	20
	E	16	20
	Total[b]	72	99

[a] One hundred organisms exposed per sample

[b] Totals represent number alive and percent survival

4

References

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APPENDICES

Appendix A

Bioassay Supporting Data Tables for Canaveral Harbor Sediments, July 2000

Appendix A-1

Sample Handling Logs for Canaveral Harbor Sediments,July 2000

Environmental Science and Engineering
Gainesville, FL

Page: 528
Toxicology Form No.: 011A
Effective: May 1996

EFFLUENT/SEDIMENT RECEIPT AND USAGE LOG

Test Material: Sediment Project No.: 31002186

Sponsor: PPB / General Receipt Date: 7/27/00

Type and Number of Containers: 5 plastic bags (in coolers) ~ 5 gallons each

Mode of Transport: ___ Mail _X_ Hand ___ Courier: _____ Tracking number: _____

Preserved on Ice: No Chain-of-Custody Tape Intact: Yes Composite/Grab: Composite

Information: Samples were packed & delivered by PPB personnel. Sample ID's

INITIAL TEST MATERIAL CHARACTERISTICS

Sample ID:				
Temperature (°C):				
Conductivity/Salinity (umhos/cm; ppt):				
pH (standard units):				
Dissolved Oxygen (mg/L):				
Color:				
Total Residual Chlorine (mg/L):				
Ammonia (mg/L as N):				

Sample Used Upon Receipt (Y/N): Y

Storage: Refrigeration @ 4°C ± 2

Date/Time Recorded: 7/27/00 1300 Sample Custodian: B. Scull

TEST MATERIAL USAGE

Date	Amount	Purpose	Storage	Initials

Test Material Discarded On: _____ By: _____

Reviewed By: _____ Date: _____

Appendix A-2

Survivorship and Water Quality Monitoring Results for *Mysidopsis bahia* Elutriate Bioassays for Canaveral Harbor, July 2000

Project: PPB Canaveral Elutriate

DAILY LOG

8-1-00 - Elutriates prepared by using 4 to 1 ratio of seawater to sediment (i.e. 10L H_2O to 2.5L sediment). Elutriates prepared by hand mixing for 30 min. Supernatant was siphoned off after 1hr of settling time. Dilutions were prepared for 10%, 50% & 100% elutriate. Organisms appeared healthy and were loaded in discriminately into test replicates. Aeration was not supplied to the replicates. ~~0.1~~ Mysid were fed newly hatched brine shrimp to prevent cannabilism.

8.2.00 EM observed + monitored tests. Fed mysid & brine shrimp. Removed dead organisms.

8/3/00 BTS Monitored & observed tests. Took water quality measurements.

8/4/00 EM monitored + observed tests.

8/5/00 EM observed + monitored FOR FINAL DAY OF TEST.

Environmental Science & Engineering, Inc.
Gainesville, FL

QST QA Form: 097
Effective: Oct 1997

SUBJECT: TOXICITY TEST DATA SHEET

Sponsor: PPB| Canaveral Harbor

Project No.:

TEST MATERIAL

Test Material: Elutriate/ Sediment

See Page 528 of Effluent Log for Test Material Information

PROTOCOL / GUIDELINES FOLLOWED:

EPA| 503| 8-91| 001

TEST CONCENTRATIONS BASED ON: [ ] ACTIVE INGREDIENT
[X] WHOLE MATERIAL

TEST CONDITIONS

[ ] Range-finder
[ ] Screening
[X] Definitive

[X] Static
[ ] Flow-Through

TEST DURATION: 96 hours

TEST AREA USED: Waterbath

TEST TEMPERATURE (°C): 20 ± 1

TEST SALINITY (ppt): 25 ± 2

REPLICATES PER CONCENTRATION: 5

ORGANISMS PER REPLICATE: 10

TEST ANIMAL HISTORY

Test Species: Mysidopsis bahia

Lot Number: 2000 - 047

Age / Life Stage: 2 days

Date Acclimation / Maintenance Began: 8|1|00

See Page 344 of Invertebrate Holding Log for Data

Mortality (%) During 48 Hours Prior to Test Initiation:

DILUTION WATER:
Natural, Filtered Seawater

Lighting: [X] Fluorescent [ ] Incandescent

Photoperiod: 16 Hours Light : 8 Hours Dark

TEST VESSELS

Dimensions (m^m): 100 Length x - Width x 50 Height

Test Solution Height: 4 cm

Test Vessels: [ ] Open [X] Covered

Test Container Volume: 0.34 Liters

Test Solution Volume: 0.20 Liters

TEST SOLUTION PREPARATION

TEST CONCENTRATION (%) mg/L	Control	10	50	100			
Volume of Dilution Water Added (mL)	1000	900	500	-			
Volume of Effluent / Stock Added (mL) Elutriate	-	100	500	1000			

ADDITIONAL OBSERVATIONS:

DATA BY: AC **DATE:** 7/18/00

Environmental Science & Engineering, Inc.
Toxicology Laboratory
Gainesville, Florida

ACUTE TOXICITY DATA SHEET - WATER QUALITY DATA

SPONSOR: PPB/Canaveral | PROJECT NUMBER:

TEST SUBSTANCE: Elutriate | TEST SPECIES: M. bahia

DATE		8/1/00				8/2/00				8/3/00				8/4/00				8/5/00									
TIME		1400				1230				1245				1145				1330									
INIT.		ADE				Em				ADE				Em				Em									
NOMIN CONCN % mg/L µg/L	REP	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN		
Control	A	21.6	8.3	7.6	25	20.1	7.8	6.3	25	20.6	7.8	4.9	27	20.3	7.9	6.4	26	20.2	8.1	6.4	30						
Control 10%	A	21.2	8.3	7.5	25	20.1	8.0	6.5	25	20.3	8.0	5.6	26	20.2	8.0	6.6	26	20.1	8.3	6.7	30						
Control 50%	A	21.0	8.3	6.6	25	19.8	8.0	6.0	26	20.3	8.1	5.4	27	20.1	8.1	7.0	28	20.0	8.4	6.8	32						
Control 100%	A	20.2	8.2	5.0	26	20.2	8.2	6.8	28	20.3	8.3	5.8	28	20.0	8.3	7.3	29	19.9	8.5	6.8	34						
~~Ref RS-CHOO 10%~~																											
~~Ref RS-CHOO 50%~~																											
~~Ref RS-CHOO 100%~~																											
E-CHOO 1-2 10%	A	21.3	8.3	~~7.5~~ 6.5	25	20.3	8.2	6.7	26	20.3	8.2	6.5	27	19.8	8.1	6.9	28	19.7	8.5	4.	32						
INST/METH		FS-8	SA 2900	DO3	Ref 6	FS-8	2903	DO4	REF6	FS-8	2908	DO4	Ref 6	FS-8	2908	DO4	~~FS-8~~ REF6	~~Ref 6~~ FS-8	2908	DO4	Ref 6						

KEY

TEMP - Temperature
SL - Salinity (ppt)
pH - standard units

DO - Dissolved oxygen (mg/L)
CN - Conductivity (µmhos/cm)
INST - Instrument
NOMIN CONCN - Nominal concentration

INIT. - Initials
REP - Replicate
METH - Method

Environmental Science & Engineering, Inc.
Toxicology Laboratory
Gainesville, Florida

ACUTE TOXICITY DATA SHEET - WATER QUALITY DATA

SPONSOR: PPB/Canaveral Harbor | PROJECT NUMBER:

TEST SUBSTANCE: Elutriate | TEST SPECIES: M. bahia

DATE		8/1/00				8/2/00				8/3/00				8/4/00				8/5/00									
TIME		1400				1230				1245				1145				1330									
INIT.		ADE				EM				ADE				EM				EM									
NOMIN CONCN % mg/L µg/L	REP	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN		
E-CHOO 1-2 50%	A	20.9	8.3	6.5	25	20.3	8.3	6.7	27	20.3	8.4	6.6	28	20.0	8.3	7.1	28	19.6	8.6	6.9	31						
E-CHOO 1-2 100%	A	20.1	8.3	5.4	26	20.3	8.2	6.8	28	20.4	8.6	6.8	29	20.0	8.4	7.1	30	19.7	8.7	7.0	31						
E-CHOO 3-4 10%	A	21.5	8.3	7.5	24	20.4	8.1	6.7	26	20.5	8.2	6.8	27	19.8	8.2	7.2	28	19.7	8.4	6.9	30						
E-CHOO 3-4 50%	A	21.1	8.4	7.0	25	20.4	8.3	6.8	27	20.5	8.4	6.6	28	19.8	8.3	7.1	28	19.8	8.6	6.7	30						
E-CHOO 3-4 100%	A	20.1	8.4	5.8	26	20.3	8.3	6.4	28	20.0	8.5	6.7	29	20.1	8.4	7.4	30	19.9	8.6	7.0	31						
E-CHOO 5 10%	A	21.4	8.3	7.5	25	20.2	8.1	6.4	27	20.6	8.3	7.1	28	20.2	8.2	7.3	28	19.8	8.5	7.1	30						
E-CHOO 5 50%	A	21.1	8.3	6.9	25	20.5	8.3	6.6	27	20.6	8.5	6.4	29	20.1	8.3	7.1	29	20.0	8.6	7.0	30						
E-CHOO 5 100%	A	20.3	8.2	5.8	25	20.2	8.4	5.7	27	20.6	8.6	6.9	29	20.2	8.5	7.1	30	20.1	8.7	6.9	31						
INST/METH		YSI 85	YSI 290B	~~REF 10~~ DOE DO5	Ref 6	YSI-85	290B	DO4	Ref 6	YSI 85	290B	DO4	Ref 6	YSI-85	290B	DO4	Ref 6	YSI-85	290B	DO4	Ref 6						

KEY

TEMP - Temperature
SL - Salinity (ppt)
pH - standard units

DO - Dissolved oxygen (mg/L)
CN - Conductivity (µmhos/cm)
INST - Instrument
NOMIN CONCN - Nominal concentration

INIT. - Initials
REP - Replicate
METH - Method

Environmental Science & Engineering, Inc.
Toxicology Laboratory
Gainesville, Florida

ACUTE TOXICITY DATA SHEET - WATER QUALITY DATA

SPONSOR: PPB/Canaveral Harbor | PROJECT NUMBER:

TEST SUBSTANCE: Elutriate | TEST SPECIES: M. bahia

DATE		8/1/00				8/2/00				8/3/00				8/4/00				8/5/00									
TIME		1400				1230				1245				1145				1330									
INIT.		ADE				EM				ADE				EM				EM									
NOMIN CONCN % mg/L µg/L	REP	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN		
E-CH00	A	21.5	8.3	7.5	24	20.6	8.2	6.8	27	20.6	8.3	6.6	27	20.3	8.2	7.1	29	20.1	8.5	6.8	30						
Dup 10%	A																										
E-CH00	A	21.2	8.3	6.8	25	20.4	8.4	6.4	27	20.7	8.5	6.3	29	20.3	8.3	7.1	29	20.3	8.6	7.0	30						
Dup 50%																											
E-CH00	A	20.4	8.3	5.6	25	20.5	8.5	6.3	28	20.7	8.6	6.8	29	20.7	8.5	7.0	30	20.5	8.8	7.0	30						
Dup 100%																											
INST/METH		FS8	3A 2998	003	Ref 6	FS8	298B	D04	Ref6	FS8	3A	D04	Ref6	FS8	298B	D04	Ref6	FS8	298B	D04	Ref b						

KEY

TEMP - Temperature
SL - Salinity (ppt)
pH - standard units

DO - Dissolved oxygen (mg/L)
CN - Conductivity (µmhos/cm)
INST - Instrument
NOMIN CONCN - Nominal concentration

INIT. - Initials
REP - Replicate
METH - Method

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0300-3100

Test Substance: Elutriate

Test Species: *Mysidopsis bahia*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		BS		BS		BS		Em		Em	
TIME		1400		1350		1145		1330		1030	
TECHNICIAN		ADE		BTS		ADE		Em		Em	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
CONTROL	A	Loaded	10	N	10	INF	9	N	9	N	9
CONTROL	B			Id	9	N	9	N	9	N	9
CONTROL	C			N	10	INF	9	N	9	N	9
CONTROL	D			INF	9	N	9	N	10*	N	10
CONTROL	E			INF	8	N	8	N	8	N	8
CONTROL 10%	A			N	10	N	10	N	10	INF	9
CONTROL 10%	B			INF	8	N	9	N	9	N	9
CONTROL 10%	C			N	10	INF	9	N	10*	N	10
CONTROL 10%	D			N	10	N	10	INF	9	N	wp 9
CONTROL 10%	E			N	10	N	10	N	10	N	10
CONTROL 50%	A			N	10	N	10	N	10	N	10
CONTROL 50%	B			INF	9	N	9	N	9	N	9
CONTROL 50%	C			INF	9	N	10	N	9	N	9
CONTROL 50%	D			Id	9	N	9	N	9	INF	8
CONTROL 50 %	E			INF	9	N	9	N	10*	N	10

OBSERVATION KEY

REP = Replicate
OBS = Observations
NO. ALIVE = Number of Organisms Alive (survival)
N (NONE) = Normal Conditions
BS = Brine Shrimp
YTC/ALG = YTC and green algae (daphnids)
NF = Not Found

PRE = Precipitate
FOS = Film on Surface of Water
UC = Undissolved Chemical
LETH = Lethargic
LE = Loss of Equilibrium
HYP = Hyperactive

AS = Organisms At Surface of Water
ERR = Erractic
GY = Gyrating
G = Gulping
RAR = Rapid Respiration
LT = Light Pigmentation

* Previous observation incorrect.

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0300-3100

Test Substance: Elutriate

Test Species: *Mysidopsis bahia*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		BS		BS		BS		Em		Em	
TIME		1400		1360		1145		1330		1030	
TECHNICIAN		ADE		BTS		ADE		Em		Em	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
CONTROL 100%	A	Loaded	10	N	10	INF	9	N	9	N	9
CONTROL 100%	B			N	10	N	10	N	10	N	10
CONTROL 100%	C			N	10	N	10	INF	9	N	9
CONTROL 100%	D			2NF	8	N	9	N	9	N	10*
CONTROL 100%	E			2NF	8	N	8	N	9*	N	9
E-CHOO Ref 10%	A										
E-CHOO Ref 10%	B										
E-CHOO Ref 10%	C										
E-CHOO Ref 10%	D										
E-CHOO Ref 10%	E										
E-CHOO Ref 50%	A										
E-CHOO Ref 50%	B										
E-CHOO Ref 50%	C										
E-CHOO Ref 50%	D										
E-CHOO Ref 50 %	E										

OBSERVATION KEY

REP = Replicate
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NO. ALIVE = Number of Organisms Alive (survival)
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AS = Organisms At Surface of Water
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GY = Gyrating
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LT = Light Pigmentation

*Previous obs. incorrect

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0300-3100

Test Substance: Elutriate

Test Species: *Mysidopsis bahia*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		BS		BS		BS		EM		EM	
TIME		1400		1350		1145		1330		1030	
TECHNICIAN		ADE		BTS		ADE		EM		EM	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
E-CHOO Ref 100%	A	Loaded	10								
E-CHOO Ref 100%	B										
E-CHOO Ref 100%	C										
E-CHOO Ref 100%	D										
E-CHOO Ref 100%	E										
E-CHOO 1-2 10%	A			INF	9	N	9	N	10*	N	10
E-CHOO 1-2 10%	B			INF	9	N	10	N	10	N	10
E-CHOO 1-2 10%	C			N	10	N	10	N	10	N	10
E-CHOO 1-2 10%	D			N	10	N	10	N	10	N	10
E-CHOO 1-2 10%	E			N	10	N	10	N	10	N	10
E-CHOO 1-2 50%	A			INF	9	N	9	N	9	N	9
E-CHOO 1-2 50%	B			2NF	8	N	9	N	9	N	9
E-CHOO 1-2 50%	C			N	10	N	10	N	10	N	10
E-CHOO 1-2 50%	D			N	10	N	10	N	10	INF	9
E-CHOO 1-2 50 %	E			N	10	N	10	N	10	N	10

OBSERVATION KEY

REP = Replicate
OBS = Observations
NO. ALIVE = Number of Organisms Alive (survival)
N (NONE) = Normal Conditions
BS = Brine Shrimp
YTC/ALG = YTC and green algae (daphnids)
NF = Not Found

PRE = Precipitate
FOS = Film on Surface of Water
UC = Undissolved Chemical
LETH = Lethargic
LE = Loss of Equilibrium
HYP = Hyperactive

AS = Organisms At Surface of Water
ERR = Erractic
GY = Gyrating
G = Gulping
RAR = Rapid Respiration
LT = Light Pigmentation

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 31002186-0300-3100

Test Substance: Elutriate

Test Species: *Mysidopsis bahia*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		BS		BS		BS		Em		Em	
TIME		1400		1350		1145		1330		1030	
TECHNICIAN		ADE		BTS		ADE		Em		Em	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
E-CHOO 1-2 100%	A	Loaded	10	INF	9	N	9	N	9	N	9
E-CHOO 1-2 100%	B			N	10	N	10	N	10	N	10
E-CHOO 1-2 100%	C			N	10	N	10	N	10	N	10
E-CHOO 1-2 100%	D			N	10	~~INF~~ N	~~9~~ 10	N	10	N	10
E-CHOO 1-2 100%	E			N	10	N	10	N	10	INF	9
E-CHOO 3-4 10%	A			INF	9	N	9	N	9	N	9
E-CHOO 3-4 10%	B			N	10	N	10	N	10	N	10
E-CHOO 3-4 10%	C			N	10	INF	9	N	9	N	9
E-CHOO 3-4 10%	D			INF	9	N	9	N	9	N	9
E-CHOO 3-4 10%	E			N	10	N	10	N	10	N	10
E-CHOO 3-4 50%	A			N	10	N	10	INF	9	N	9
E-CHOO 3-4 50%	B			N	10	N	10	INF	9	N	9
E-CHOO 3-4 50%	C			INF	9	N	9	N	9	N	9
E-CHOO 3-4 50%	D			N	10	N	10	N	10	N	10
E-CHOO 3-4 50%	E			N	10	N	10	N	10	N	10

OBSERVATION KEY

REP = Replicate
OBS = Observations
NO. ALIVE = Number of Organisms Alive (survival)
N (NONE) = Normal Conditions
BS = Brine Shrimp
YTC/ALG = YTC and green algae (daphnids)
NF = Not Found

PRE = Precipitate
FOS = Film on Surface of Water
UC = Undissolved Chemical
LETH = Lethargic
LE = Loss of Equilibrium
HYP = Hyperactive

AS = Organisms At Surface of Water
ERR = Erractic
GY = Gyrating
G = Gulping
RAR = Rapid Respiration
LT = Light Pigmentation

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0300-3100

Test Substance: Elutriate

Test Species: *Mysidopsis bahia*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		BS		BS		BS		Em		Em	
TIME		1400		1350		1145		1030		1030	
TECHNICIAN		ADE		BTS		ADE		Em		Em	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
E-CHOO 3-4 100%	A	Loaded	10	INF	9	N	9	N	10[x]	N	10
E-CHOO 3-4 100%	B			2NF	8	N	10	N	10	N	10
E-CHOO 3-4 100%	C			N	10	N	10	INF	9	N	9
E-CHOO 3-4 100%	D			N	10	N	10	INF	9	N	10[x]
E-CHOO 3-4 100%	E			N	10	N	10	N	10	N	10
E-CHOO 5 10%	A			N	10	N, 1D, 1INF	8	N	10	N	10
E-CHOO 5 10%	B			N	10	2D N	8	N	10	N	10
E-CHOO 5 10%	C			N	10	N	10	N	10	N	10
E-CHOO 5 10%	D			INF	9	N	10	N	10	N	10
E-CHOO 5 10%	E			N	10	INF	9	N	10[x]	N	10
E-CHOO 5 50%	A			1d, INF	8	N	9	N	9	N	9
E-CHOO 5 50%	B			INF	9	N	9	N	9	N	9
E-CHOO 5 50%	C			3d, INF	6	N	7	N	7	N	7
E-CHOO 5 50%	D			N	10	N	10	N	9	N	10[x]
E-CHOO 5 50%	E			2d, 1 Leth	8	N	8	N	8	N	8

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UC = Undissolved Chemical
LETH = Lethargic
LE = Loss of Equilibrium
HYP = Hyperactive

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ERR = Erractic
GY = Gyrating
G = Gulping
RAR = Rapid Respiration
LT = Light Pigmentation

[x] Previous obs. incorrect

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 31002186-0300-3100

Test Substance: Elutriate

Test Species: *Mysidopsis bahia*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		BS		BS		BS		Em		Em	
TIME		1400		1350		1145		1330		1030	
TECHNICIAN		ADE		BTS		ADE		Em		Em	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
E-CHOO 5 100%	A	Loaded	10	1d	9	2d INF	7 8	N	8	N	8
E-CHOO 5 100%	B			3d	7	INF	6	N	7[x]	N	7
E-CHOO 5 100%	C			3d, 1Leth	7	1 Leth	7	1d	6	N	6
E-CHOO 5 100%	D			2d, INF	7	N	7	N	7	N	7
E-CHOO 5 100%	E			2d, 2NF	6	N	6	N	6	N	6
E-CHOO-Dup 10%	A			INF	9	N	9	1NF	W1 8 9	N	9
E-CHOO-Dup 10%	B			N	10	N	10	N	10	N	10
E-CHOO-Dup 10%	C			N	10	N	10	N	10	N	10
E-CHOO-Dup 10%	D			3NF	7	N	8	N	8	N	8
E-CHOO-Dup10%	E			2NF	8	N	8 9	1NF	8	N	9[x]
E-CHOO-Dup 50%	A			1d	9	N	9	N	9	N	9
E-CHOO-Dup 50%	B			INF	9	N	9	N	9	N	9
E-CHOO-Dup 50%	C			N	10	N	10	N	10	N	10
E-CHOO-Dup 50%	D			N	10	INF	9	N	10[x]	N	10
E-CHOO-Dup 50%	E			N	10	INF	9	N	9	N	9

OBSERVATION KEY

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OBS = Observations
NO. ALIVE = Number of Organisms Alive (survival)
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FOS = Film on Surface of Water
UC = Undissolved Chemical
LETH = Lethargic
LE = Loss of Equilibrium
HYP = Hyperactive

AS = Organisms At Surface of Water
ERR = Erractic
GY = Gyrating
G = Gulping
RAR = Rapid Respiration
LT = Light Pigmentation

x Previous obs incorrect

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0300-3100

Test Substance: Elutriate

Test Species: *Mysidopsis bahia*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		BS		BS		BS		Em		Em	
TIME		1400		1350		1145		1330		1030	
TECHNICIAN		ADE		BTS		ADE		Em		Em	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
E-CHOO Dup 100%	A	Loaded	10	Id	9	N	9	N	9	N	9
E-CHOO Dup 100%	B			N	10	N	10	N	10	N	10
E-CHOO Dup 100%	C			N	10	INF	9	N	9	N	9
E-CHOO Dup 100%	D			Id, 2d	7	N	7	N	7	N	7
E-CHOO Dup 100%	E			Id	9	N	9	N	9	N	9

OBSERVATION KEY

REP = Replicate
OBS = Observations
NO. ALIVE = Number of Organisms Alive (survival)
N (NONE) = Normal Conditions
BS = Brine Shrimp
YTC/ALG = YTC and green algae (daphnids)
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PRE = Precipitate
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AS = Organisms At Surface of Water
ERR = Erractic
GY = Gyrating
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RAR = Rapid Respiration
LT = Light Pigmentation

Appendix A-3

Survivorship and Water Quality Monitoring Results for *Menidia beryllina* Elutriate Bioassays for Canaveral Harbor, July 2000

Environmental Science & Engineering, Inc.
Gainesville, FL

QST QA Form: 097
Effective: Oct 1997

SUBJECT: TOXICITY TEST DATA SHEET

Sponsor: PPBI Canaveral Harbor Project No.:

TEST MATERIAL

Test Material: Elutriate/ Sediment

See Page 5296 of Effluent Log for Test Material Information

PROTOCOL / GUIDELINES FOLLOWED:

EPA-503/8-91/001

TEST CONCENTRATIONS BASED ON: [ ] ACTIVE INGREDIENT
[X] WHOLE MATERIAL

TEST CONDITIONS

[ ] Range-finder [X] Static
[ ] Screening [ ] Flow-Through
[X] Definitive

TEST DURATION: 96 Hours

TEST AREA USED: Waterbath

TEST TEMPERATURE (°C): 20 ± 1

TEST SALINITY (ppt): 25 ± 2

REPLICATES PER CONCENTRATION: 5

ORGANISMS PER REPLICATE: 10

TEST ANIMAL HISTORY

Test Species: Menidia beryllina

Lot Number: 2000-048

Age / Life Stage: 10 days

Date Acclimation / Maintenance Began: 7/1/00

See Page 42 of Fish Holding Log for Data

Mortality (%) During 48 Hours Prior to Test Initiation: >1 %

DILUTION WATER:

Lighting: [X] Fluorescent [ ] Incandescent

Photoperiod: 16 Hours Light : 8 Hours Dark

TEST VESSELS

Dimensions (mm) : 100 Length x - Width x 50 Height

Test Solution Height: 4 cm

Test Vessels: [X] Open [ ] Covered

Test Container Volume: 0.346 WI HT Liters

Test Solution Volume: 0.203 WI HT Liters

TEST SOLUTION PREPARATION

TEST CONCENTRATION (%) mg/L	Control	10	50	100			
Volume of Dilution Water Added (mL) *	1500 ~~2000~~	1350 ~~1800~~	750 ~~1000~~	-			
Volume of Effluent / Stock Added (mL) Elutriate	-	150 200	750 ~~1000~~	1500 2000			

ADDITIONAL OBSERVATIONS: * WI HT

DATA BY: AC DATE: 7/18/00

ACUTE TOXICITY DATA SHEET - WATER QUALITY DATA

SPONSOR: PPB/Canaveral | PROJECT NUMBER: 3100218

TEST SUBSTANCE: Elutriate | TEST SPECIES: M. beryllina

DATE		8/1/00				8/2/00				8/3/00				8/4/00				8/5/00									
TIME		1430				1030				1310				1100				1300									
INIT.		ADE				EM				BTS				EM				EM									
NOMIN CONCN (%) mg/L µg/L	REP	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN
Control	A	21.6	8.3	7.6	25	20.5	7.9	5.4	25	20.6	8.0	7.8	25	20.1	7.7	5.8	25	20.6	7.8	5.4	27								
Control 10%	A	21.2	8.3	7.5	25	20.2	8.0	5.6	25	20.4	8.0	7.2	25	20.3	7.9	6.2	25	20.7	8.0	5.7	28								
Control 50%		21.0	8.3	6.6	25	20.5	8.0	5.6	26	20.3	8.2	7.4	26	20.2	7.9	5.7	27	20.7	8.2	6.0	29								
Control 100%		20.2	8.2	5.0	26	20.5	8.2	5.6	27	20.4	8.2	6.4	26	20.2	8.0	6.0	28	20.6	8.2	5.6	30								
Ref RS-CH00 10%																													
Ref RS-CH00 50%																													
Ref RS-CH00 100%																													
E-CH00 1/2 10%		21.3	8.3	7.5	25	20.5	8.0	5.3	26	20.4	8.1	6.7	26	20.1	8.0		27												
INST/METH		FS 8	SA 280B	DO 3	Ref 6	FS 8	280B	DO 4	Ref 6	FS 4	SA 280B	DO 4	Ref 6	FS 8	280B	DO 4	Ref 6												

KEY

TEMP - Temperature
SL - Salinity (ppt)
pH - standard units

DO - Dissolved oxygen (mg/L)
CN - Conductivity (µmhos/cm)
INST - Instrument
NOMIN CONCN - Nominal concentration

INIT. - Initials
REP - Replicate
METH - Method

ACUTE TOXICITY DATA SHEET - WATER QUALITY DATA

SPONSOR: PPB/Canaveral | PROJECT NUMBER: 3100218

TEST SUBSTANCE: Elutriate | TEST SPECIES: M. beryllina

DATE	8/1/00	8/2/00	8/3/00	8/4/00	8/5/00	
TIME	1430	1030	1310	1100	1300	
INIT.	ADE	EM	BTS	EM	EM	

NOMIN CONCN (%) mg/L µg/L	REP	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN
E-CHOO 1-2 50%		20.9	8.3	6.5	25	20.4	8.2	5.0	27	20.5	8.3	7.8	26	20.1	8.2	6.0	28	20.5	8.2	7.0	28				
E-CHOO 1-2 100%		20.1	8.3	5.4	26	20.3	8.2	4.8	28	20.4	8.5	7.6 BTS	27	20.1	8.3	5.8	30	20.3	8.4	6.7	28				
E-CHOO 3-4 10%		21.5	8.3	7.5	24	20.3	8.0	5.0	25	20.4	8.0	6.7	26	19.9	7.9	6.1	27	20.2	8.1	5.6	28				
E-CHOO 3-4 50%		21.1	8.4	7.0	25	20.2	8.2	5.5	27	20.3	8.2	6.8	26	19.4	8.0	5.8	28	20.1	8.3	5.9	29				
E-CHOO 3-4 100%		20.1	8.4	5.8	26	20.2	8.3	4.8	28	20.2	8.4	7.3	27	19.7	8.1	6.1	28	20.0	8.4	5.8	30				
E-CHOO 5 10%		21.4	8.3	7.5	25	20.2	8.0	5.6	25	20.2	8.1	7.2	26	19.7	7.9	6.1	27	20.0	8.3	5.6	28				
E-CHOO 5 50%		21.1	8.3	6.9	25	20.2	8.2	4.8	25	20.1	8.3	5.6	26	19.8	7.9	5.8	27	19.9	8.4	5.7	28				
E-CHOO 5 100%		20.3	8.2	5.8	25	20.2	8.3	4.7	26	20.1	8.5	6.5	27	19.7	8.3	5.6	28	19.9	8.5	5.7	30				
INST/METH		558	SA 290B	DO3	REF 6	FS 8	290B	DO4	REF 6	FS 4	SA 290B	DO4	REF 6	FS 8	290B	DO4	REF 6	FS 8	290B	DO4	REF 6				

KEY

TEMP - Temperature
SL - Salinity (ppt)
pH - standard units

DO - Dissolved oxygen (mg/L)
CN - Conductivity (µmhos/cm)
INST - Instrument

INIT. - Initials
REP - Replicate
METH - Method

Environmental Science & Engineering, Inc.
Toxicology Laboratory
Gainesville, Florida

ACUTE TOXICITY DATA SHEET - WATER QUALITY DATA

SPONSOR: PPB/Canaveral | PROJECT NUMBER: 3100218

TEST SUBSTANCE: Elutriate | TEST SPECIES: M. beryllina

DATE		8/1/00				8/2/00				8/3/00				8/4/00				8/5/00													
TIME		1430				1030				1310				1100				1300													
INIT.		ADE				Em				BTS				Em				Em													
NOMIN CONCN % mg/L µg/L	REP	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN		
E-CH00		21.5	8.3	7.5	24	20.3	8.0	5.4	25	20.1	8.1	7.1	25	19.7	8.0	6.1	27	19.9	8.3	5.8	28										
Dup																															
10%																															
E-CH00		21.2	8.3	6.8	25	20.4	8.2	4.4	25	20.2	8.4	7.0	26	19.8	8.2	6.2	27	20.0	8.5	6.2	29										
Dup																															
50%																															
E-CH00		20.4	8.3	5.6	25	20.6	8.3	4.0	26	20.2	8.5	7.8	27	20.0	8.4	6.0	29	20.1	8.6	6.1	30										
Dup																															
100%																															
INST/METH		FS-8	SA 2908	DO3	Ref 6	FS-8	SA 2908	DO4	Ref 6	FS 9	SA 2910 B	DO4	Ref 6	FS 9	SA 2910 B	DO4	Ref 6	FS 8	SA 2908 B	DO 4	Ref 6										

KEY

TEMP - Temperature
SL - Salinity (ppt)
pH - standard units

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Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0300-3100

Test Substance: Elutriate

Test Species: *Menidia beryllina*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		9a Brine Shrimp prior to test		-		-		-		-	
TIME		1300		1030		1100		1030		1130	
TECHNICIAN		ADE		EM		BOB		EM		EM	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
CONTROL	A	LOADED	10	N	10	N	10	N	10	N 2d	8
CONTROL	B			N	10	N	10	N	10	N 2d	8
CONTROL	C			N	10	N	10	N	10	N	10
CONTROL	D			N	10	N	10	N	10	N	10
CONTROL	E			N	10	N	10	N	10	N	10
CONTROL 10%	A			N	10	N	10	N	10	N	10
CONTROL 10%	B			N	10	N	10	N	10	N	10
CONTROL 10%	C			N	10	N	10	N	10	N 2d	8
CONTROL 10%	D			N	10	N	10	N	10	N 1d	9
CONTROL 10%	E			N	10	N	10	N	10	N	10
CONTROL ~~10%~~ 50	A			N	10	N	10	N	10	Leth 1d	9
CONTROL 50%	B			N	10	N	10	N	10	Leth	10
CONTROL 50%	C			N	10	N	10	N	10	N	10
CONTROL 50%	D			N	10	N	10	N	10	N	10
CONTROL 50%	E			N	10	N	10	N	10	N 1d	9

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Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0300-3100

Test Substance: Elutriate

Test Species: *Menidia beryllina*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		Brine shrimp prior to test		–		–		–		–	
TIME		1300		1130		1100		1030		1130	
TECHNICIAN		AOE		EM		AOE		EM		EM	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
CONTROL 100%	A	Loaded	10	N	10	N	10	N	10	N ld	8
CONTROL 100%	B			N	10	N	10	N	10	N ld	9
CONTROL 100%	C			N	10	N	10	N	10	N	8
CONTROL 100%	D			N	10	N	10	N	10	N	10
CONTROL 100%	E			N	10	N	10	N	10	N	10
E-CHOO Ref 10%	A										
E-CHOO Ref 10%	B										
E-CHOO Ref 10%	C										
E-CHOO Ref 10%	D										
E-CHOO Ref 10%	E										
E-CHOO Ref 50%	A										
E-CHOO Ref 50%	B										
E-CHOO Ref 50%	C										
E-CHOO Ref 50%	D										
E-CHOO Ref 50%	E										

OBSERVATION KEY

REP = Replicate
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HYP = Hyperactive

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ERR = Erractic
GY = Gyrating
G = Gulping
RAR = Rapid Respiration
LT = Light Pigmentation

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0300-3100

Test Substance: Elutriate

Test Species: *Menidia beryllina*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		Brine Shrimp prior to test		-		-		-		-	
TIME		1300		1130		1100		1030		1130	
TECHNICIAN		ADE		Em		ADE		Em		Em	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
E-CHOO Ref 100%	A	Loaded	10								
E-CHOO Ref 100%	B										
E-CHOO Ref 100%	C										
E-CHOO Ref 100%	D										
E-CHOO Ref 100%	E										
E-CHOO 1-2 10%	A			N	10	N	10	N	10	N	10
E-CHOO 1-2 10%	B			N	10	N	10	N	10	N	10
E-CHOO 1-2 10%	C			N	10	N	10	N	10	N	10
E-CHOO 1-2 10%	D			N	10	N	10	N	10	N	10
E-CHOO 1-2 10%	E			N	10	N	10	N	10	N	10
E-CHOO 1-2 50%	A			N	10	N	10	N	10	3 Leth	10
E-CHOO 1-2 50%	B			N	10	N	10	N	10	2 Leth/d	9
E-CHOO 1-2 50%	C			N	10	N	10	N	10	Leth 3d	7
E-CHOO 1-2 50%	D			N	10	N	10	N	10	N 3d	7
E-CHOO 1-2 50%	E			N	10	N	10	N	10	N 1d	9

OBSERVATION KEY

REP = Replicate
OBS = Observations
NO. ALIVE = Number of Organisms Alive (survival)
N (NONE) = Normal Conditions
BS = Brine Shrimp
YTC/ALG = YTC and green algae (daphnids)
NF = Not Found

PRE = Precipitate
FOS = Film on Surface of Water
UC = Undissolved Chemical
LETH = Lethargic
LE = Loss of Equilibrium
HYP = Hyperactive

AS = Organisms At Surface of Water
ERR = Erractic
GY = Gyrating
G = Gulping
RAR = Rapid Respiration
LT = Light Pigmentation

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0300-3100

Test Substance: Elutriate

Test Species: *Menidia beryllina*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		brine shrimp prior to test		-		-		-		-	
TIME		1300		11 30		1100		1030		1130	
TECHNICIAN		ADE		EM		ADE		EM		EM	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
E-CHOO 1-2 100%	A	Loaded	10	LE 2d	8	LE	8	Leth 2d	6	N 3d	3
E-CHOO 1-2 100%	B			LE 3d	7	N	7	Leth 3d	4	Leth 1d	3
E-CHOO 1-2 100%	C			LE 2d	8	N	8	Leth 2d	6	Leth 1d	5
E-CHOO 1-2 100%	D			LE 1d	9	N	9	Leth 1d	8	Leth 2d	6
E-CHOO 1-2 100%	E			LE 1d	9	N	9	Leth	9	Leth 4d	5
E-CHOO 3-4 10%	A			N	10	N	10	N	10	N	10
E-CHOO 3-4 10%	B			N	10	N	10	N	10	N 1d	9
E-CHOO 3-4 10%	C			N	10	N	10	N	10	N	10
E-CHOO 3-4 10%	D			N	10	N	10	N	10	2Leth	10
E-CHOO 3-4 10%	E			N	10	N	10	N	10	N	10
E-CHOO 3-4 50%	A			N	10	N	10	N	10	N	10
E-CHOO 3-4 50%	B			N	10	N	10	N	10	N	10
E-CHOO 3-4 50%	C			N	10	N	10	N	10	N	10
E-CHOO 3-4 50%	D			N	10	N	10	N	10	2Leth	10
E-CHOO 3-4 50%	E			N	10	N	10	N	10	N	10

OBSERVATION KEY

REP = Replicate
OBS = Observations
NO. ALIVE = Number of Organisms Alive (survival)
N (NONE) = Normal Conditions
BS = Brine Shrimp
YTC/ALG = YTC and green algae (daphnids)
NF = Not Found

PRE = Precipitate
FOS = Film on Surface of Water
UC = Undissolved Chemical
LETH = Lethargic
LE = Loss of Equilibrium
HYP = Hyperactive

AS = Organisms At Surface of Water
ERR = Erractic
GY = Gyrating
G = Gulping
RAR = Rapid Respiration
LT = Light Pigmentation

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 31002186-0300-3100

Test Substance: Elutriate

Test Species: *Menidia beryllina*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		Brine shrimp prior to test		-		-		-		-	
TIME		1300		1130		1100		1030		1130	
TECHNICIAN		ADE				ADE		Em		Em	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
E-CHOO 3-4 100%	A	Loaded	10	N	10	N	10	N	10	N 1d	9
E-CHOO 3-4 100%	B			N	10	N	10	N	10	N	10
E-CHOO 3-4 100%	C			N	10	N	10	N	10	1Leth	10
E-CHOO 3-4 100%	D			N	10	N	10	N	10	4Leth 1d	9
E-CHOO 3-4 100%	E			N	10	N	10	N	10	3Leth 1d	9
E-CHOO 5 10%	A			LE WP	9 WP	10	8	N 4d	4	N	4
E-CHOO 5 10%	B			LE WP	10 WP	20	8	N 3d	5	1Leth 1d	4
E-CHOO 5 10%	C			LE WP	10 WP	N	10	N 4d	6	N 1d	5
E-CHOO 5 10%	D			N	10	N	10	N 5d	5	N 1d	4
E-CHOO 5 10%	E			N	10	N	10	N 5d	5	N	5
E-CHOO 5 50%	A			N	10	N	10	N 2d	8	Leth 3d	5
E-CHOO 5 50%	B			N	10	N	10	N 1Leth	10	N 1d	9
E-CHOO 5 50%	C			N	10	N	10	4d 2Leth	6	N 2d	4
E-CHOO 5 50%	D			N	10	N	10	N 4d	6	N 2d	4
E-CHOO 5 50%	E			N	10	N	10	N 4d	6	N 2d	4

OBSERVATION KEY

REP = Replicate
OBS = Observations
NO. ALIVE = Number of Organisms Alive (survival)
N (NONE) = Normal Conditions
BS = Brine Shrimp
YTC/ALG = YTC and green algae (daphnids)
NF = Not Found

PRE = Precipitate
FOS = Film on Surface of Water
UC = Undissolved Chemical
LETH = Lethargic
LE = Loss of Equilibrium
HYP = Hyperactive

AS = Organisms At Surface of Water
ERR = Erractic
GY = Gyrating
G = Gulping
RAR = Rapid Respiration
LT = Light Pigmentation

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0300-3100

Test Substance: Elutriate

Test Species: *Menidia beryllina*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		Brine shrimp prior to test		-		-		-		-	
TIME		1300		1130		1100		1030		1130	
TECHNICIAN		ADE		EM		ADE		EM		EM	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
E-CHOO 5 100%	A	Loaded	10	LE	9	2D/Leth	7	Leth	7	Leth 1d	6
E-CHOO 5 100%	B			LE	8	Leth	8	Leth	8	Leth	8
E-CHOO 5 100%	C			LE	7	Leth	7	Leth 1d	6	Leth	6
E-CHOO 5 100%	D			LE	9	Leth	9	Leth	9	Leth 1d	8
E-CHOO 5 100%	E			LE	9	Leth	9	Leth 2d	7	Leth 1d	6
E-CHOO-Dup 10%	A			N	10	N	10	N	10	N 1d	9
E-CHOO-Dup 10%	B			N	10	N	10	N 1Leth	10	N 1d	9
E-CHOO-Dup 10%	C			N	10	N	10	N	10	N	10
E-CHOO-Dup 10%	D			N	10	N	10	N 1Leth	10	1Leth N	10
E-CHOO-Dup 10%	E			N	10	N	10	N	10	N	9
E-CHOO-Dup 50%	A			N	10	N	10	N	10	1Leth	10
E-CHOO-Dup 50%	B			N	10	N	10	N 3d	7	1Leth	7
E-CHOO-Dup 50%	C			N	10	N	10	N 1d	9	2Leth	9
E-CHOO-Dup 50%	D			N	10	1D	9	N 1d	8	2Leth	8
E-CHOO-Dup 50%	E			N	10	N	10	N 1Leth	10	1Leth	9

OBSERVATION KEY

REP = Replicate
OBS = Observations
NO. ALIVE = Number of Organisms Alive (survival)
N (NONE) = Normal Conditions
BS = Brine Shrimp
YTC/ALG = YTC and green algae (daphnids)
NF = Not Found

PRE = Precipitate
FOS = Film on Surface of Water
UC = Undissolved Chemical
LETH = Lethargic
LE = Loss of Equilibrium
HYP = Hyperactive

AS = Organisms At Surface of Water
ERR = Erractic
GY = Gyrating
G = Gulping
RAR = Rapid Respiration
LT = Light Pigmentation

Environmental Science and Engineering
Gainesville, Florida

QA Form: 015B
Revised March 2000

SUBJECT: ACUTE TOXICITY DATA SHEET - SURVIVAL

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0300-3100

Test Substance: Elutriate

Test Species: *Menidia beryllina*

TEST HOUR		0-HOUR		24-HOURS		48-HOURS		72-HOURS		96-HOURS	
DATE		8/1/00		8/2/00		8/3/00		8/4/00		8/5/00	
FEEDING		Brine shrimp prior to test		-		-					
TIME		1300		1130		1100		1030		1130	
TECHNICIAN		ADE		EM		ADE		EM		EM	
NOMINAL CONCENTRATION mg/L %	REP	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive	OBSERV.	No. Alive
E-CHOO Dup 100%	A	Loaded	10	LE/Leth	7	Leth	7	Leth 1d	6	Leth 2d	4
E-CHOO Dup 100%	B			LE/Leth	7	10 Leth	6	Leth	6	Leth 3d	3
E-CHOO Dup 100%	C			LE	8	Leth	8	Leth	8	Leth 2d	6
E-CHOO Dup 100%	D			LE/Leth	8	Leth	8	Leth 2d	6	Leth 2d	4
E-CHOO Dup 100%	E			LE/Leth	8	Leth	8	Leth 1d	7	Leth 1d	6

OBSERVATION KEY

REP = Replicate
OBS = Observations
NO. ALIVE = Number of Organisms Alive (survival)
N (NONE) = Normal Conditions
BS = Brine Shrimp
YTC/ALG = YTC and green algae (daphnids)
NF = Not Found

PRE = Precipitate
FOS = Film on Surface of Water
UC = Undissolved Chemical
LETH = Lethargic
LE = Loss of Equilibrium
HYP = Hyperactive

AS = Organisms At Surface of Water
ERR = Erractic
GY = Gyrating
G = Gulping
RAR = Rapid Respiration
LT = Light Pigmentation

Appendix A-4

Survivorship and Water Quality Monitoring Results for *Lytechinus variegatus* Elutriate Bioassays for Canaveral Harbor, July 2000

ESE Environmental
Toxicology Laboratory
Gainesville, FL

ESE Form No: 114
Effective: July 2000

SEA URCHIN FERTILIZATION TEST

Client: PPB / Canaveral Harbor Project No.: 3100 2186 - 0300 - 3100

Test Substance: Elutriate Test Species: L. variegatus

Source of Sea Urchins: Gulf Specimen Date Received: 8/1/00

See Page ____ of the Invertebrate Holding Log Condition of organisms: Normal

Dilution Water: Natural, Filtered Seawater Salinity: 29 ‰

Test Temperature (°C): 20 ± 1 Type of Lighting: Fluorescent

Test Guidelines:

TEST CONCENTRATIONS

Concentration (%)	Control	10	50	100		
Dilution Water (mL)	50	45	25	-		
Stock/Effluent (mL)	-	5	25	50		

Stock Preparation / Comments: _____

Type of Test Chamber: Glass Scintillation Vials Test Chamber Volume (mL): 24

Number of Replicates per Concentration: 3

Volume of Test Solution per Replicate (mL): 5

Test Location: Prep Room

Test Duration: 80 minutes

Environmental Science & Engineering, Inc.
Toxicology Laboratory
Gainesville, Florida

ESE QA Form Number: 016
Effective: 5/1/96

ACUTE TOXICITY DATA SHEET - WATER QUALITY DATA

SPONSOR: PPB | Canaveral Harbor
PROJECT NUMBER: 3100218G-0300-3100
TEST SUBSTANCE: Elutriate
TEST SPECIES: L. variegatus

DATE		8/4/00																									
TIME		1500																									
INIT.		WT																									
NOMIN CONCN (%) mg/L µg/L	REP	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN
Seawater Control		20.1	7.8	7.6	28																						
10% Control		20.1	7.8	7.5	28																						
50% Control		20.0	7.8	7.5	28																						
100% Control		20.0	7.8	7.5	28																						
10% E-CHOO-1+2		20.0	7.9	7.4	28																						
50% E-CHOO-1+2		19.8	7.9	7.4	28																						
100% E-CHOO-1+2		19.9	7.9	7.5	28																						
10% E-CHOO-3+4		19.9	7.9	7.4	28																						
INST/METH		YSI-8	SA 250	DO-4	Ref-6																						

KEY

TEMP - Temperature
SL - Salinity (ppt)
pH - standard units

DO - Dissolved oxygen (mg/L)
CN - Conductivity (µmhos/cm)
INST - Instrument
NOMIN CONCN - Nominal concentration

INIT. - Initials
REP - Replicate
METH - Method

Environmental Science & Engineering, Inc.
Toxicology Laboratory
Gainesville, Florida

ESE QA Form Number: 016
Effective: 5/1/96

ACUTE TOXICITY DATA SHEET - WATER QUALITY DATA

SPONSOR: PPB / Canaveral Harbor | PROJECT NUMBER: 3100218G-0300-3100

TEST SUBSTANCE: | TEST SPECIES: L. variegatus

DATE		8/4/00																									
TIME		1500																									
INIT.		KyT																									
NOMIN CONCN % mg/L µg/L	REP	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN		
50% E-CHOO-3+4		19.9	7.8	7.6	28																						
100% E-CHOO-3+4		19.8	7.8	7.5	28																						
10% E-CHOO-5		19.7	7.9	7.6	28																						
50% E-CHOO-5		19.7	7.9	7.7	28																						
100% E-CHOO-5		19.6	7.9	7.6	28																						
10% E-CHOO-Dup		19.7	7.9	7.7	28																						
50% E-CHOO-Dup		19.7	7.8	7.7	28																						
100% E-CHOO-Dup		19.8	7.9	7.5	28																						
INST/METH		FS-8	GA 25D	DO-4	ref 6																						

KEY

TEMP - Temperature
SL - Salinity (ppt)
pH - standard units

DO - Dissolved oxygen (mg/L)
CN - Conductivity (µmhos/cm)
INST - Instrument
NOMIN CONCN - Nominal concentration

INIT. - Initials
REP - Replicate
METH - Method

~~QST~~ Environmental
Toxicology Laboratory
Gainesville, Florida

~~QST~~ Form No.: 116
Effective: Feb 1997

SEA URCHIN FERTILIZATION TEST

Client: PPB | Canaveral Harbor Project No.: 3100Z1A6-0300-3100

Test Substance: Elutriate Test Species: L. variegatus

Investigator: A Shuntelle Date:

FINAL EGG FERTILIZATION COUNTS

Concentration (%, mg/L)	U	F	U	F	U	F	U	F	TOTAL	
	A		B		C		D			
Saltwater Control	20	80	~~68~~ ABS 32	68	12	88	–	–		
10% Control	27	73	16	84	21	79	–	–		
50% Control	30	70	10	90	15	85	–	–		
100% Control	32	68	29	71	19	81	–	–		
10% E-CHOO-1+2	37	63	19	81	24	76	–	–		
50% E-CHOO-1+2	26	74	31	69	18	82	–	–		
100% E-CHOO-1+2	40	60	29	71	44	66	–	–		

~~QST~~ Environmental
Toxicology Laboratory
Gainesville, Florida

~~QST~~ Form No.: 116
Effective: Feb 1997

SEA URCHIN FERTILIZATION TEST

Client: PPB / Canaveral Harbor Project No.: 3100218G-0300-3100

Test Substance: Elutriate Test Species: L. variegatus

Investigator: A Shortelle Date:

FINAL EGG FERTILIZATION COUNTS

Concentration (%, mg/L)	REPLICATE VIAL A		B		C		D		TOTAL	
	U	F	U	F	U	F				
10% E-CHOO-3+4	18	82	31	69	13	87				
50% E-CHOO-3+4	22	78	24	76	30	70				
100% E-CHOO-3+4	38	62	20	80	18	82				
10% E-CHOO-5	32	68	23	77	35	65				
50% E-CHOO-5	39	61	28	72	41	59				
100% E-CHOO-5	48	52	31	69	27	73				
10% E-CHOO-Dup	29	71	35	65	31	69				

~~QST~~ Environmental
Toxicology Laboratory
Gainesville, Florida

~~QST~~ Form No.: 116
Effective: Feb 1997

SEA URCHIN FERTILIZATION TEST

Client: PPB / Canaveral Harbor Project No.: 3100 2486-0300-3100

Test Substance: Elutriate Test Species: L. variegatus

Investigator: A Shinkle Date: _____

FINAL EGG FERTILIZATION COUNTS

Concentration (%, mg/L)	REPLICATE VIAL A U	A F	B U	B F	C U	C F	D		TOTAL	
50% E-CHOO-Dup	41	59	37	63	25	75				
100% E-CHOO-Dup	40	60	29	71	44	56				

F:\users\2450\info.lab\seaurch.tst

Appendix A-5

Elutriate Reference Toxicant Raw Data for Canaveral Harbor, July 2000

ESE ENVIRONMENTAL
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
ESE QA FORM NO: 097A REFTOX
REVISED: JANUARY 2000

REFERENCE TOXICANT TEST DATA SHEET

Client: Misc

Project Number: Ref Tox

Test Material

Amount of SDS : 0.1000 (g)

Volume of Milli-Q Water: 100 (mL)

Date Prepared: 8/2/00

Test Conditions

[X] Definitive [X] Static

[ ] Screening Duration: 48 Hours

Test Organism History

Species: M. beryllina

Batch Number: 2000-048

Age/Life Stage: 10 days

Date of Acclimation/Maintenance: 8/1/00

See Page 42 of Fish Holding Log

Mortality 48 hours prior to test: >1 (%)

Replicates/Concentration: 1

No. Of Organisms/Replicate: 10

Dilution Water: Natural, Filtered Seawater

Lighting: [X] Fluorescent [ ] Incandescent

Photoperiod: 16 Hr Light 8 Hr Dark

Test Vessel Dimensions: 100 (mm) L X - W 50 H

Test Solution Height: 4 (cm)

Test Vessel Volume: 0.34 (L)

Test Solution Volume: 0.20 (L)

Test Temperature: 20 ± 1 °C

Test Salinity: 20 ± 2 ppt

Test Area Used: Waterbath

Test Vessel Composition: [X] Glass [ ] Plastic

Test Concentrations Based on:

[X] Whole Material [ ] Active Ingredient

Test Protocol/Guideline Followed:

SOP-A-004

Test Concentrations: (Units: mg/L)	Control	1.25	2.5	5	10	20	
Amount Dilution Water Added (mL)	200	199.75	199.5	199	198	196	
Amount of Reftox Stock Added (mL)	-	0.25	0.5	1	2	4	

Additional Observations:_____

Data By: AMC Date: 8/2/00

ESE ENVIRONMENTAL, INC
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
ESE QA FORM NO: 097 REFTOX
REVISED: JANUARY 2000

REFERENCE TOXICANT TEST DATA: DAY 0 - 2

Client: misc | Project Number: Ref Tox | Species M. beryllina

DAY 0 | REF TOXICANT: SDS

Nominal Concentration (mg/L)	Date: 8/2/00 # Alive	Observ.	Time: 1110 Temp. (°C)	Sal (ppt)	Analyst: BTS DO (mg/L)	pH
Control	10	Loaded 10	20.0	20	7.0	8.2
1.25	10	↓	20.1	20	7.0	8.2
2.5	10		20.1	20	7.0	8.2
5	10		20.1	20	7.0	8.2
10	10		20.1	20	7.0	8.2
20	10	↓	20.2	20	7.0	8.2

DAY 1	Date: 8/3/00		Time: 1345		Analyst: BTS	
Nominal Concentration	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	21.0	19	5.9	7.8
1.25	10	N	20.9	19	6.1	7.9
2.5	8	2d	20.9	19	6.1	7.9
5	0	10d	20.8	19	<4.0	7.6
10	0	10d	20.7	19	<4.0	7.5
20	0	10d	20.7	19	<4.0	7.4

DAY 2	Date: 8/4/00		Time: 1320		Analyst: BTS	
Nominal Concentration	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	21.2	22	6.1	7.7
1.25	10	N	21.1	21	6.1	7.7
2.5	8	N	21.1	21	6.1	7.8
5	–	–	–	–	–	–
10	–	–	–	–	–	–
20	–	–	–	–	/	/

TRIMMED SPEARMAN-KARBER METHOD. VERSION 1.5

DATE: 8/4/00 TEST NUMBER: 1 DURATION: 48 h
TOXICANT : SDS
SPECIES: M.beryllina

RAW DATA: Concentration (mg/l)	Number Exposed	Mortalities
.00	10	0
1.25	10	0
2.50	10	2
5.00	10	10
10.00	10	10
20.00	10	10

SPEARMAN-KARBER TRIM: .00%

SPEARMAN-KARBER ESTIMATES: LC50: 3.08
95% LOWER CONFIDENCE: 2.58
95% UPPER CONFIDENCE: 3.67

ESE ENVIRONMENTAL
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
ESE QA FORM NO: 097A REFTOX
REVISED: JANUARY 2000

REFERENCE TOXICANT TEST DATA SHEET

Client: Misc

Project Number: Ref Tox

Test Material

Amount of SDS : 0.100 (g)

Volume of Milli-Q Water: 100 (mL)

Date Prepared: 8/1/00

Test Conditions

[X] Definitive [X] Static

[ ] Screening Duration: 48 Hours

Test Organism History

Species: M. bahia

Batch Number: 2000-047

Age/Life Stage: 2days

Date of Acclimation/Maintenance: 8/1/00

See Page 344 of Invert. Holding Log

Mortality 48 hours prior to test: < 1 (%)

Replicates/Concentration: 1

No. Of Organisms/Replicate: 10

Dilution Water: Natural, Filtered Seawater

Lighting: [X] Fluorescent [ ] Incandescent

Photoperiod: 16 Hr Light 8 Hr Dark

Test Vessel Dimensions: 100 L X - W 50 H

Test Solution Height: 4 (cm)

Test Vessel Volume: 0.34 (L)

Test Solution Volume: 0.20 (L)

Test Temperature: 20 ± 1 °C

Test Salinity: 20 ± 2 ppt

Test Area Used: Waterbath

Test Vessel Composition: [X] Glass [ ] Plastic

Test Concentrations Based on:

[X] Whole Material [ ] Active Ingredient

Test Protocol/Guideline Followed:

SOP-A-004

Test Concentrations: (Units: mg/L)	Control	2.5	5	10	20	40	
Amount Dilution Water Added (mL)	200	199.5	199	198	196	192	
Amount of Reftox Stock Added (mL)	-	0.5	1	2	4	8	

Additional Observations: _____

Data By: Amc

Date: 8/2/00

ESE ENVIRONMENTAL, INC
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
ESE QA FORM NO: 097 REFTOX
REVISED: JANUARY 2000

REFERENCE TOXICANT TEST DATA: DAY 0 - 2

Client: misc | Project Number: Ref Tox | Species M. bahia

DAY 0 | REF TOXICANT:

Nominal Concentration (mg/L)	Date: 8/1/00 # Alive	Observ.	Time: 1615 Temp. (°C)	Sal (ppt)	Analyst: BTS DO (mg/L)	pH
Control	10	Loaded 10	20.3	20	7.3	8.3
2.5	10		20.1	20	7.3	8.4
5	10		20.0	20	7.4	8.4
10	10		20.3	20	7.2	8.4
20	10		20.2	20	7.2	8.4
40	10	↓	20.2	19	7.2	8.4

DAY 1	Date: 8/2/00		Time: 1515		Analyst: BTS	
Nominal Concentration	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	20.8	20	7.8	8.1
2.5	9	1 NF	20.7	20	7.8	8.1
5	10	N	20.7	20	7.7	8.1
10	10	N	20.6	20	7.2	8.0
20	7	3 d	20.6	20	6.8	8.0
40	0	10 d	20.6	20	6.8	8.0

DAY 2	Date: 8/3/00		Time: 1500		Analyst: ADE	
Nominal Concentration	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	20.7	20 ppt	7.2	8.1
2.5	9	N	20.7	21	7.4	8.1
5	10	N	20.6	21	7.4	8.1
10	10	N	20.7	21	7.4	8.1
20	4	3D	20.8	21	7.1	8.1
40	—	—	—	—	—	—

TRIMMED SPEARMAN-KARBER METHOD. VERSION 1.5

DATE: 8/3/00 TEST NUMBER: 2 DURATION: 48 h
TOXICANT : SDS
SPECIES: M.bahia

RAW DATA: Concentration (mg/l)	Number Exposed	Mortalities
.00	10	0
2.50	10	1
5.00	10	0
10.00	10	0
20.00	10	6
40.00	10	10

SPEARMAN-KARBER TRIM: 3.33%

SPEARMAN-KARBER ESTIMATES: LC50: 18.36
95% LOWER CONFIDENCE: 14.54
95% UPPER CONFIDENCE: 23.18

NOTE: MORTALITY PROPORTIONS W

ESE Environmental
Toxicology Laboratory
Gainesville, FL

ESE Form No: 114
Effective: July 2000

SEA URCHIN FERTILIZATION TEST

Client: Misc. Project No.: Ref Tox

Test Substance: $CuSO_4$ Test Species: L. variegatus

Source of Sea Urchins: Gulf Specimen Marine Labs Date Received: 8/1/00

See Page ____ of the Invertebrate Holding Log Condition of organisms: Normal

Dilution Water: Natural Filtered Seawater Salinity: 28 ‰

Test Temperature (°C): 20 ± 1 Type of Lighting: Fluorescent

Test Guidelines: SOP-A-004, ASTM

TEST CONCENTRATIONS

Concentration (ug/L)	Control	25	50	100	200	400
Dilution Water (mL)	100	99.875	99.75	99.5	99.0	98.0
Stock/Effluent (mL)	-	0.125	0.25	0.5	1	2

Stock Preparation / Comments:
Primary Stock: 0.2g $CuSO_4$ in 1000ml Milli-Q Water
Secondary Stock: 10ml of Primary Stock diluted to 100ml with Milli-Q
Secondary Stock used to prepare test concentrations

Type of Test Chamber: Glass Scintillation Vials Test Chamber Volume (mL): 24

Number of Replicates per Concentration: 3
Volume of Test Solution per Replicate (mL): 5

Test Location: Prep Room

Test Duration: 30 minutes

seaurch.cov

ACUTE TOXICITY DATA SHEET - WATER QUALITY DATA

SPONSOR: Misc | PROJECT NUMBER: Ref Tox

TEST SUBSTANCE: $CuSO_4$ | TEST SPECIES: L. variegatus

DATE		8/4/00																													
TIME		1500																													
INIT.		HNT																													
NOMIN CONCN % mg/L µg/L	REP	TEMP	pH	DO	SD or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN	TEMP	pH	DO	SL or CN		
Control		19.9	7.8	7.6	28																										
25		19.9	7.8	7.6	28																										
50		19.8	7.8	7.6	28																										
100		19.8	7.7	7.6	28																										
200		19.8	7.7	7.6	28																										
400		19.9	7.8	7.6	28																										
INST/METH		YSI 85	SA 250	DO -4	RC 6																										

KEY

TEMP - Temperature
SL - Salinity (ppt)
pH - standard units

DO - Dissolved oxygen (mg/L)
CN - Conductivity (µmhos/cm)
INST - Instrument
NOMIN CONCN - Nominal concentration

INIT. - Initials
REP - Replicate
METH - Method

QST Environmental
Toxicology Laboratory
Gainesville, Florida

QST Form No.: 116
Effective: Feb 1997

SEA URCHIN FERTILIZATION TEST

Client: Misc Project No.: Ref Tox

Test Substance: $CuSO_4$ Test Species: L. variegatus

Investigator: A Shortelle Date:

FINAL EGG FERTILIZATION COUNTS

Concentration (%, mg/L)	REPLICATE VIAL A		B		C		D		TOTAL		
	U	F	U	F	U	F					
Control	15	85	9	91	17	83	–	–		41 259	86%
25	20	80	10	90	12	88	–	–		42 258	86%
50	13	87	9	91	18	82	–	–		40 260	87%
100	56	44	40	60	38	62	–	–		134 166	55%
200	88	12	70	30	95	5	–	–		253 47	15%
400	97	3	90	10	93	7	–	–		280 20	6%
							–	–			

Appendix A-6

Survivorship and Water Quality Monitoring Results for *Mysidopsis bahia* Sediment Bioassays for Canaveral Harbor, July 2000

Project: PPB/Canaveral Harbor Whole Sediment 31002186-0200-3100

DAILY LOG

7/27/00 BTS - Loaded sediments into test vessels. Covered sediments w/natural-filtered seawater - 28 ppt for L. plumulosus, 25 ppt for M. bahia. Allowed sediments to settle overnight.

7/28/00 BTS - Renewed overlying water. Took water quality measurements. Hooked up airlines. Loaded 20 L. plumulosus & 20 M. bahia into replicate chambers. M. bahia Fed brine shrimp to prevent cannibalism.

7:29:00 Monitored test + Fed M. bahia brine shrimp. Checked Airlines - EM

7/30/00 Observed tests. Renewed overlying water. Monitored tests + checked airlines. Fed M. bahia brine shrimp. - EM Took samples For NH_3 measurements during Renewal.

7/31/00 Observed + monitored tests. Fed mysid b. shp.

8/1/00 Observed tests. Renewed overlying water. Took NH_3 samples. Renewed mysid water w/ 20 ppt to Reduce salinity. Fed mysid b. shrmp. Monitored tests.

8/2/00 EM Observed + monitored tests checked Airlines. Fed mysids b. shrmp.

8/3/00 BTS - Renewed overlying water. Monitored + observed test. Took water quality measurements. Fed mysid brine shrimp

8/4/00 EM Observed + monitored tests. Fed mysid brine shrmp.

8/5/00 EM Observed + monitored tests. Fed mysid brine shrmp.

Project No: Client: Test:

DAILY LOG

8/6/00 HT Test monitored & observations taken

8/7/00 HT Test monitored and terminated; observations & counts made of surviving organisms

Environmental Science & Engineering, Inc.
Gainesville, FL

QST QA Form: 097
Effective: Oct 1997

SUBJECT: TOXICITY TEST DATA SHEET

Sponsor: PPB | Canaveral Harbor

Project No.: 3100218G-0200-3100

TEST MATERIAL

Test Material: Whole Sediment

See Page 526 of Effluent Log for Test Material Information

PROTOCOL / GUIDELINES FOLLOWED:

EPA-503/8-91/001

TEST CONCENTRATIONS BASED ON: [ ] ACTIVE INGREDIENT
[X] WHOLE MATERIAL

TEST CONDITIONS

[ ] Range-finder
[ ] Screening
[ ] Definitive

[X] Static
[ ] Flow-Through

TEST DURATION: 10 days

TEST AREA USED: Water bath

TEST TEMPERATURE (°C): 20 ± 1

TEST SALINITY (ppt): AC ~~20~~ 25 ± 2

REPLICATES PER CONCENTRATION: 5

ORGANISMS PER REPLICATE: 20

TEST ANIMAL HISTORY

Test Species: Mysidopsis bahia

Lot Number: 2000-046

Age / Life Stage: 4 days

Date Acclimation / Maintenance Began: 7/27/00

See Page 343 of Invertebrate Log for Data

Mortality (%) During 48 Hours Prior to Test Initiation: >10%

DILUTION WATER:
Natural, Filtered Seawater

Lighting: [X] Fluorescent [ ] Incandescent

Photoperiod: 16 Hours Light : 8 Hours Dark

TEST VESSELS

Dimensions (cm) : 9.5 Length x - Width x 6.6 Height

Test Solution Height: 5 cm

Test Vessels: [ ] Open [X] Covered

Test Container Volume: 1.6 Liters

Test Solution Volume: 0.6 Liters

TEST SOLUTION PREPARATION

TEST CONCENTRATION (%) mg/L	Control	Samples*					
Volume of Dilution Water Added (mL)	800	800					
Volume of Effluent / Stock Added (mL)	200	200					

ADDITIONAL OBSERVATIONS: * Samples- RS-CH00 Ref, E-CH00 1/2, 3/4, 5, and Duplicate

DATA BY: AC **DATE:** 7/17/00

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **CONTROL**

PROJECT NUMBER: 31002186-0200-3100
TEST SPECIES: *Mysidopsis bahia*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.7	25	<0.1	8.0	6.3		BS	EM 1130
7/29/00 1	B	19.7	29		8.0	6.7		EM	EM 1000
7/30/00 2	C	20.3	28	<0.1	8.0	6.3		EM	EM 1400
7/31/00 3	D	19.8	27		8.0	7.2		EM	EM 1100
8/1/00 4	E	21.2	23	0.1	8.3	7.1		EM	EM 1340
8/2/00 5	A	20.3	24		8.0	7.1		EM	EM/930
8/3/00 6	B	19.3	23	0.1	8.3	6.6		Brine Shrimp	BTS/1125
8/4/00 7	C	18.0	25		8.1	7.1		EM	EM/930
8/5/00 8	D	18.1	27	0.1	8.4	7.6		EM	EM/1230
8/6/00 9	E	18.5	25		8.3	7.4		EM	EM/1350
8/7/00 10	A	19.8	27	0.1	8.1	7.2		—	BTS/1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/28/00 0	loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	20	19	20	18	19

Comments:

96%

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-1/2**

PROJECT NUMBER: 31002186-0200-3100
TEST SPECIES: *Mysidopsis bahia*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.7	26	0.3	8.0	2.5		BS	EM 1130
7/29/00 1	B	19.6	29		8.1	6.8		EM	EM 1000
7/30/00 2	C	20.2	30	0.5	8.4	6.6		EM	EM 1400
7/31/00 3	D	19.6	28		8.1	6.8		EM	EM 1100
8/1/00 4	E	21.L	25	0.8	8.3	6.8		EM	EM 1340
8/2/00 5	A	20.2	25		8.1	7.0		EM	EM 930
8/3/00 6	B	19.1	23	0.5	8.4	7.6		Brine Shrimp	BTS / 1125
8/4/00 7	C	17.8	25		8.2	6.6		EM	EM/930
8/5/00 8	D	18.1	29	0.4	8.4	7.5		EM	EM 1230
8/6/00 9	E	18.2	25		8.6	7.4		EM	EM 1350
8/7/00 10	A	19.1	27	0.5	8.7	8.5		—	BTS / 1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/28/00 0	Loaded 20				
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	14	16	17	16	18

Comments:

81

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-3/4**

PROJECT NUMBER: 3100218 G - 0200 - 3100
TEST SPECIES: *Mysidopsis bahia*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/24/00 0	A	20.6	26	0.2	8.0	3.9		BS	Em 1130
7/25/00 1	B	19.7	29		8.1	6.2		Em	Em 1000
7/30/00 2	C	20.1	28	0.3	8.4	6.7		Em	Em 1400
7/31/00 3	D	19.7	27		8.0	7.4		Em	Em 1100
8/1/00 4	E	21.5	23	0.4	8.3	6.1		Em	Em 1340
8/2/00 5	A	20.2	24		8.1	7.1		Em	Em 930
8/3/00 6	B	19.2	23	0.3	8.3	7.6		Brine Shrimp	BTS / 1125
8/4/00 7	C	17.7	26		8.4	7.3		Em	Em 930
8/5/00 8	D	18.1	29	0.4	8.7	7.1		Em	Em 1230
8/6/00 9	E	18.2	25		8.8	7.5		Em	Em 1350
8/7/00 10	A	19.6	27	0.4	8.7	6.9		←	BTS / 1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/24/00 0	loaded 20	→			
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	19	15	13	18	19

Comments:

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-Duplicate**

PROJECT NUMBER: 31002186-0200-3100
TEST SPECIES: *Mysidopsis bahia*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.6	26	0.2	8.0	3.3		BS	Em 1130
7/29/00 1	B	19.6	27		8.0	6.3		Em	Em 1000
7/30/00 2	C	19.6	27	0.1	8.3	5.5		Em	Em 1400
7/31/00 3	D	19.6	27		8.1	6.0		Em	Em 1100
8/1/00 4	E	21.6	23	0.8	8.3	6.1		Em	Em 1340
8/2/00 5	A	20.1	26		8.3	7.3		Em	Em 930
8/3/00 6	B	19.6	25	0.6	8.3	6.7		Brine Shrimp	BTS / 1125
8/4/00 7	C	17.7	26		8.2	7.6		Em	Em 930
8/5/00 8	D	18.0	29	0.4	8.4	7.7		Em	Em 1230
8/6/00 9	E	18.1	25		8.6	7.6		Em	Em 1350
8/7/00 10	A	18.6	30	0.5	8.2	7.1		–	BTS / 1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/28/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	19	20	14	17	15

Comments:

85

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-5**

PROJECT NUMBER: 31002186-0200-3100
TEST SPECIES: *Mysidopsis bahia*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.6	26	0.2	8.0	3.2		BS	EM 1130
7/29/00 1	B	19.8	29		8.1	5.8		EM	EM 1000
7/30/00 2	C	20.3	29	0.1	8.4	6.5		EM	EM 1400
7/31/00 3	D	19.7	28		8.0	7.0		EM	EM 1100
8/1/00 4	E	21.6	25	0.8	8.3	5.6		EM	EM 1340
8/2/00 5	A	20.1	26		8.2	7.0		EM	EM 930
8/3/00 6	B	19.3	25	0.6	8.4	7.5		Brine shrimp	BTS/1125
8/4/00 7	C	18.1	28		8.1	7.6		EM	EM 1930
8/5/00 8	D	18.2	30	0.5	8.4	7.6		EM	EM 1230
8/6/00 9	E	18.3	25		8.3	7.3		EM	EM 1340
8/7/00 10	A	18.6	29	0.5	8.2	7.2		—	BTS/1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/28/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	17	16	19	14	12

Comments:

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO Reference**

PROJECT NUMBER: 3100218G-0200-3100
TEST SPECIES: *Mysidopsis bahia*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/24/00 0	A	20.5	26	<0.1	8.1	6.2		BS	Em 1130
7/29/00 1	B	19.8	28		8.2	6.8		Em	Em 1000
7/30/00 2	C	20.2	25	0.1	8.3	5.9		Em	Em 1400
7/31/00 3	D	19.8	28		8.0	6.9		Em	Em 1100
8/1/00 4	E	21.8	25	0.1	8.0	6.4		Em	Em 1340
8/2/00 5	A	19.9	26		8.0	7.1		Em	Em 930
8/3/00 6	B	19.2	25	0.1	8.3	7.5		Brine Shrimp	BTS / 1125
8/4/00 7	C	18.0	25		8.1	6.7		Em	Em 930
8/5/00 8	D	18.4	29	0.1	8.4	7.6		Em	Em 1230
8/6/00 9	E	18.5	W1 Em ~~28~~ 27		8.3	7.5		Em	Em 1340
8/7/00 10	A	19.3	30	0.1	8.2	6.4		—	BTS / 1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/24/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	16A 4NF	20	17	16	17

Comments:

8/6

Appendix A-7

Survivorship and Water Quality Monitoring Results for *Leptocheirus plumulosus* Sediment Bioassays for Canaveral Harbor, July 2000

Environmental Science & Engineering, Inc.
Gainesville, FL

QST QA Form: 097
Effective: Oct 1997

SUBJECT: TOXICITY TEST DATA SHEET

Sponsor: PPB/ Canaveral Harbor

Project No.: 3100218G-0200-3100

TEST MATERIAL

Test Material: Whole Sediment

See Page 526 of Effluent Log for Test Material Information

PROTOCOL / GUIDELINES FOLLOWED:

EPA-503/8-91/001

TEST CONCENTRATIONS BASED ON: [ ] ACTIVE INGREDIENT
[X] WHOLE MATERIAL

TEST CONDITIONS

[ ] Range-finder
[ ] Screening
[ ] Definitive

[X] Static
[ ] Flow-Through

TEST DURATION: 10 days

TEST AREA USED:

TEST TEMPERATURE (°C): 20 ± 1

TEST SALINITY (ppt): 28 ± 2

REPLICATES PER CONCENTRATION: 5

ORGANISMS PER REPLICATE: 20

TEST ANIMAL HISTORY

Test Species: Leptocheirus plumulosus

Lot Number: 2000-045

Age / Life Stage: Juvenile

Date Acclimation / Maintenance Began: 7/27/00

See Page 342 of Invertebrate Holding Log for Data

Mortality (%) During 48 Hours Prior to Test Initiation: >10%

DILUTION WATER:
Natural, Filtered Seawater

Lighting: [X] Fluorescent [ ] Incandescent

Photoperiod: 16 Hours Light : 8 Hours Dark

TEST VESSELS

Dimensions (cm): 10.5 Length x - Width x 23 Height

Test Solution Height: ~13 cm

Test Vessels: [X] Open [ ] Covered

Test Container Volume: 2.0 Liters

Test Solution Volume: 0.8 Liters

TEST SOLUTION PREPARATION

TEST CONCENTRATION (%) mg/L	Control	Samples					
Volume of Dilution Water Added (mL)	800	800					
Volume of Effluent / Stock Added (mL)	200	200					

ADDITIONAL OBSERVATIONS:

DATA BY: AC DATE: 7/17/00

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **CONTROL**

PROJECT NUMBER: 31002186-0200-3100
TEST SPECIES: *Leptocheirus plumulosus*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/24/00 0	A	20.8	26	<0.1	8.0	6.8		~~85~~	Em 1145
7/29/00 1	B	19.6	27		8.0	7.4			Em 1000
7/30/00 2	C	19.8	28	<0.1	8.0	7.8			Em 1320
7/31/00 3	D	19.7	27		8.0	7.1			Em 1100
8/1/00 4	E	21.3	26	<0.1	8.2	7.1			Em 1400
8/2/00 5	A	20.4	26		8.2	7.4			Em 930
8/3/00 6	B	20.1	26	<0.1	8.3	7.6			BTS / 1135
8/4/00 7	C	19.6	26		7.9	7.1			Em / 930
8/5/00 8	D	20.0	26	<0.1	8.3	6.4			Em / 1230
8/6/00 9	E	19.9	28		8.3	7.1			Em / 1340
8/7/00 10	A	19.5	27	<0.1	8.2	7.4			BTS / 1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/29/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	17 A	20 A	20 A	19 A	18 A

Comments:

94%

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-1/2**

PROJECT NUMBER: 3100218G-0200-3100
TEST SPECIES: *Leptocheirus plumulosus*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/29/00 0	A	20.6	25	0.3	7.8	4.0		~~BS~~	Em 1145
7/29/00 1	B	19.5	28		8.2	7.4			Em 1000
7/30/00 2	C	19.7	28	0.5	7.9	5.4			Em 1330
7/31/00 3	D	19.5	27		8.1	7.0			Em 1100
8/1/00 4	E	21.4	26	0.4	7.9	4.5*			Em 1400
8/2/00 5	A	20.4	27		8.1	6.9			Em 930
8/3/00 6	B	19.9	27	0.4	8.6	7.5			BTS/1125
8/4/00 7	C	19.3	27		8.0	7.0			Em/930
8/5/00 8	D	20.2	27	0.4	8.4	5.8			Em 1230
8/6/00 9	E	20.0	28		8.4	7.2			Em 1340
8/7/00 10	A	19.3	29	0.4	8.5	7.4			BTS 1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/29/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	20 A	18 A	8 A	5 A	10 A

Comments: * Aeration rate increased, after reading.

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-3/4**

PROJECT NUMBER: 31002186-0200-3100
TEST SPECIES: *Leptocheirus plumulosus*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/29/00 0	A	20.5	27	0.2	7.8	3.6		~~B5~~	EM 1145
7/29/00 1	B	19.3	27		8.0	7.1			EM 1000
7/30/00 2	C	19.7	28	0.3	8.2	7.8			EM 1330
7/31/00 3	D	19.3	28		8.4	7.1			EM 1100
8/1/00 4	E	21.2	26	0.2	8.2	7.1			EM 1400
8/2/00 5	A	20.3	27		8.0	6.9			EM 930
8/3/00 6	B	19.8	27	0.2	8.4	7.4			BTS/1125
8/4/00 7	C	19.3	27		8.3	7.5			EM 930
8/5/00 8	D	20.0	27	0.2	8.8	7.2			EM 1230
8/6/00 9	E	19.9	28		8.6	7.3			EM 1340
8/7/00 10	A	19.2	29	0.2	8.2	7.5			BTS/1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/29/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	20 A	20 A	13 A	20 A	19 A

Comments:

92

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-5**

PROJECT NUMBER: 31002186-0200-3100
TEST SPECIES: *Leptocheirus plumulosus*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/24/00 0 loaded	A	20.6	25	0.2	7.7	3.8		~~35~~	Em 1145
7/29/00 1	B	19.6	29		7.9	6.5			Em 1000
7/30/00 2	C	19.8	28	0.5	8.1	7.7			Em 1330
7/31/00 3	D	19.5	28		8.4	6.4			Em 1100
8/1/00 4	E	21.4	26	0.3	8.2	6.9			Em 1400
8/2/00 5	A	20.4	28		8.0	6.4			Em 930
8/3/00 6	B	19.8	26	0.4	8.3	7.1			BTS/1125
8/4/00 7	C	19.1	28		7.9	7.5			Em/930
8/5/00 8	D	19.9	28	0.2	8.5	7.3			Em/1230
8/6/00 9	E	19.8	28		8.3	7.2			Em/1340
8/7/00 10	A	19.1	24	0.3	8.2	6.7			BTS/1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/24/00 0	loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	10A 10NF	11A	17A 3NF	10A	13A 7NF

Comments:

6/06

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-Duplicate**

PROJECT NUMBER: 3100218G-0200-3100
TEST SPECIES: *Leptocheirus plumulosus*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/29/00 0	A	20.5	27	0.2	7.8	3.9		~~BS~~	EM 1145
7/29/00 1	B	19.4	28		7.8	7.4			EM 1000
7/30/00 2	C	19.6	26	0.6	8.0	6.9			EM 1330
7/31/00 3	D	19.3	28		8.3	6.1			EM 1100
8/1/00 4	E	21.3	26	0.5	8.0	5.4			EM 1400
8/2/00 5	A	20.3	27		8.1	7.0			EM 930
8/3/00 6	B	19.8	27	0.5	8.2	5.6			BTS / 1125
8/4/00 7	C	19.2	28		8.3	7.6			EM 1930
8/5/00 8	D	20.0	28	0.5	8.3	7.0			EM 1230
8/6/00 9	E	19.9	28		8.4	7.3			EM 1340
8/7/00 10	A	19.2	29	0.5	8.3	7.6			BTS / 1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/29/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	12 A	13 A	8 A	~~EM~~ 10 A	10 A

Comments:

~~BS~~ WT ~~BM~~ BTS

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **RS-CHOO Ref**

PROJECT NUMBER: 3100218G-0200-3100
TEST SPECIES: *Leptocheirus plumulosus*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.6	27	<0.1	8.1	6.8		~~BS~~	Em 1145
7/29/00 1	B	19.6	29		8.1	7.3			Em 1000
7/30/00 2	C	20.0	28	0.1	8.1	7.4			Em 1330
7/31/00 3	D	19.5	28		8.3	7.2			Em 1100
8/1/00 4	E	21.3	26	<0.1	8.2	6.7			Em 1430
8/2/00 5	A	20.4	28		8.2	7.4			Em 930
8/3/00 6	B	19.8	27	<0.1	8.3	7.4			BTS / 1125
8/4/00 7	C	19.2	28		8.0	7.5			Em / 930
8/5/00 8	D	19.9	29	<0.1	8.4	7.3			Em 1230
8/6/00 9	E	19.9	28		8.5	7.2			Em / 1340
8/7/00 10	A	19.1	29	<0.1	8.2	7.5			BTS / 1030

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/28/00 0	Loaded 20	→			
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	19A INF	17A 3NF	16A 4NF	19A INF	8A 12NF

Comments:

Appendix A-8

Sediment Reference Toxicant Data Sheets for Canaveral Harbor Sediments, July 2000

ESE ENVIRONMENTAL
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
ESE QA FORM NO: 097A REFTOX
REVISED: JANUARY 2000

REFERENCE TOXICANT TEST DATA SHEET

Client: MISC

Project Number: Ref Tox

Test Material

Amount of CdCl2 : 0.0328 (g)

Volume of Milli-Q Water: 1000 (mL)

Date Prepared: 7/31/00

Test Conditions

[X] Definitive [X] Static

[ ] Screening Duration: 96 Hours

Test Organism History

Dilution Water: Natural, Filtered Seawater

Species: L. plumulosus

Batch Number: 2000-045

Age/Life Stage: Juvenile

Date of Acclimation/Maintenance: 7/27/00

See Page 342 of Invert. Holding Log

Mortality 48 hours prior to test: >1 (%)

Replicates/Concentration: 1

No. Of Organisms/Replicate: 10

Lighting: [X] Fluorescent [ ] Incandescent

Photoperiod: 16 Hr Light 8 Hr Dark

Test Vessel Dimensions: 100 (mm) L X - W 50 H

Test Solution Height: 4 (cm)

Test Vessel Volume: 0.34 (L)

Test Solution Volume: 0.25 (L)

Test Temperature: 20 ± 1 °C

Test Salinity: ~~20~~ 28 Ac ± 2 ppt

Test Area Used: Waterbath

Test Vessel Composition: [X] Glass [ ] Plastic

Test Concentrations Based on:

[X] Whole Material [ ] Active Ingredient

Test Protocol/Guideline Followed:

SOP-A-004

Test Concentrations: (Units: mg/L)	Control						
Amount Dilution Water Added (mL)	250	246.8	243.6	237.2	224.4	199.8	
Amount of Reftox Stock Added (mL)	-	3.2	6.4	12.8	25.6	51.2	

Additional Observations:_____

Data By: AMC Date: 7/31/00

ESE ENVIRONMENTAL, INC
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
ESE QA FORM NO: 097 REFTOX
REVISED: JANUARY 2000

REFERENCE TOXICANT TEST DATA: DAY 0 - 2

Client: misc | Project Number: Ref Tox | Species L. plumulosus

DAY 0 | REF TOXICANT:

Nominal Concentration (mg/L)	Date: 7/31/00 # Alive	Observ.	Time: 1300 Temp. (°C)	Sal (ppt)	Analyst: ADE DO (mg/L)	pH
Control	loaded 10	N	20.5	25	7.7	8.3
0.256	↓	N	20.3	25	7.7	8.3
0.512	↓	N	20.2	25	7.7	8.3
1.02	↓	N	20.1	24	7.6	8.3
2.05	↓	N	20.1	24	7.4	8.3
4.1	↓	N	20.1	22	6.9	8.4

DAY 1	Date: 8/1/00		Time: 1130		Analyst: ADE	
Nominal Concentration	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	21.6	27	7.3	8.2
0.256	10	N	21.6	27	7.3	8.2
0.512	10	N	21.7	27	7.3	8.2
1.02	10	N	21.8	26	7.2	8.2
2.05	10	N	21.7	25	7.5	8.2
4.1	9	1D	21.8	22	7.7	8.2

DAY 2	Date: 8/2/00		Time: 1530		Analyst: BTS	
Nominal Concentration	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	21.0	27	6.9	8.0
0.256	10	N	21.0	27	7.0	8.0
0.512	10	N	20.9	27	7.0	8.0
1.02	10	N	21.0	27	7.0	8.0
2.05	9	1d	21.0	25	7.1	8.0
4.1	3	6d, 3Leth	21.0	23	7.4	8.0

ESE ENVIRONMENTAL
TOXICOLOGY LABORATORY

ESE QA FORM NO: 097 REFTOX
EFFECTIVE: AUGUST 1997

REFERENCE TOXICANT TEST DATA: DAY 3 AND 4

Client: misc | Project Number: Ref Tox | Species: L. plumulosus

DAY 3

Nominal Concentration	Date: 8/3/00 # Alive	Observ.	Time: 1400 Temp. (°C)	Sal (ppt)	Analyst: BTS DO (mg/L)	pH
Control	10	N	20.9	28	6.6	8.1
0.256	10	N	20.8	28	6.6	8.1
0.512	10	N	20.8	28	6.7	8.1
1.02	10	N	20.7	27	6.8	8.1
2.05	9	1 Leth	20.7	26	6.9	8.1
4.1	0	4D	20.7	24	6.9	8.1

DAY 4 Nominal Concentration	Date: 8/4/00 # Alive	Observ.	Time: 1245 Temp. (°C)	Sal (ppt)	Analyst: BTS DO (mg/L)	pH
Control	9	1 RD (20 ABS)	20.8	30	6.7	7.9
0.256	10	N	20.8	30	6.7	7.9
0.512	9	1 NF	20.8	30	6.9	7.9
1.02	10	N	20.8	28	6.9	7.9
2.05	6	2d, 1 NF	20.8	27	7.1	7.9
4.1	—	—	~~20.6~~	—	—	—

SUMMARY

Nominal Concentration	Number Dead
Control	1 (wt loss)
0.256	0
0.512	2
1.02	0
2.05	4
4.1	10

COMMENTS:

Appendix A-9

Survivorship and Water Quality Monitoring Results for *Macoma nasuta* Bioaccumulation Tests for Canaveral Harbor, July 2000

Project: PPB/Canaveral Harbor Bioaccumulation 3100218G-0400-3100

DAILY LOG

7/27/00 BTS - Loaded sediments into aquaria and filled w/25ppt natural filtered seawater. Hooked up aeration and allowed sediments to settle overnight.

7/29/00 BTS - Renewed overlying water. Took water quality measurements. Loaded 20 M. nasuta and 20 N. virens into test vessels. All organisms appeared to be in good condition prior to test initiation.

7/29/00 EM. Observed + monitored tests. Removed 1 dead clam from rep A sample ECH00-5. Checked air lines.

7/30/00 Em Observed + monitored tests, Noted dead organisms, + Removed dead organisms.

7/31/00 BTS - Renewed overlying water. Removed any dead organisms. Took water quality measurements. Checked airlines. Monitored + observed test.

8/1/00 BTS - Monitored + observed test. Took water quality measurements.

8/2/00 BTS - Monitored + observed test. Renewed overlying water. Took water quality measurements + checked airlines.

8/3/00 BTS - Monitored + observed test. Took water quality measurements. Checked airlines.

8/4/00 BTS - Monitored + observed test. Renewed overlying water. Took water quality measurements + checked airlines.

8/5/00 Em - Monitored + observed tests. checked airlines. Removed dead organisms

8/6/00 Em - monitored + observed tests. Checked airlines.

8/7/00 KT - Test monitored + terminated; organisms placed on seawater to depurate overnight -

Environmental Science & Engineering, Inc.
Gainesville, FL

QST QA Form: 097
Effective: Oct 1997

SUBJECT: TOXICITY TEST DATA SHEET

Sponsor: PPB/Canaveral Harbor

Project No.: 3100218G-0400-3100

TEST MATERIAL

Test Material: Whole Sediment

See Page 528 of Effluent Log for Test Material Information

PROTOCOL / GUIDELINES FOLLOWED:

EPA-50318-91/001

TEST CONCENTRATIONS BASED ON: [ ] ACTIVE INGREDIENT
[X] WHOLE MATERIAL

TEST CONDITIONS

[ ] Range-finder
[X] Screening
[ ] Definitive

[X] Static
[ ] Flow-Through

TEST DURATION: 10 days

TEST AREA USED: Bioaccumulation Room

TEST TEMPERATURE (°C): 18 ± 2

TEST SALINITY (ppt): 25 ± 2

REPLICATES PER CONCENTRATION: 5

ORGANISMS PER REPLICATE: 20

TEST ANIMAL HISTORY

Test Species: Macoma nasuta

Lot Number: 2000-048

Age / Life Stage: Mixed, 2-4 cm

Date Acclimation / Maintenance Began: 7/27/00

See Page 347 of Invertebrate Holding Log for Data

Mortality (%) During 48 Hours Prior to Test Initiation: >10%

DILUTION WATER:
Natural, Filtered Seawater

Lighting: [X] Fluorescent [ ] Incandescent

Photoperiod: 16 Hours Light : 8 Hours Dark

TEST VESSELS

Dimensions (cm) : 50 Length x 26.5 Width x 31.5 Height

Test Solution Height: ~25 cm

Test Vessels: [X] Open [ ] Covered

Test Container Volume: 37.5 Liters

Test Solution Volume: ~30.0 Liters

TEST SOLUTION PREPARATION

TEST CONCENTRATION % mg/L	Control						
Volume of Dilution Water Added (Gal)	# 8						
Volume of Effluent / Stock Added (cm)	2						

ADDITIONAL OBSERVATIONS: * Same for every sample

DATA BY: AC DATE: 7/17/00

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **CONTROL**

PROJECT NUMBER: 31002186-0400-3100
TEST SPECIES: *Macoma nasuta*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/29/00 0	A	19.9	25		8.3	7.7			1000/BTS
7/29/00 1	B	18.7	25		8.3	7.8			Em 1100
7/30/00 2	C	18.0	25		8.3	7.3			Em 1430
7/31/00 3	D	19.3	26		8.5	7.9			BTS/1040
8/1/00 4	E	18.1	26		8.3	7.9			BTS/0955
8/2/00 5	A	19.3	26		8.4	7.8			BTS/1000
8/3/00 6	B	18.1	26		8.3	7.4			BTS/0900
8/4/00 7	C	20.5	26		8.3	7.6			BTS/1005
8/5/00 8	D	18.4	25		8.5	6.8			Em 1400
8/6/00 9	E	18.1	25		8.3	7.3			Em/1330
8/7/00 10	A	17.9	26		8.2	7.8			BTS/0945

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/29/00 0	loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	Em WT ~~N~~ 1d	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	1d	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	1d	1d	N	N	N
8/4/00 7	3d	N	2d	1d	N
8/5/00 8	3d	N	1d	N	N
8/6/00 9	1d	N	1d	N	1d
8/7/00 10	12A	19A	16A	18A 1d	19A

Comments:

84/100 = 84%

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO Reference**

PROJECT NUMBER: 31002186-0400-3100
TEST SPECIES: *Macoma nasuta*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.0	25		8.4	7.6			BTS / 1000
7/29/00 1	B	18.4	25		8.2	7.4			EM / 1100
7/30/00 2	C	18.8	25		8.5	7.0			EM / 1430
7/31/00 3	D	19.5	26		8.5	7.6			BTS / 1040
8/1/00 4	E	18.6	26		8.3	7.6			BTS / 0955
8/2/00 5	A	19.6	26		8.4	7.8			BTS / 1000
8/3/00 6	B	18.4	26		8.3	6.9			BTS / 0900
8/4/00 7	C	20.6	26		8.3	7.5			BTS / 1005
8/5/00 8	D	18.5	25		8.5	7.3			EM / 1400
8/6/00 9	E	18.5	25		8.4	7.2			EM / 1330
8/7/00 10	A	18.1	26		8.1	7.7			BTS / 0945

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/24/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	1d	1d	N	1d	N
7/31/00 3	N	N	1d	2d	1d
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	1d	N
8/3/00 6	N	1d	N	N	2d
8/4/00 7	2d	N	N	1d	4d
8/5/00 8	1d	1d	1d	1d	1d
8/6/00 9	1d	3d	5d	2d	1d
8/7/00 10	1d 14A	14	13	H 13	1d 10A

Comments:

64 g

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-1/2**

PROJECT NUMBER: 31002186-0400-3100
TEST SPECIES: *Macoma nasuta*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.2	25		8.3	7.5			BTS / 1000
7/29/00 1	B	18.8	25		8.0	7.6			EM / 1100
7/30/00 2	C	18.6	25		8.1	7.3			Em/1430
7/31/00 3	D	20.0	26		8.5	7.6			BTS/1040
8/1/00 4	E	18.5	26		8.4	7.7			BTS/0855
8/2/00 5	A	19.6	26		8.4	7.6			BTS/1000
8/3/00 6	B	18.3	26		8.3	7.6			BTS/0900
8/4/00 7	C	20.2	26		8.3	7.5			BTS/1005
8/5/00 8	D	18.8	25		8.4	7.2			Em/1400
8/6/00 9	E	18.2	25		8.4	7.2			Em/1330
8/7/00 10	A	18.0	26		8.2	7.8			BTS/0845

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/28/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	1d	WI Em ~~1d~~ N *	N	N	N
7/31/00 3	N	1d	N	2d	N
8/1/00 4	1d	N	N	N	1d
8/2/00 5	4d	N	1d	2d	1d
8/3/00 6	1d	2d	N	2d	1d
8/4/00 7	3d	2d	3d	2d	1d
8/5/00 8	4d	1d	4d	N	2d
8/6/00 9	WI Em ~~N~~ 1d	WI Em ~~2d~~ 1d	WI Em ~~N~~ 3d	N	N
8/7/00 10	6	13	~~13~~ 10	10	13 1d

Comments: * Clam looked dead but wasn't.

52%

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-3/4**

PROJECT NUMBER: 31002186-0400-3100
TEST SPECIES: *Macoma nasuta*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.1	26		8.3	7.4			BTS / 1000
7/29/00 1	B	18.0	25		8.4	7.4			Em / 1100
7/30/00 2	C	17.9	26		8.4	6.4			Em / 1430
7/31/00 3	D	19.7	26		8.5	7.8			BTS / 1040
8/1/00 4	E	18.3	26		8.4	7.8			BTS / 0855
8/2/00 5	A	19.6	26		8.3	7.5			BTS / 1000
8/3/00 6	B	18.1	26		8.4	7.9			BTS / 0900
8/4/00 7	C	20.0	26		8.3	7.5			BTS / 1005
8/5/00 8	D	18.5	25		8.3	7.1			Em / 1400
8/6/00 9	E	18.1	25		8.3	6.9			Em / 1330
8/7/00 10	A	18.1	26		8.1	7.4			BTS / 0845

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/28/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	1d	N	N	2d
7/31/00 3	1d	N	1d	N	1d
8/1/00 4	2d	N	N	N	N
8/2/00 5	N	N	1d	1d	2d
8/3/00 6	N	N	N	N	N
8/4/00 7	1d	~~Sd~~ N BTS	N	2d	~~2d~~ N BTS
8/5/00 8	N	2d	N	N	N
8/6/00 9	N	1d	1d	1d	1d
8/7/00 10	16	16	17	16	3d 11

Comments:

76%

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-5**

PROJECT NUMBER: 3i00218G-0400-3100
TEST SPECIES: *Macoma nasuta*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.1	26		8.4	7.6			BTS / 1000
7/29/00 1	B	18.2	25		8.4	7.5			EM / 1100
7/30/00 2	C	18.5	25		8.6	7.3			EM / 1430
7/31/00 3	D	19.3	26		8.5	7.9			BTS / 1040
8/1/00 4	E	18.2	26		8.3	7.3			BTS / 0955
8/2/00 5	A	19.6	26		8.4	7.8			BTS / 1000
8/3/00 6	B	18.2	26		8.4	7.9			BTS / 0900
8/4/00 7	C	20.5	26		8.3	7.5			BTS / 1005
8/5/00 8	D	18.5	25		8.5	7.3			EM / 1400
8/6/00 9	E	18.2	25		8.3	6.9			EM / 1330
8/7/00 10	A	17.5	26		8.2	7.8			BTS / 0945

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/28/00 0	Loaded 20	→	→	→	→
7/29/00 1	1d	N	N	N	N
7/30/00 2	1d	1d	N	N	2d
7/31/00 3	N	N	N	N	1d
8/1/00 4	1d	N	N	N	N
8/2/00 5	N	1d	N	N	N
8/3/00 6	1d	N	N	N	2d
8/4/00 7	N	5d	N	N	1d
8/5/00 8	1d	N Leak	2d	N	2d
8/6/00 9	2d	1d	1d	N	2d
8/7/00 10	12 1d	11 1d	17	18 2d	10

Comments:

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-Duplicate**

PROJECT NUMBER: 3100218G-0400-3100
TEST SPECIES: *Macoma nasuta*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/29/00 0	A	20.1	26		8.4	7.5			BTS / 1000
7/29/00 1	B	18.1	25		8.4	WL SW 7.6.5			EM / 1100
7/30/00 2	C	18.2	25		8.2	6.4			EM/1430
7/31/00 3	D	19.5	26		8.5	7.7			BTS / 1040
8/1/00 4	E	19.0	26		8.4	7.7			BTS/ 0955
8/2/00 5	A	19.7	26		8.4	7.9			BTS/ 1000
8/3/00 6	B	18.1	26		8.4	8.0			BTS/0900
8/4/00 7	C	20.2	26		8.3	7.5			BTS/ 1005
8/5/00 8	D	18.4	25		8.6	7.0			EM/ 1400
8/6/00 9	E	18.2	25		8.4	7.1			EM/ 1330
8/7/00 10	A	17.7	26		8.2	7.8			BTS/ 0945

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/29/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	1d	1d	1d	1d	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	2d	4d	N
8/3/00 6	N	N	N	1d	1d
8/4/00 7	1d	N	1d	N	N
8/5/00 8	N	1d	1d	1d	1d
8/6/00 9	1d	2d	1d	1d	2d
8/7/00 10	15 2d	16	~~X~~ 13 1d FO-HM	12	16

Comments:

77%

Appendix A-10

Survivorship and Water Quality Monitoring Results for *Nereis virens* Bioaccumulation Tests for Canaveral Harbor, July 2000

Environmental Science & Engineering, Inc.
Gainesville, FL

QST QA Form: 097
Effective: Oct 1997

SUBJECT: TOXICITY TEST DATA SHEET

Sponsor: PPBI Canaveral Harbor

Project No.: 31002186-0400-3100

TEST MATERIAL

Test Material: Whole Sediment

See Page 528 of Effluent Log for Test Material Information

PROTOCOL / GUIDELINES FOLLOWED:

EPA-503/8-91/001

TEST CONCENTRATIONS BASED ON: [ ] ACTIVE INGREDIENT
[X] WHOLE MATERIAL

TEST CONDITIONS

[ ] Range-finder
[X] Screening
[ ] Definitive

[X] Static Renewal
[ ] Flow-Through

TEST DURATION: 10 days

TEST AREA USED: Bioaccumulation Room

TEST TEMPERATURE (°C): 18 ± 2

TEST SALINITY (ppt): 25 ± 2

REPLICATES PER CONCENTRATION: 5

ORGANISMS PER REPLICATE: 20

TEST ANIMAL HISTORY

Test Species: Nereis virens

Lot Number: 2000-043

Age / Life Stage: 3-5 grams

Date Acclimation / Maintenance Began: 7/27/00

See Page 341 of Invertebrate Holding Log for Data

Mortality (%) During 48 Hours Prior to Test Initiation: >10%

DILUTION WATER:

Natural, Filtered Seawater

Lighting: [X] Fluorescent [ ] Incandescent

Photoperiod: 16 Hours Light : 8 Hours Dark

TEST VESSELS

Dimensions (cm) : 50 Length x 26.5 Width x 31.5 Height

Test Solution Height: ~25 cm

Test Vessels: [X] Open [ ] Covered

Test Container Volume: 37.5 Liters

Test Solution Volume: ~30.0 Liters

TEST SOLUTION PREPARATION

TEST CONCENTRATION % mg/L	Control						
Volume of Dilution Water Added (gal)	8						
Volume of Effluent / Stock Added (cm)	2						

ADDITIONAL OBSERVATIONS:

DATA BY: AC DATE: 7/17/00

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **CONTROL**

PROJECT NUMBER: 31002186-0400-3100
TEST SPECIES: *Nereis virens*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.1	25		8.2	7.6			BTS / 1000
7/29/00 1	B	17.7	25		8.3	7.8			EM/1100
7/30/00 2	C	17.6	25		8.4	7.7			EM/1430
7/31/00 3	D	19.6	26		8.5	7.6			BTS/1040
8/1/00 4	E	18.2	26		8.2	6.9			BTS/0855
8/2/00 5	A	19.5	26		8.4	7.7			BTS/1000
8/3/00 6	B	18.0	26		8.3	7.9			BTS/0900
8/4/00 7	C	19.9	26		8.3	7.5			BTS/1005
8/5/00 8	D	18.7	25		8.4	6.5			EM/1400
8/6/00 9	E	18.0	26		8.1	6.3			EM/1300
8/7/00 10	A	18.0	26		8.1	7.5			BTS/0845

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/28/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	Id	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	20 A	20 A	20 A	19 A	18 A 2 NF

Comments:

97%

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-Reference**

PROJECT NUMBER: 31002186-0400-3100
TEST SPECIES: *Nereis virens*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/29/00 0	A	19.7	25		8.3	7.7			BTS / 1000
7/29/00 1	B	18.0	25		8.3	7.3			EM / 1100
7/30/00 2	C	18.0	25		8.3	6.7			GM / 1430
7/31/00 3	D	19.7	26		8.5	7.8			BTS / 1040
8/1/00 4	E	19.3	26		8.3	7.6			BTS / 0955
8/2/00 5	A	19.3	26		8.4	7.8			BTS / 1000
8/3/00 6	B	18.1	26		8.3	7.7			BTS / 0900
8/4/00 7	C	20.3	26		8.2	7.3			BTS / 1005
8/5/00 8	D	18.0	25		8.5	6.9			EM 1400
8/6/00 9	E	18.5	26		8.2	6.5			EM / 1300
8/7/00 10	A	19.5	26		8.2	7.9			BTS / 0845

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/29/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	1
8/7/00 10	20A	20A	20A	19A INF	19A

Comments:

98

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-1/2**

PROJECT NUMBER: 31002186-0400-3100
TEST SPECIES: *Nereis virens*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/29/00 0	A	20.2	25		8.3	7.4			BTS / 1000
7/29/00 1	B	18.0	25		8.3	7.4			BTS / 1100
7/30/00 2	C	18.1	25		8.4	7.1			BTS / 1430
7/31/00 3	D	19.5	26		8.5	7.2			BTS / 1040
8/1/00 4	E	18.2	26		8.2	6.8			BTS / 0855
8/2/00 5	A	19.7	26		8.4	7.6			BTS / 1000
8/3/00 6	B	18.0	26		8.2	7.6			BTS / 0900
8/4/00 7	C	20.3	26		8.3	7.4			BTS / 1005
8/5/00 8	D	18.2	25		8.4	7.0			BTS / 1400
8/6/00 9	E	18.0	26		8.2	6.8			BTS / 1300
8/7/00 10	A	17.7	26		8.1	7.4			BTS / 0845

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/29/00 0	Loaded 20 →				
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	18A	20A	19A 1NF	18A 2NF	20A

Comments:

95%

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-3/4**

PROJECT NUMBER: 31002186-0400-3100
TEST SPECIES: *Nereis virens*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.3	25		8.3	7.0			BTS / 1000
7/29/00 1	B	17.8	25		8.2	7.7			EM / 1100
7/30/00 2	C	17.6	25		8.4	6.9			EM / 1430
7/31/00 3	D	19.5	26		8.5	7.8			BTS / 1040
8/1/00 4	E	18.1	26		8.3	7.7			BTS / 0955
8/2/00 5	A	19.3	26		8.4	7.6			BTS / 1000
8/3/00 6	B	17.8	26		8.3	7.5			BTS / 0900
8/4/00 7	C	19.9	26		8.3	7.5			BTS / 1005
8/5/00 8	D	18.2	25		8.6	7.2			EM / 1400
8/6/00 9	E	17.8	26		8.3	7.7			EM / 1300
8/7/00 10	A	18.0	26		8.2	7.5			BTS / 0845

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/28/00 0	Loaded to →				
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	17A 3NF	20A	19A INF	20A	19A INF

Comments:

95%

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-5**

PROJECT NUMBER: 31002186-0400-3100
TEST SPECIES: *Nereis virens*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/28/00 0	A	20.0	25		8.3	7.6			BTS / 1000
7/29/00 1	B	18.2	25		8.3	7.5			Em / 1100
7/30/00 2	C	17.8	25		8.5	7.6			Em/1430
7/31/00 3	D	19.5	26		8.5	7.7			BTS / 1040
8/1/00 4	E	19.3	26		8.3	7.5 ~~8.4~~ BTS			BTS/0955
8/2/00 5	A	19.2	26		8.4	7.8			BTS/ 1000
8/3/00 6	B	19.2	26		8.3	7.5			BTS/ 0900
8/4/00 7	C	20.6	26		8.3	7.4			BTS/ 1005
8/5/00 8	D	18.2	25		8.5	6.4			Em/1400
8/6/00 9	E	17.9	26		8.4	7.2			Em / 1300
8/7/00 10	A	17.6	26		8.2	7.8			BTS/0845

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/28/00 0	Loaded 20	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	N	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	20 A	20 A	20 A	19 A INF	20 A

Comments:

99%

ESE ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108D
EFFECTIVE: AUGUST 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET

SPONSOR: PPB/Canaveral Harbor
SAMPLE ID: **E-CHOO-Duplicate**

PROJECT NUMBER: 31002186-0400-3100
TEST SPECIES: *Nereis virens*

DATE-DAY	REP	TEMP (°C)	SALIN (ppt)	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
7/26/00 0	A	20.0	25		8.4	7.5			BTS / 1000
7/29/00 1	B	18.1	25		8.2	7.5			Em / 1100
7/30/00 2	C	18.0	25		8.5	6.6			Em / 1430
7/31/00 3	D	19.5	26		8.5	7.6			BTS / 1040
8/1/00 4	E	18.1	26		8.4	7.7			BTS / 0855
8/2/00 5	A	19.5	26		8.4	7.7			BTS / 1000
8/3/00 6	B	18.1	26		8.4	7.9			BTS / 0900
8/4/00 7	C	20.2	26		8.3	7.5			BTS / 1005
8/5/00 8	D	18.1	25		8.4	7.4			Em / 1400
8/6/00 9	E	18.1	25		8.3	7.3			Em / 1300
8/7/00 10	A	17.7	26		8.1	6.8			BTS / 0845

OBSERV	REPLICATE				
DATE-DAY	A	B	C	D	E
7/26/00 0	Loaded Zo	→	→	→	→
7/29/00 1	N	N	N	N	N
7/30/00 2	N	N	N	N	N
7/31/00 3	N	N	N	N	N
8/1/00 4	N	N	N	N	N
8/2/00 5	N	N	N	N	N
8/3/00 6	N	N	N	N	N
8/4/00 7	N	N	N	1 Leth	N
8/5/00 8	N	N	N	N	N
8/6/00 9	N	N	N	N	N
8/7/00 10	20A	19A 1d	20A	20A	20A

Comments:

Appendix B

Physical Testing Data for Canaveral Harbor Sediments, July 2000

LAW
LAWGIBB Group Member
3901 Carmichael Avenue
Jacksonville, FL 32207
(904) 396-5173 • (904) 396-5703

Report of Specific Gravity and Percent Solids

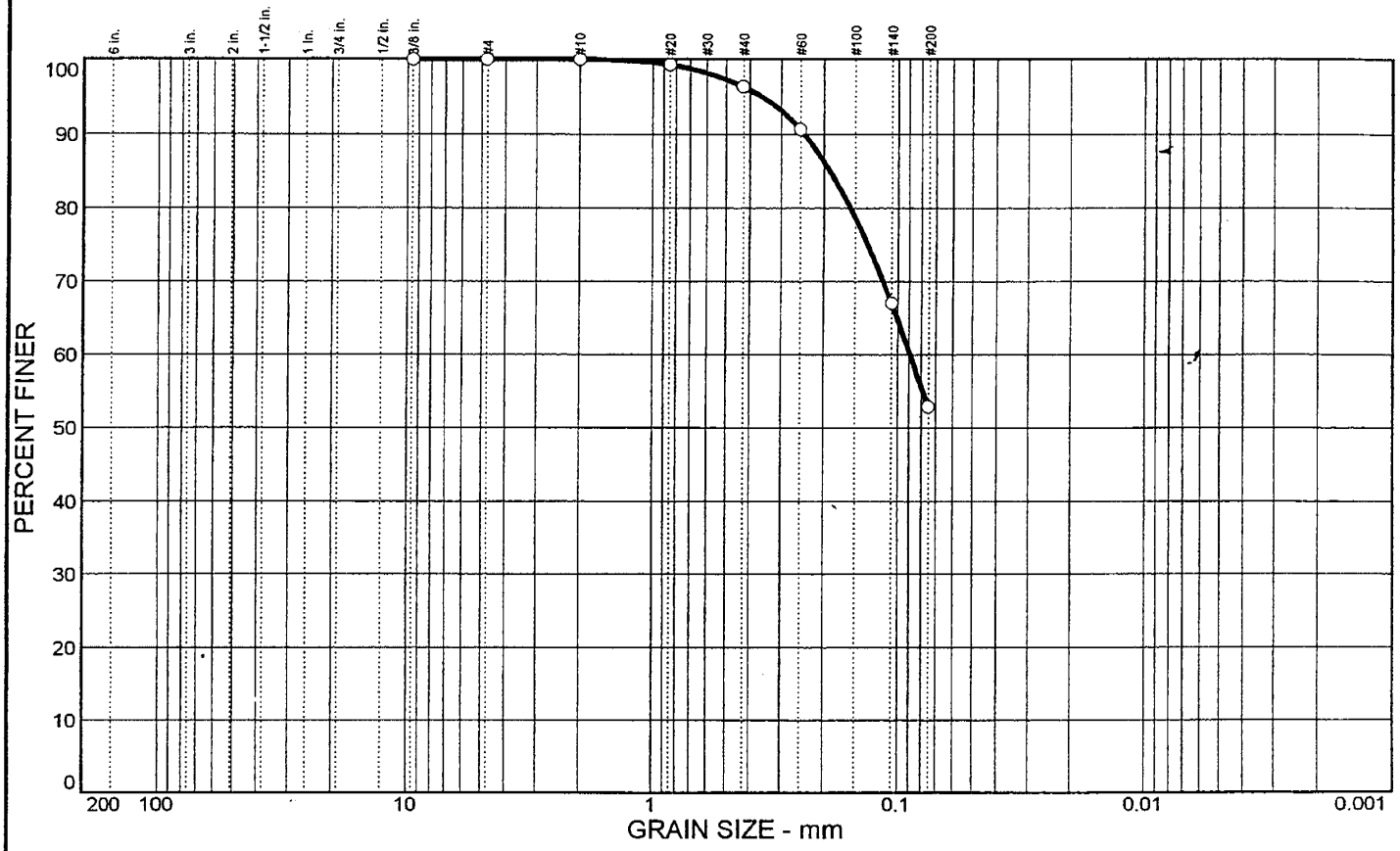
CLIENT: COE – Canaveral Harbor
JOB NO.: 40564-5-1484-03
PROJECT: PPB Environmental Laboratories
DATE: August 30, 2000

PPB SAMPLE NO.	STATION NO.	SPECIFIC GRAVITY	PERCENT SOLIDS
190393	E-CHOO-1/2	2.790	39.1
190395	E-CHOO-3/4	2.721	56.2
190397	E-CHOO-5	2.646	48.8
190398	E-CHOO-5 Dup	2.599	46.5
190399	RS-CHOO-1/2	2.651	61.2
190792	Control	2.622	75.8

Reviewed by:

Stephanie A. Setser, P.E.

Grain Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			47.1	52.9		CH	A-7-5(35)	40	114

SIEVE inches size	PERCENT FINER ○		
.375	100.0		
	GRAIN SIZE		
D_{60}	0.0889		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	100.0		
#10	100.0		
#20	99.3		
#40	96.3		
#60	90.6		
#140	67.0		
#200	52.9		

SOIL DESCRIPTION

○ Dark Gray Sandy CLAY

REMARKS:

○

○ Source: E-CHOO-1/2

Sample No.: PPB Sample No. 190393

Law Engineering and Environmental Services, Inc.

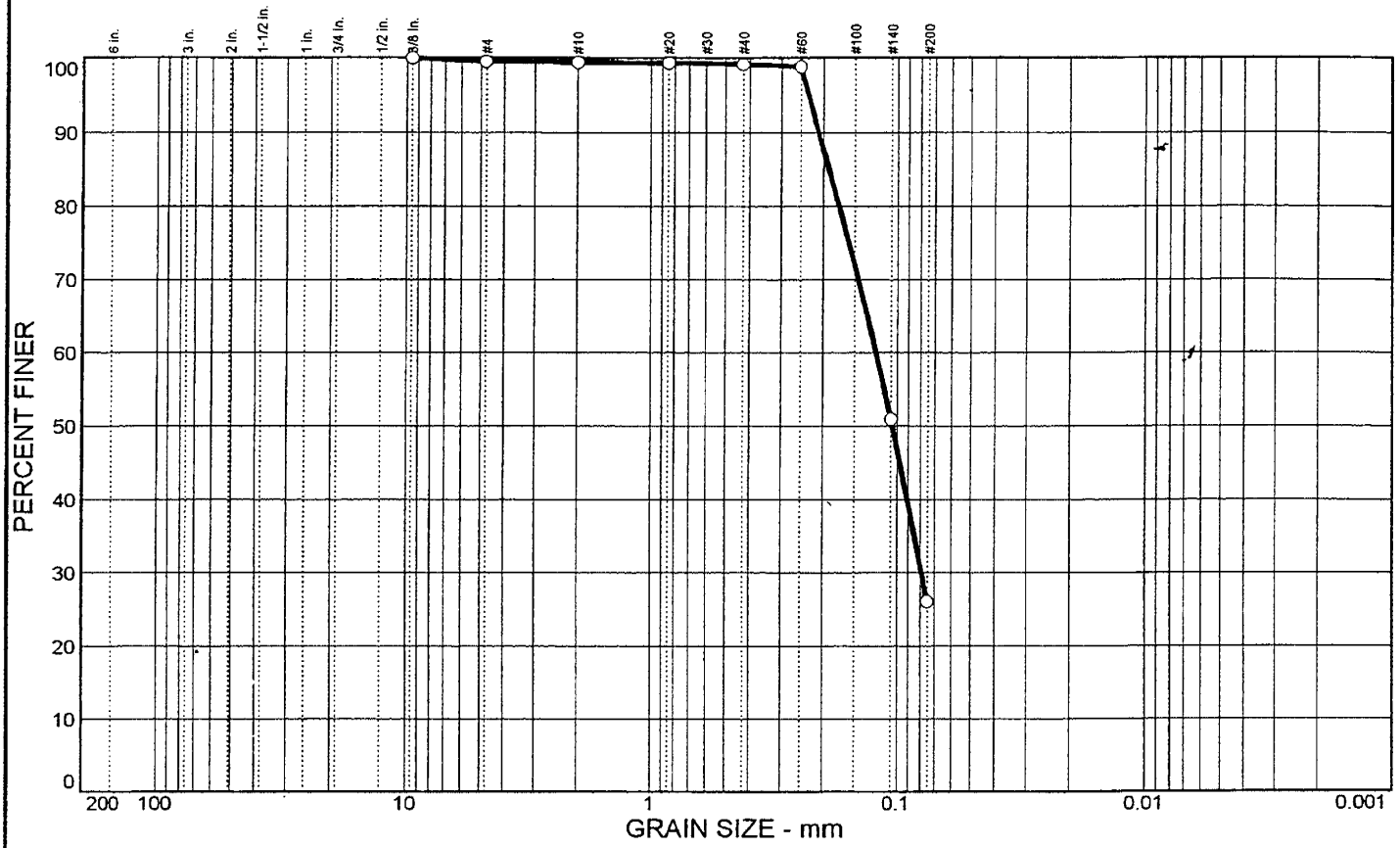
Client: PPB Environmental Laboratories

Project: Canaveral Harbor

Project No.: 40564-5-1484-03

JOHN A. UNTERSPAN, P.E.

Grain Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		0.5	73.4	26.1		SM	A-2-7(1)	31	48

SIEVE inches size	PERCENT FINER ○		
.375	100.0		
	GRAIN SIZE		
D_{60}	0.122		
D_{30}	0.0791		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○
#4	99.5
#10	99.4
#20	99.3
#40	99.1
#60	98.8
#140	50.9
#200	26.1

SOIL DESCRIPTION

○ Dark Gray Silty Fine SAND

REMARKS:

○

○ Source: E-CHOO-3/4 Sample No.: PPB Sample No. 190395

Law Engineering and Environmental Services, Inc.

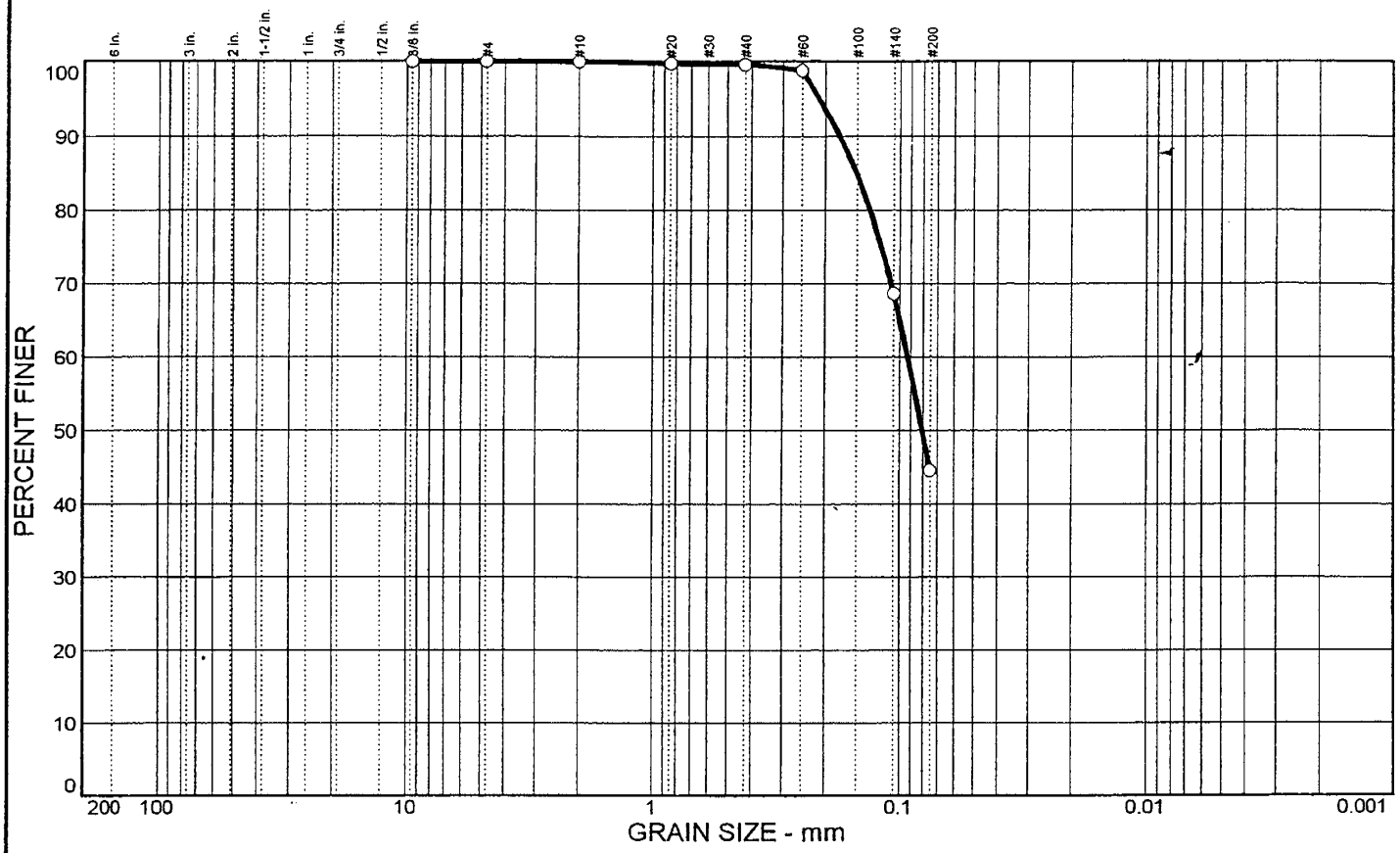
Client: PPB Environmental Laboratories

Project: Canaveral Harbor

Project No.: 40564-5-1484-03

JOHN A. UNTERSPAN, P.E.

Grain Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			55.4	44.6		SC	A-7-5(14)	33	76

SIEVE inches size	PERCENT FINER ○		
.375	100.0		

GRAIN SIZE			
D_{60}	0.0928		
D_{30}			
D_{10}			

COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	100.0		
#10	100.0		
#20	99.7		
#40	99.6		
#60	98.8		
#140	68.6		
#200	44.6		

SOIL DESCRIPTION

○ Dark Gray Very Clayey Fine SAND

REMARKS:

○

○ Source: E-CHOO-5

Sample No.: PPB Sample No. 190397

Law Engineering and Environmental Services, Inc.

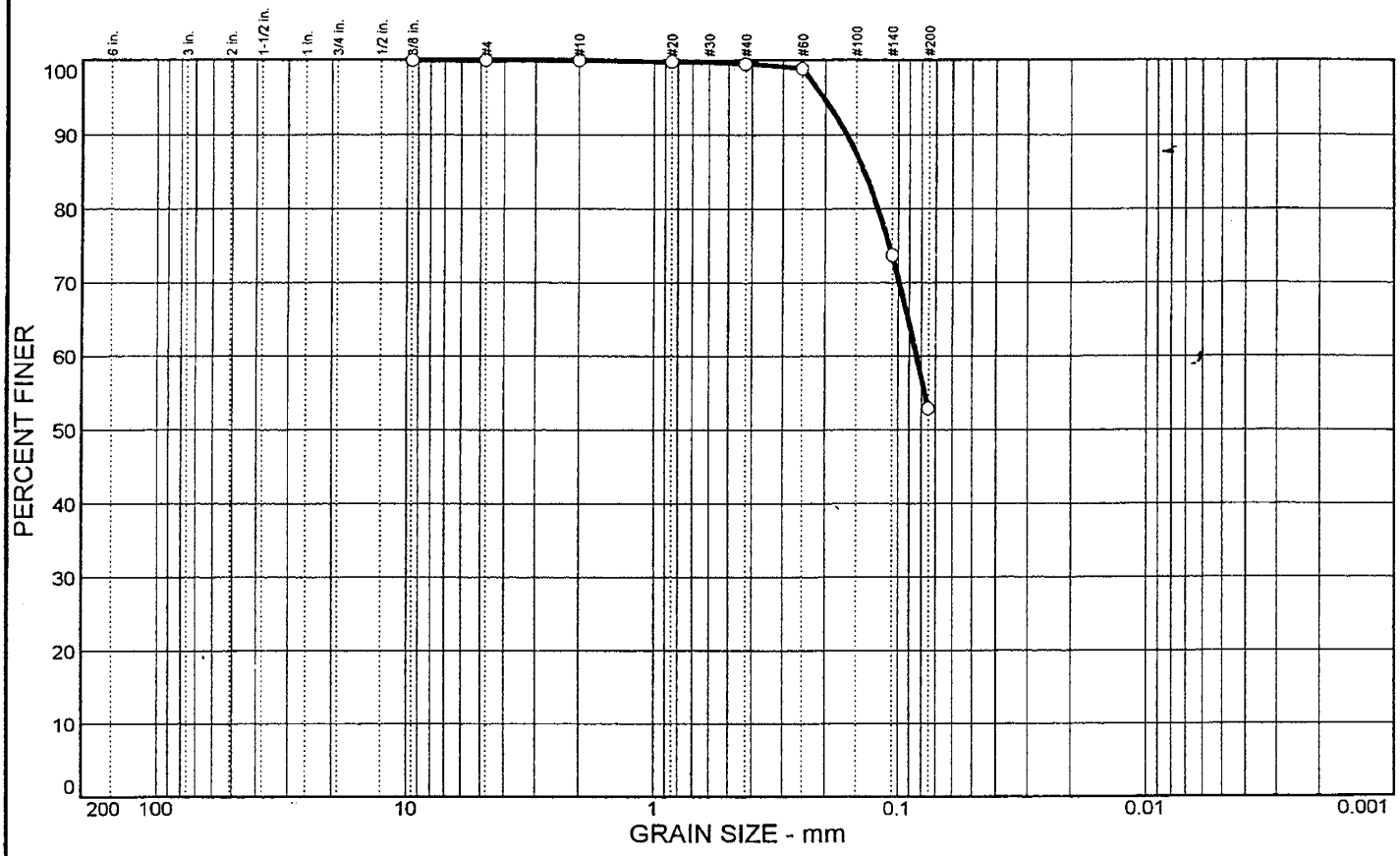
Client: PPB Environmental Laboratories

Project: Canaveral Harbor

Project No.: 40564-5-1484-03

JOHN A. UNTERSPAN, P.E.

Grain Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			47.1	52.9		CH	A-7-5(23)	35	85

SIEVE inches size	PERCENT FINER ○		
.375	100.0		
GRAIN SIZE			
D_{60}	0.0838		
D_{30}			
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	100.0		
#10	100.0		
#20	99.8		
#40	99.5		
#60	98.9		
#140	73.7		
#200	52.9		

SOIL DESCRIPTION

○ Dark Gray Very Sandy CLAY

REMARKS:

○

○ Source: E-CHOO-5 Dup

Sample No.: PPB Sample No. 190398

Law Engineering and Environmental Services, Inc.

Client: PPB Environmental Laboratories

Project: Canaveral Harbor

Project No.: 40564-5-1484-03

JOHN A. UNTERSPAN, P.E.

Grain Size Distribution Report

	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
O		0.9	57.5	41.6		SM	A-7-6(3)	29	45

SIEVE inches size	PERCENT FINER O		
.5	100.0		
.375	99.8		
	GRAIN SIZE		
D_{60}	0.0960		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER O		
#4	99.1		
#10	98.5		
#20	97.6		
#40	96.0		
#60	86.4		
#140	66.1		
#200	41.6		

SOIL DESCRIPTION

O Dark Gray Very Silty Fine SAND

REMARKS:

O

O Source: RS-CHOO-1/2

Sample No.: PPB Sample No. 190399

Law Engineering and Environmental Services, Inc.

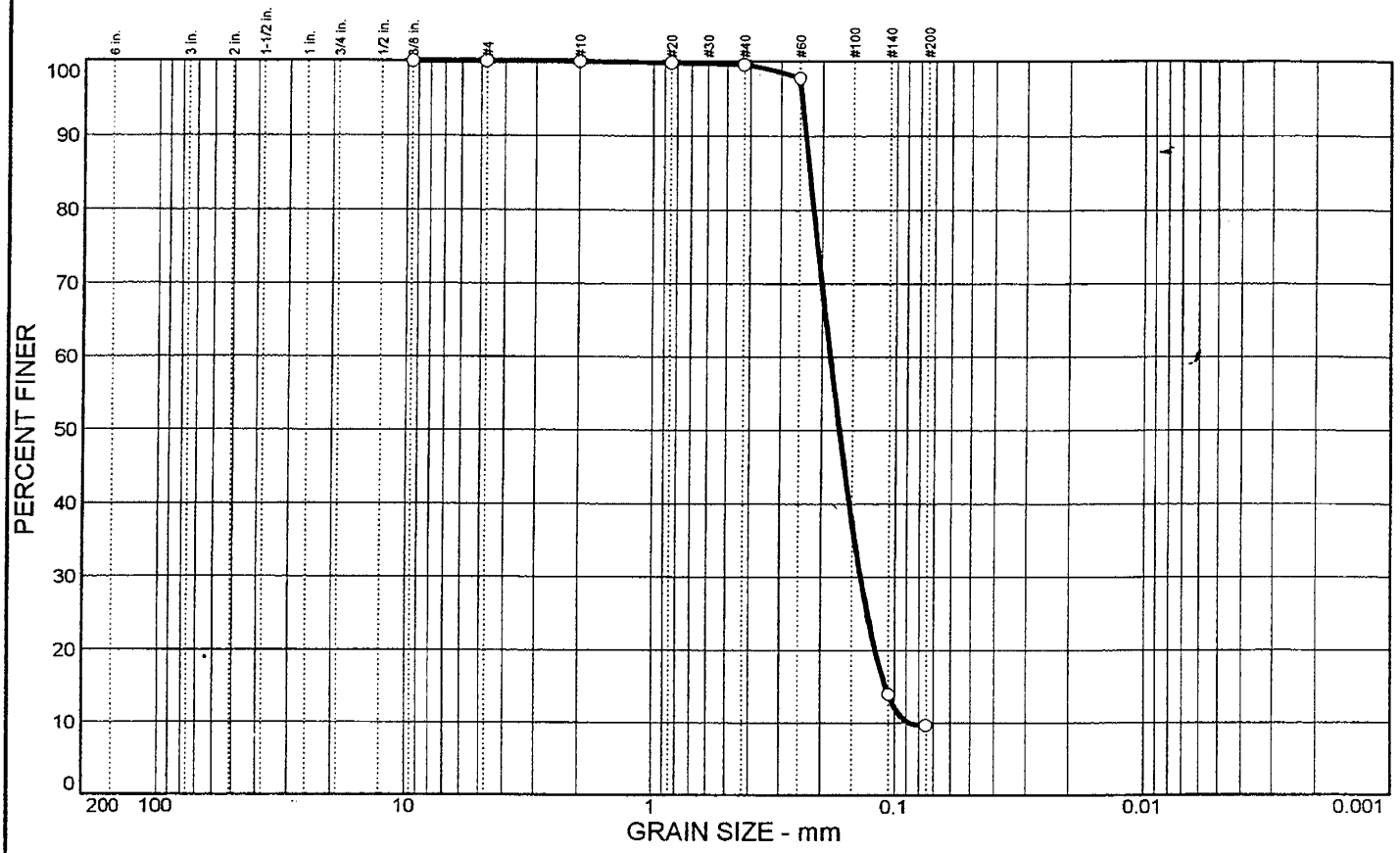
Client: PPB Environmental Laboratories

Project: Canaveral Harbor

Project No.: 40564-5-1484-03

JOHN A. UNTERSPAN, P.E.

Grain Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			90.4	9.6		SP-SM	A-2-4(0)	22	23

SIEVE inches size	PERCENT FINER ○		
.375	100.0		
GRAIN SIZE			
D_{60}	0.184		
D_{30}	0.137		
D_{10}	0.0876		
COEFFICIENTS			
C_c	1.17		
C_u	2.10		

SIEVE number size	PERCENT FINER ○		
#4	100.0		
#10	100.0		
#20	99.8		
#40	99.6		
#60	97.8		
#140	13.9		
#200	9.6		

SOIL DESCRIPTION

○ Dark Gray Slightly Silty Fine SAND

REMARKS:

○

○ Source: Control

Sample No.: PPB Sample No. 190792

Law Engineering and Environmental Services, Inc.

Client: PPB Environmental Laboratories

Project: Canaveral Harbor

Project No.: 40564-5-1484-03

JOHN A. UNTERSPAN, P.E.

LAW
LAWGIBB Group Member
3901 Carmichael Avenue
Jacksonville, FL 32207
(904) 396-5173 • (904) 396-5703

Report of Atterberg Limits

CLIENT: COE – Canaveral Harbor
JOB NO.: 40564-5-1484-03
PROJECT: PPB Environmental Laboratories
DATE: August 30, 2000

PPB SAMPLE NO.	STATION NO.	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX
190393	E-CHOO-1/2	114	40	74
190395	E-CHOO-3/4	48	31	17
190397	E-CHOO-5	76	34	42
190398	E-CHOO-5 Dup	85	35	50
190399	RS-CHOO-1/2	45	29	16
190792	Control	23	21	2

Reviewed by:

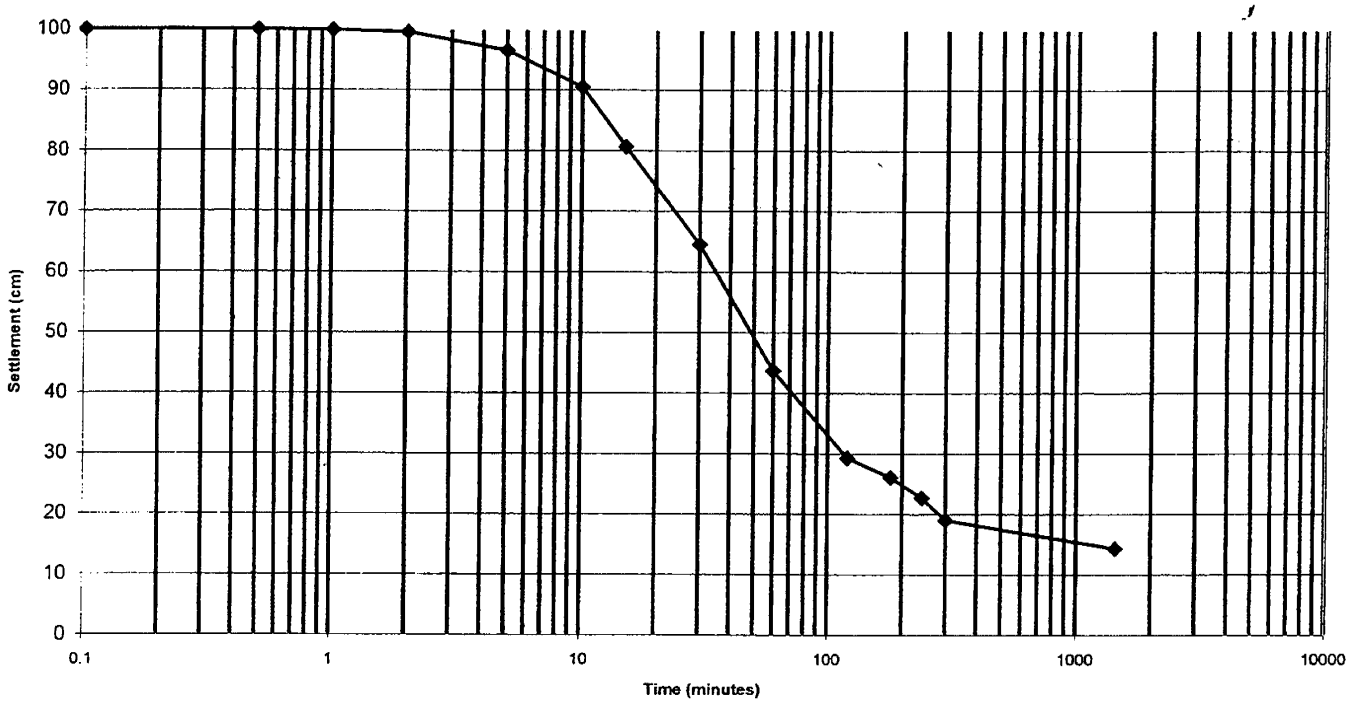
Stephanie A. Setser, P.E.

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES
3901 CARMICHAEL AVENUE
JACKSONVILLE, FLORIDA 32207
(904)396-5173

REPORT OF SETTLING RATE TESTING

LAW PROJECT NO: 40564-5-1484-03
PROJECT: COE Canaveral Harbor
CLIENT: PPB Environmental Labs

Sample No 190393
Station No. E-CH00-1/2
CONCENTRATION: 100g/L



TIME	INTERFACE (cm)	TIME	INTERFACE (cm)
0.1	100	30	64.5
0.5	100	60	43.7
1	99.9	120	29.3
2	99.5	180	26.1
5	96.5	240	22.7
10	90.5	300	19
15	80.7	1440	14.3

Reviewed By:

JOHN A. UNTERSPAN, P.E.

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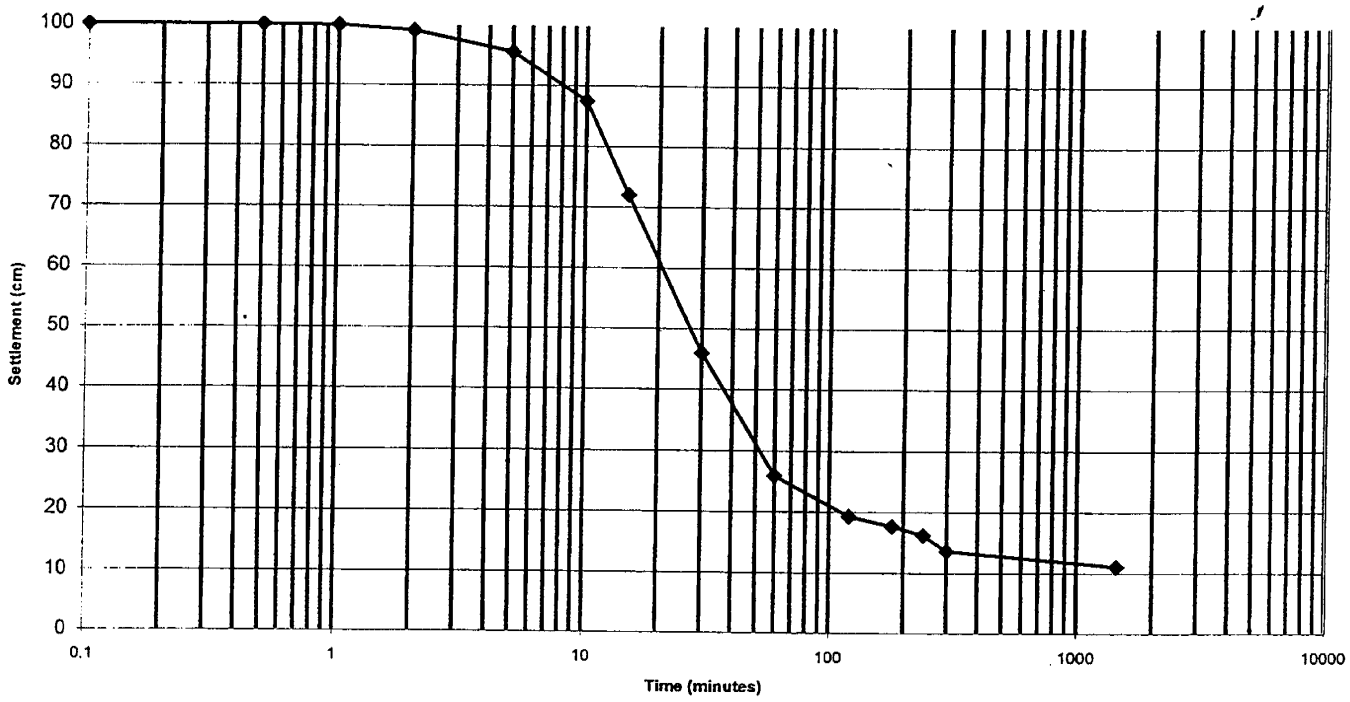
REPORT OF SETTLING RATE TESTING

LAW PROJECT NO: 40564-5-1484-03
PROJECT: COE Canaveral Harbor
CLIENT: PPB Environmental Labs

Sample No 190395
Station No. E-CH00-3/4
CONCENTRATION: 100g/L



TIME	INTERFACE (cm)	TIME	INTERFACE (cm)
0.1	100	30	46
0.5	100	60	25.9
1	99.9	120	19.3
2	99	180	17.7
5	95.5	240	16.2
10	87.5	300	13.6
15	72	1440	11.1

Reviewed By:

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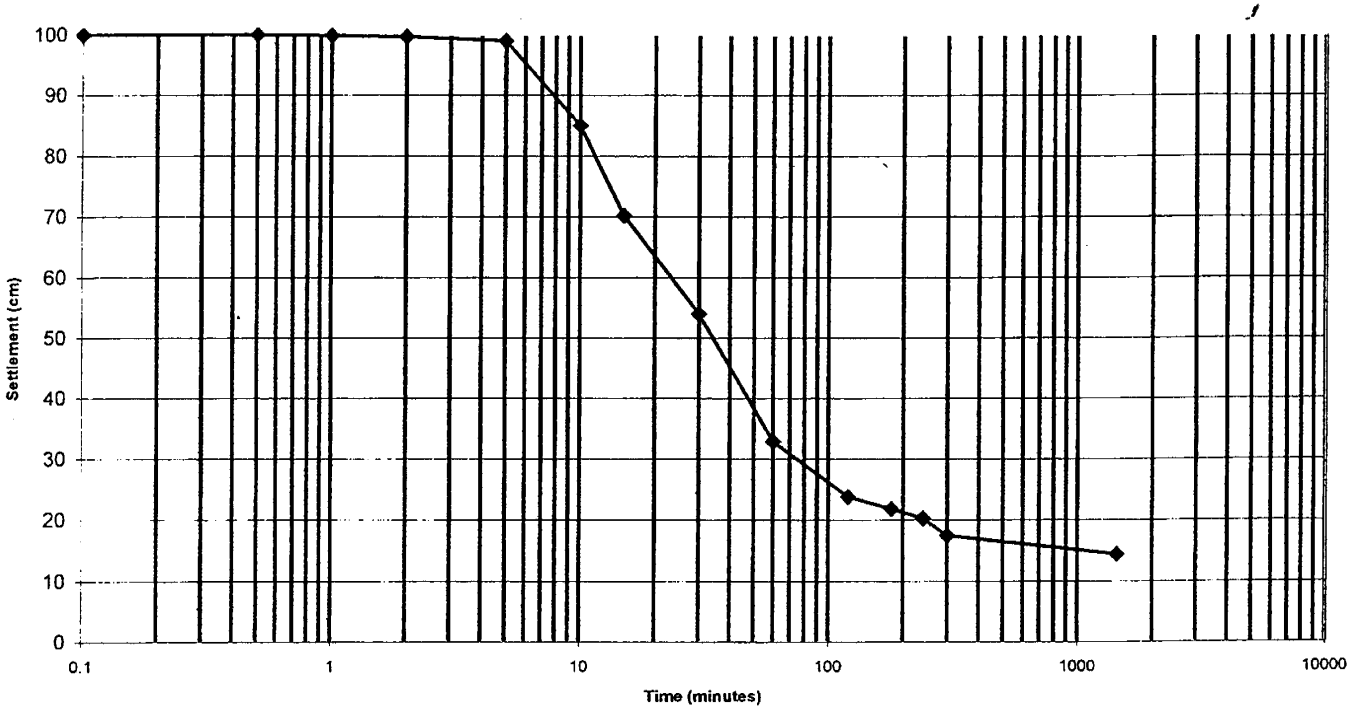
REPORT OF SETTLING RATE TESTING

LAW PROJECT NO: 40564-5-1484-03
PROJECT: COE Canaveral Harbor
CLIENT: PPB Environmental Labs

Sample No 190397
Station No. E-CH00-5
CONCENTRATION: 100g/L



TIME	INTERFACE (cm)	TIME	INTERFACE (cm)
0.1	100	30	54
0.5	100	60	32.9
1	99.9	120	23.8
2	99.7	180	21.8
5	99	240	20.3
10	85	300	17.5
15	70.2	1440	14.4

Reviewed By:

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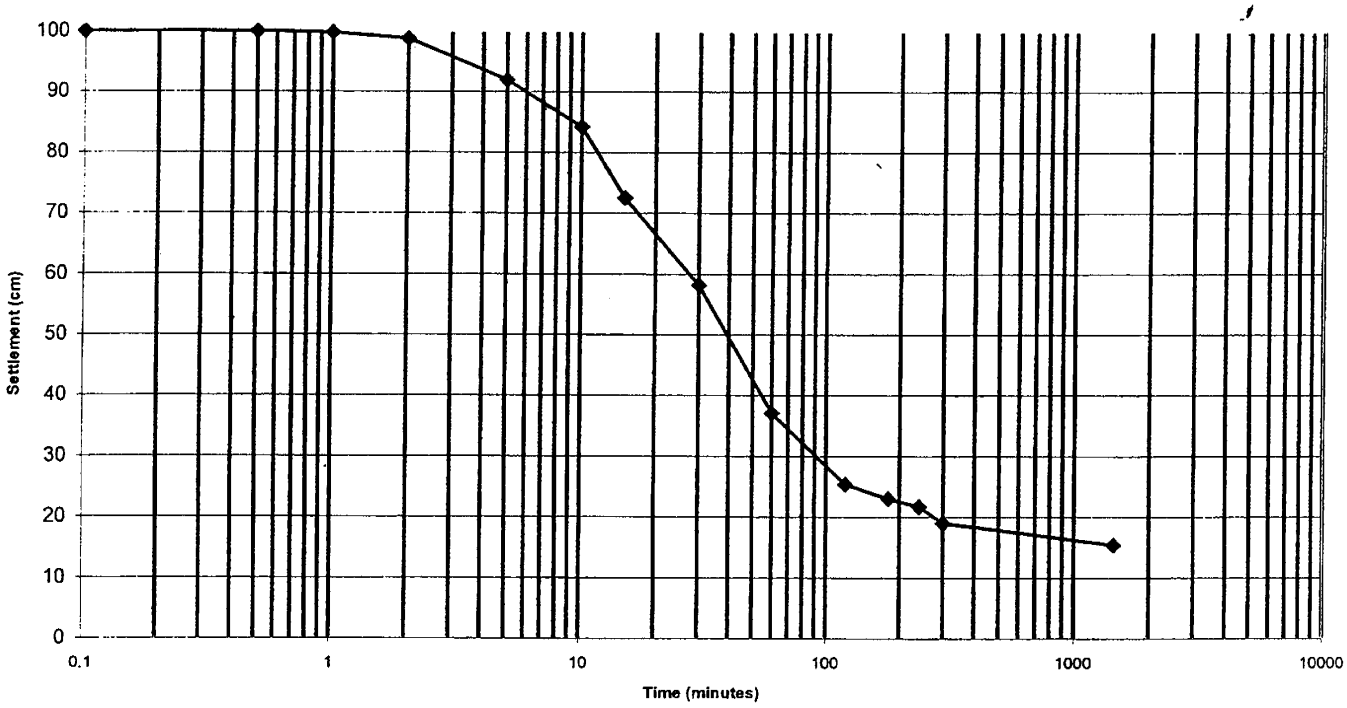
REPORT OF SETTLING RATE TESTING

LAW PROJECT NO: 40564-5-1484-03
PROJECT: COE Canaveral Harbor
CLIENT: PPB Environmental Labs

Sample No 190398
Station No. E-CH00-5DUP
CONCENTRATION: 100g/L



TIME	INTERFACE (cm)	TIME	INTERFACE (cm)
0.1	100	30	58.2
0.5	100	60	37.1
1	99.8	120	25.4
2	98.8	180	23
5	92	240	21.7
10	84.2	300	19
15	72.5	1440	15.4

Reviewed By:

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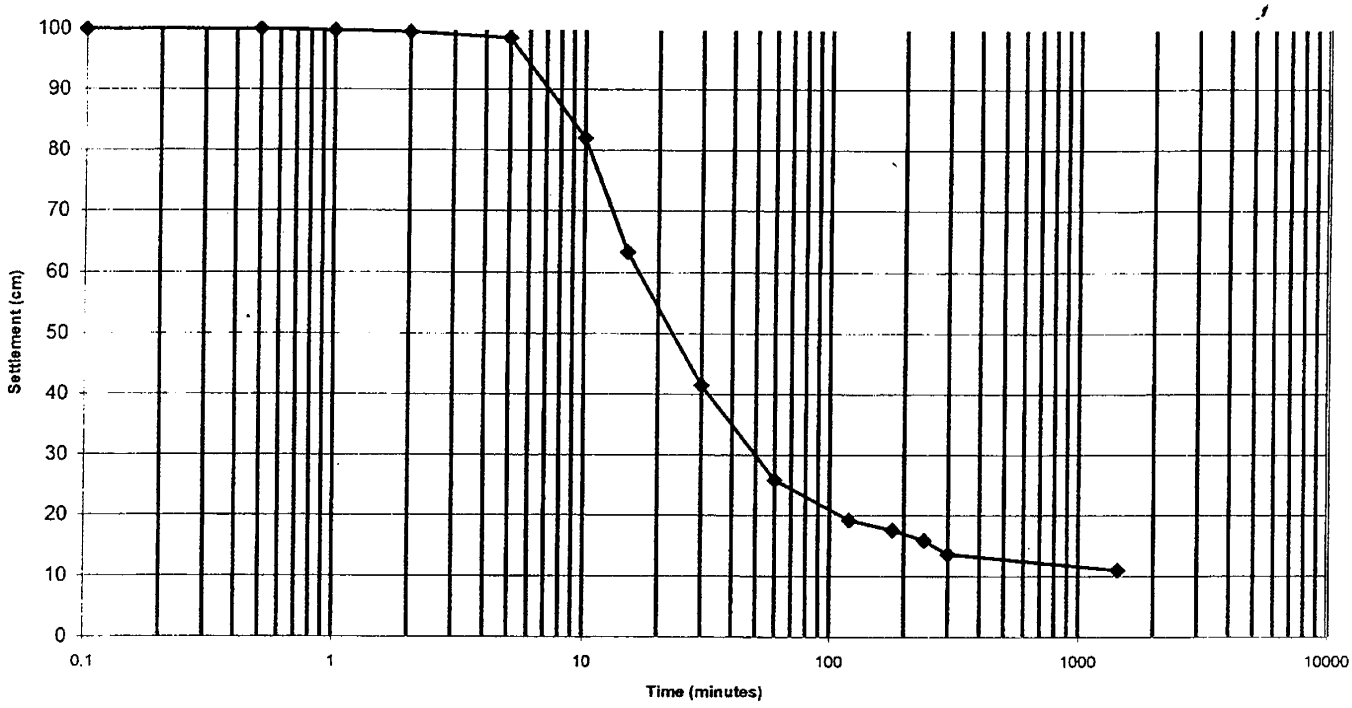
JACKSONVILLE, FLORIDA 32207
(904)396-5173

REPORT OF SETTLING RATE TESTING

LAW PROJECT NO: 40564-5-1484-03
PROJECT: COE Canaveral Harbor
CLIENT: PPB Environmental Labs

Sample No 190399
Station No. RS-CH00-1/2
CONCENTRATION: 100g/L



TIME	INTERFACE (cm)	TIME	INTERFACE (cm)
0.1	100	30	41.5
0.5	100	60	25.8
1	99.8	120	19.2
2	99.5	180	17.6
5	98.5	240	15.9
10	82	300	13.6
15	63.3	1440	11

Reviewed By:

JOHN A. UNTERSPAN, P.E.

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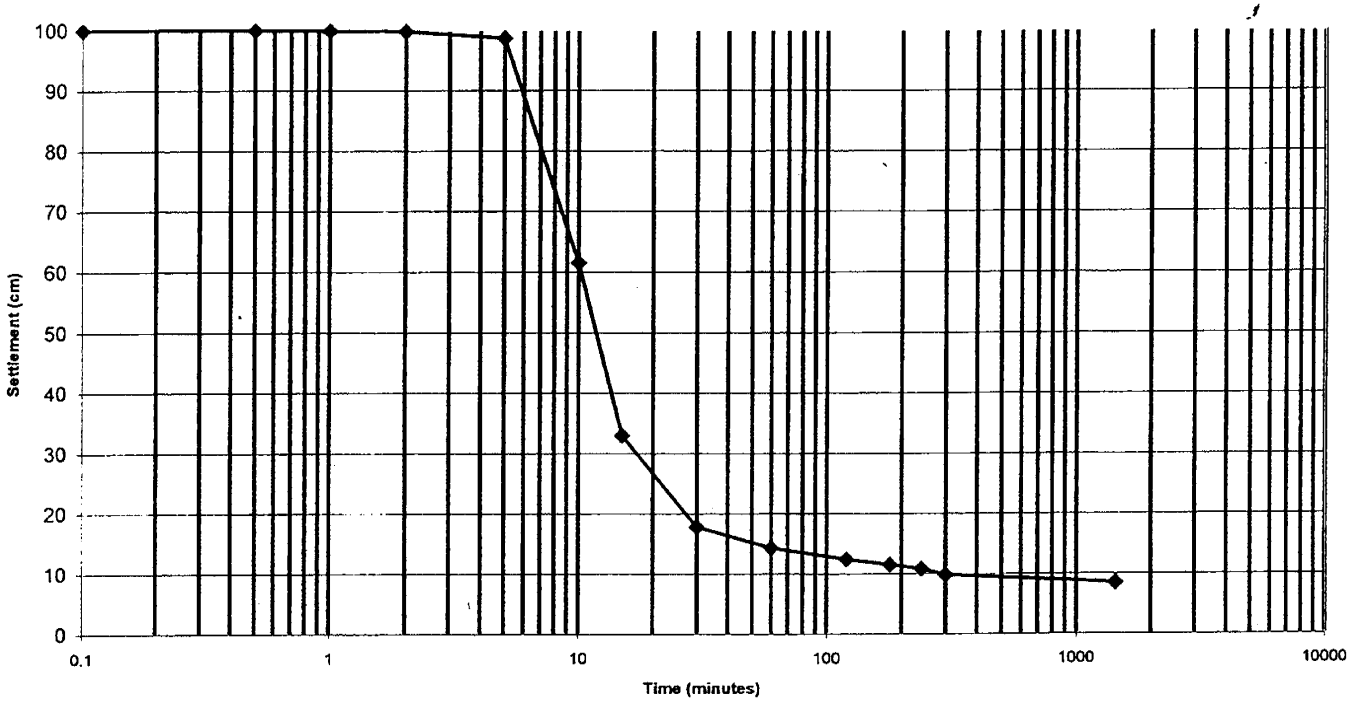
(904)396-5173

REPORT OF SETTLING RATE TESTING

LAW PROJECT NO: 40564-5-1484-03
PROJECT: COE Canaveral Harbor
CLIENT: PPB Environmental Labs

Sample No 190792
Station No. Control
CONCENTRATION: 100g/L



TIME	INTERFACE (cm)	TIME	INTERFACE (cm)
0.1	100	30	17.8
0.5	100	60	14.3
1	99.9	120	12.4
2	99.8	180	11.5
5	98.7	240	10.8
10	61.5	300	9.8
15	33	1440	8.5

Reviewed By:

JOHN A. UNTERSPAN, P.E.