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NAS CECIL FIELD, FL
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CONTAMINATION ASSESSMENT REPORT ADDENDUM 3 FOR SAL TAYLOR CREEK JET PROPELLANT 5 SPILL CONTAINMENT AREAS NAS CECIL FIELD FL
2/19/1998
ABB ENVIRONMENTAL SERVICES INC

ABB

February 19, 1998 2523-3234

Mr. Mike Deliz
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: **Contamination Assessment Report Addendum III**
Sal Taylor Creek Jet Propellant (JP) 5 Spill Containment Areas
Naval Air Station (NAS) Cecil Field
Jacksonville, Florida
Contract No. N62467-89-D-0317/090

INTRODUCTION

The Sal Taylor Creek JP-5 Fuel Spill Containment Areas Contamination Assessment Report Addendum II (ABB Environmental Services, Inc., 1997) included the following recommendations: (1) no further action at the Alpha Dam, Avord Dam, and Gate 14 Dam, and (2) one more round of biomonitoring be conducted in December 1997 at Possum Dam location CEF-POS-SD/TOX 4A. To assess whether or not sediment quality has improved since the December 1996, thus potentially eliminating future biomonitoring or sediment remediation, the NAS Cecil Field Partnering Team agreed to resample sediment at Possum Dam location CEF-POS-SD/TOX 4A.

FIELD INVESTIGATION

Resampling of the sediment (sample number CEF-POS-SD/TOX 4B) for toxicity testing and analysis of total recoverable petroleum hydrocarbons (TRPH) was conducted on December 23, 1997. The sampling location is presented on Figure 1, in Attachment A. Sediment toxicity testing included survival and growth for the amphipod *Hyalella azteca* and the midge larve *Chironomus tentans*. The sediment sample (CEF-POS-SD/TOX 4B) was collected from the same location as the May 1995 (CEF-POS-SD/TOX 4) and December 1996 (CEF-POS-SD-TOX 4A) sampling events.

RESULTS AND CONCLUSIONS

Results of the December 23, 1997, toxicity testing and laboratory analysis are presented in Table 1, in Attachment A. The laboratory report for toxicity analysis of sediment samples is included as Attachment B. In general, there was a significant decrease in the mortality rates for both test species. *Hyalella azteca* decreased from 25 percent mortality to 1 percent and *Chironomus tentans* decreased from 82 percent mortality to 11 percent.

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The decreased mortality rate is most likely the result of the improved sediment quality from the previous sampling in 1996. TRPH was not detected in the 1997 sampling but had a concentration of 200 milligrams per kilogram in 1996.

The complete analytical data set is in Attachment C.

RECOMMENDATIONS

Based on the results of the December 1997 biomonitoring, it is recommended that no further action take place at Possum Dam location CEF-POS-SD/TOX 4B.

REFERENCE

ABB Environmental Services, Inc. 1997. *Contamination Assessment Report Addendum II, Sal Taylor Creek JP-5 Fuel Spill Containment Areas, Naval Air Station Cecil Field, Jacksonville, Florida.* Prepared for Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

Very truly yours,

ABB ENVIRONMENTAL SERVICES, INC.

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2-20-98

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ATTACHMENT A

FIGURE AND TABLE

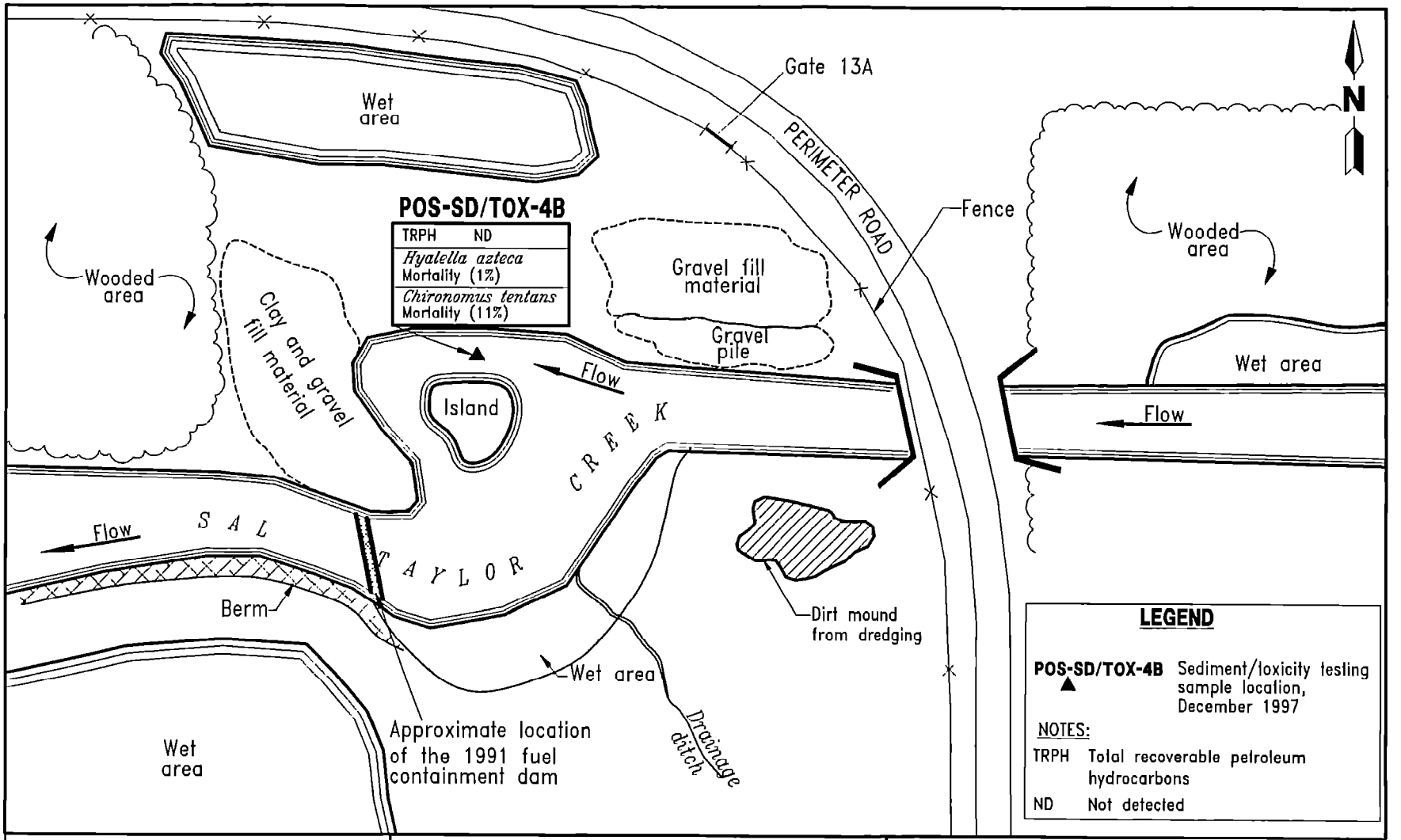

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FIGURE 1
SEDIMENT AND TOXICITY TESTING SAMPLE LOCATIONS AND RESULTS DECEMBER 1997

CONTAMINATION ASSESSMENT REPORT ADDENDUM III
POSSUM DAM SITE

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Table 1
Comparison of Toxicity Testing Results and Analytical Results
Sal Taylor Creek JP-5 Fuel Spill Containment Areas

Technical Memorandum
Sal Taylor Creek JP-5 Containment Areas
Naval Air Station Cecil Field
Jacksonville, Florida

Site	Sample	Lead	TRPH[1]	*Hyalella azteca*[2]		*Chironomus tentans*	
	1995/1996/1997	(mg/kg)	(mg/kg)	Mortality	Growth	Mortality	Growth
Control		NA	NA	7/2/1	NA/0.33/0.20	10/28/10	0.5/0.86/0.65
Possum Dam	TOX4/TOX4A/TOX4B	ND/3.2/NA	116/200/ND	100/25/1	NA/0.23/0.24	100/82/11	0/0.45/0.65

[1] TRPH analysis in 1997 was by FL-PRO, previously by USEPA 418.1.
[2] No *Hyalella azteca* growth tests were conducted on the 1995 samples.

Notes: JP-5 = jet propellant 5.
TRPH = total recoverable petroleum hydrocarbons.
mg/kg = milligrams per kilogram.
NA = not applicable.
ND = not detected.
FL-PRO = Florida-Petroleum Residual Organic.
USEPA = U.S. Environmental Protection Agency.

ATTACHMENT B

TOXICITY ANALYSIS REPORT

FINAL REPORT:

SUB-CHRONIC TOXICITY OF SEDIMENTS FROM NAS CECIL FIELD, JACKSONVILLE, FLORIDA FRESHWATER INVERTEBRATES, *HYALELLA AZTECA* AND *CHIRONOMUS TENTANS*

TEST GUIDE:

EPA/600/R-94/024

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ABB-ES Project No: 02523.09
QST Project No: 3197250G-0100-3100

January 1998

EXECUTIVE SUMMARY

Whole sediment toxicity tests were conducted at QST Environmental with the freshwater amphipod, *Hyalella azteca,* and the midge, *Chironomus tentans,* on samples collected from Naval Air Station (NAS) Cecil Field, Jacksonville, Florida. The effect criteria for the tests were survival and growth. A total of four site sediments and one laboratory control sediment were used in the toxicity tests. After 10 days of exposure, there was 99 percent survivorship of *Hyalella azteca* in the laboratory control sediment. Survival of *Hyalella azteca* in the laboratory control sediment was significantly different (P=0.05) from survival in sediment from sample stations CF15SD3A and CF15SD7A. There were no significant differences (P=0.05) in growth of *Hyalella azteca*, measured as mean dry weight, between the laboratory control sediment and any of the site sediments. Survival of *C. tentans* in the laboratory control sediment was significantly different (P=0.05) from survival in sediment from sample stations CF15SD4A and CF15SD7A. Growth, measured as mean dry weight of *C. tentans* in the laboratory control sediment was significantly different (P=0.05) from growth in sediments from sample stations CF15SD3A and CF15SD7A.

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Appendix B: *Hyalella azteca* Sediment Test Raw Data

Appendix C: *Chironomus tentans* Sediment Test Raw Data

Appendix D: Reference Toxicant Test Raw Data

1.0 INTRODUCTION

Whole sediment toxicity tests were conducted at QST Environmental on samples collected from NAS Cecil Field, Jacksonville, Florida, to determine the potential toxicity of the test samples. The test organisms used for sediment toxicity tests were the freshwater amphipod, *Hyalella azteca,* and the midge, *Chironomus tentans*. The effect criteria for the sub-chronic toxicity tests were survival and growth (measured as mean dry weight for *C. tentans* and mean dry weight and mean length for *H. azteca*).

The tests were conducted following EPA guidelines entitled *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants With Freshwater Invertebrates* (EPA 1994) and QST in-house protocols. All of the original raw data pertaining to this study are maintained at QST, 404 SW 140th Terrace, Newberry, Florida 32669-3000.

2.0 MATERIALS AND METHODS

2.1 TEST SAMPLES

Test sediments were collected on December 17 and 23, 1997 by ABB Environmental Services, Inc. (ABB-ES) personnel and were received on ice at the QST Gainesville office on December 18 and 24, 1997. The test samples, identified as CF15SD3A, CF15SD4A, CF15SD7A, and POS-SD/TOX4B, were received in quantities of approximately 2 kilograms each. Upon receipt, the coolers were opened and the contents checked against the chain-of-custody to ensure that all of the recorded samples were present. The temperature of the coolers were then measured using the temperature blanks provided in the coolers. Any observations made were recorded in the sample receipt logbook.

Laboratory control sediment was fine silica (quartz) sand purchased from Feldspar Corporation, Edgar, Florida. The control sediment has been proven to be clean and support test organism survival and growth in previous tests. Prior to use in testing, the laboratory control sediment was thoroughly washed in deionized water and then rinsed with overlying water. Chain-of-custody records and other traffic information pertaining to the sediment samples are presented in Appendix A. All samples were stored in a refrigerator at 4 $\pm$ 2 °C prior to use and during the testing period.

2.2 OVERLYING WATER

Overlying water for the *H. azteca* tests was hard freshwater with a hardness of approximately 131 mg/L as $CaCO_3$. The water was obtained from a deep well located at the QST toxicology laboratory and was diluted with deionized water to achieve the desired hardness. Overlying water for the *C. tentans* tests was moderately hard reconstituted water with a hardness of approximately 89 mg/L as $CaCO_3$.

2.3 TEST ORGANISMS

The whole sediment bioassays were conducted using juvenile (second or third instar) *H. azteca* (2-3 mm in length) and juvenile *C. tentans* (second to third instar). *H. azteca* were obtained from Chesapeake Cultures, Hayes, Virginia, and *C. tentans* were obtained from Environmental Consulting and Testing, Superior, WI. Test organisms were acclimated to any differences in water chemistry by diluting the receiving water with overlying water to 50 percent of receiving water, and then to 100 percent overlying water within 24 hours. All the organisms appeared to be healthy and normal at test initiation.

2.4 TEST DESIGN

The whole sediment toxicity tests were initiated on December 30, 1997, within one week of receipt of the last sample. Prior to use in the toxicity tests, sediment samples were allowed to equilibrate to room temperature and individually homogenized. Sediments were then hand-sorted to remove small stones and sticks, plant debris and indigenous organisms. The test vessels used for the bioassays were 300 mL glass jars (13 cm height and 7 cm diameter). On day minus one, approximately 100 grams (or 100 mL) of site, field reference, or laboratory control sediment were introduced into the test chambers and uniformly leveled. One-hundred and seventy-five milliliters (175 mL) of overlying freshwater were added to each test chamber to provide a ratio of 1 part sediment to 1.75 parts overlying water. The test chambers were then allowed to settle overnight without aeration. On day zero, the initial water quality measurements were taken and the test organisms were introduced into the test chambers. The test organisms were randomly added to the test chambers, loading one replicate at a time until loading was complete. The test vessels were examined one hour after loading to identify and replace any floaters. No floating organisms were found on the surface of the overlying water. All test chambers were aerated at a rate of approximately 80 bubbles-per-minute to maintain dissolved levels above 40 mg/L. Aeration was supplied by a laboratory air

compressor (Aquatic Eco Systems, Inc., Sweetwater, Florida) through flexible Tygon tubing.

The whole sediment tests were conducted using eight replicates of 10 organisms per replicate for a total of 80 *H. azteca* and 80 *C. tentans* per sample. The test vessels were labeled with the sample number and replicate number (A through H), and the test area was identified by the QST project number, test type and schedule, and the project manager.

The duration of the static-renewal whole sediment toxicity tests was 10-days during which the overlying water was renewed daily. During renewals, approximately 75 percent of the overlying water was siphoned off through a 0.5 mm mesh Nytex sieve. Any test organisms trapped inside the sieve were pipetted back into the appropriate test chamber. New overlying water was then slowly added to the test chamber while diverting the flow onto the side of the test chamber to minimize resuspension of the sediments. Test solution renewals provided two volume additions per day. *H. azteca* were fed 1 mL of YTC (yeast/trout chow/cereal leaves) and green algae daily following renewal of the overlying water. *C. tentans* were fed 1 mL of YTC (yeast/trout chow/cereal leaves) daily following renewal of the overlying water.

The tests were conducted in a waterbath adjusted to maintain a temperature of 23 $\pm$ 1 °C under fluorescent lighting with a daily photoperiod of 16 hours light (ambient laboratory illumination, 680 Lux) and 8 hours darkness. Temperature, pH, and dissolved oxygen (DO) concentrations, were measured daily. Hardness, alkalinity, and conductivity were measured at the beginning and end of the tests. Water quality measurements were taken with the following instruments: temperature--Fisher Scientific digital thermocouple; pH--SA 290A Orion pH meter equipped with an Orion 91-57 triode; dissolved oxygen--YSI, Model 57 DO meter; and conductivity--YSI, Model 33 SCT conductivity meter. Hardness and alkalinity were measured by EDTA and sulfuric acid titration, respectively. Ammonia was measured on an SA 290A ammonia meter equipped with an Orion SA 95-12 ammonia probe. All instruments were calibrated daily during the testing period.

The test chambers were observed daily for organism mortality, entrapment at the surface of overlying water, sediment avoidance, and/or lack of burrowing. At test termination, the overlying water was swirled

and then poured through a 0.5 mm mesh Nytex screen to collect, observe, and enumerate test organisms. If all organisms were not immediately found, the remaining sediment was poured onto a 0.50 mm mesh Nytex screen sieve or a glass pan for further observation. Test organisms were considered dead if they appeared pale, remained immobile and did not respond to a gentle stimulus. Growth, measured as dry weight in milligrams of surviving *H. azteca* and *C. tentans*, was measured by placing the surviving organisms from each replicate in pre-weighed, dried aluminum pans and drying the organisms in a Blue-M oven at 60 °C for 24 hours. After 24 hours, the pans were removed from the oven and placed in a desiccator to cool. The weights of the cooled pans were measured on an American Scientific S/P 180 analytical balance and the group weight of the organisms was determined by difference.

2.5 REFERENCE TOXICANT TEST

Ninety-six-hour reference toxicant tests were conducted concurrently with the whole sediment toxicity tests to determine the general health of the test organisms. The reference toxicant used was cadmium chloride ($CdCl_2$) at concentrations of 0, 8, 16, 32, 64 and 128 μg/L for *H. azteca*, and 0, 125, 250, 500, 1,000 and 2,000 μg/L for *C. tentans*. The reference toxicant tests were conducted under similar conditions as the whole sediment tests. However, only 10 organisms were exposed per reference toxicant concentration without any replication.

3.0 STATISTICAL ANALYSIS

All toxicity data were evaluated by a statistical comparison of mean survival and growth of *H. azteca* and *C. tentans* in the site samples with mean survival and growth in the laboratory control samples using appropriate statistical procedures. Analysis of variance and Dunnett's t-test (EPA/600/4-89/001, EPA, 1988) were used to determine statistical significance. The 96-hour LC_{50} values for the reference toxicant tests, the concentration of the reference toxicant causing 50 percent mortality of the test organisms under the specified conditions of exposure, were determined using the Trimmed Spearman-Karber Statistical Method (Hamilton et. al., 1977).

4.0 RESULTS AND DISCUSSION

4.1 SEDIMENT TOXICITY TESTS

A summary of the sub-chronic toxicity test survival and growth data is provided in Table 1. Test conditions, including lighting, DO, conductivity, temperature, and pH levels remained at acceptable levels throughout the testing period for the *H. azteca* and *C. tentans* tests. Test temperature remained in the range of 22.4 to 24.1 °C, pH ranged from 6.7 to 7.6 standard units, and dissolved oxygen remained above 40 percent saturation (7.2 to 8.5 mg/L) (Tables 2 and 3). Ammonia concentrations were determined to be less than the method reporting of 0.10 mg/L in all exposures. There were no major deviations from the EPA test protocols used in the performance of the sub-chronic toxicity tests (EPA, 1994).

After 10 days of exposure, there was 99 percent survivorship of *H. azteca* in the laboratory control sediment. Survival of *H. azteca* in the site sediments ranged from 9 percent (CF15SD3A) to 99 percent (POS-SD/TOX4B) (Table 4). Survival of *H. azteca* in the laboratory control sediment was significantly different (P=0.05) from survival in sediments from sample station CF15SD3A and CF15SD7A.

Growth, measured as mean dry weight in milligrams of *H. azteca*, averaged 0.20 mg per organism in the laboratory control sediment. The mean dry weight of *H. azteca* in the Cecil Field site samples ranged from 0.22 (CF15SD3A and CF15SD7A) to 0.29 mg per organism (CF15SD4A). There were no significant differences (P=0.05) in growth of *H. azteca*, measured as mean dry weight, between the laboratory control sediment and any of the site sediments. All of the original raw data pertaining to the *H. azteca* toxicity tests are provided in Appendix B.

After 10 days of exposure, survival of *C. tentans* in the laboratory control sediment 90. Survival of *C. tentans* in the NAS Cecil Field, Jacksonville, Florida site sediments ranged from 61 percent (CF15SD7A) to 89 percent (POS-SD/TOX4B). Survival of *C. tentans* in the laboratory control sediment was significantly different (P=0.05) from survival in sediments from sample stations, CF15SD4A and CF15SD7A (Table 5).

Growth, measured as mean dry weight in milligrams of *C. tentans*, averaged 0.65 mg per organism in the

laboratory control sediment. Laboratory control growth was within the acceptable mean growth of 0.60 mg per organism recommended for this test (EPA, 1994). The mean dry weight of test organisms in the site sediments ranged from 0.34 mg per organism (CF15SD3A) to 0.65 mg per organism (POS-SD/TOX4B). Growth of *C. tentans* in the laboratory control sediment was significantly different (P=0.05) from growth in sediments from sample stations CF15SD3A and CF15SD7A. All of the original raw data pertaining to the *C. tentans* toxicity tests are provided in Appendix C.

No indigenous organisms were detected in the site sediments during the sorting and cleaning processes. Twigs, small rocks and plant debris were removed from the samples prior to use in testing. Behavioral observations recorded during the 10-day exposures included amplexus (sexual behavior in *H. azteca)* and organism emergence from the sediment to feed.

4.2 REFERENCE TOXICANT TESTS

The median lethal concentration (LC_{50}) values of the reference toxicant for *H. azteca* and *C. tentans* were determined to be 19.6 μg $CdCl_2$/L (95 percent confidence limits of 15.3 and 25.2 μg $CdCl_2$/L) and 406.1 μg $CdCl_2$/L (95 percent confidence limits of 319.4 and 516.4 μg $CdCl_2$/L), respectively. The LC_{50} values fall within the normal sensitivity ranges of test species used for testing at QST. The original raw data pertaining to the reference toxicant test are provided in Appendix D.

5.0 CONCLUSION

The toxicity test results indicated that after 10 days of exposure to whole sediments from NAS Cecil Field, Jacksonville, Florida, survival of *H. azteca* in the laboratory control sediment was significantly different (P=0.05) from survival in sediments from sample stations CF15SD3A and CF15SD7A. There were no significant differences (P=0.05) in growth, measured as mean dry weight, between the laboratory control sediment and any of the site sediments tested. Survival of *C. tentans* in the laboratory control sediment was significantly different (P=0.05) from survival in sediments from sample station CF15SD4A and CF15SD7A. Growth, measured as mean dry weight of *C. tentans* in the laboratory control sediment, was significantly different (P=0.05) from growth in sediments from sample stations CF15SD3A and CF15SD7A.

6.0 REFERENCES

American Society for Testing and Materials. ASTM E 1383-94. *Standard Guide for Conducting Sediment Toxicity Tests with Freshwater Invertebrates*. Annual Book of ASTM Standards Vol. 11.05, 1995.

Gulley, D., and WEST, Inc. 1994. *Toxstat Version 3.4*. Department of Zoology and Physiology, University of Wyoming.

Hamilton, M.A., R.C. Russo, and R.V. Thurston. 1977. *Trimmed Spearman-Karber Method for Estimating Median Lethal Concentrations in Toxicity Bioassays*. Environmental Science and Technology. 11(7):714-719; Correction 12(4):417 (1978).

U.S. Environmental Protection Agency (EPA). 1994. *Methods for Measuring the Toxicity and Bioaccumulation Potential of Sediments-Associated Contaminants to Freshwater Invertebrates*. EPA/600/R-94/024, June 1994.

U.S. Environmental Protection Agency (EPA). 1988. *Computer Program and Users Guide for Probit and Dunnett's Analysis of Data from Acute and Short Term Chronic Toxicity Tests with Aquatic Organisms*. Prepared by Statistical Support Staff, Computer Sciences Corporation. Prepared for the Biological Methods Branch, Environmental Monitoring and Support Laboratory, Cincinnati, OH, 1988.

Table 1. Summary of Survival Data for *Hyalella azteca* and *Chironomus tentans* Exposed to Sediment Samples From NAS Cecil Field, Jacksonville, Florida, During a 10-Day Sub-Chronic Toxicity Test

Sample ID	***Hyalella azteca***		***Chironomus tentans***	
	Survival (Percent)[a]	**Mean Growth (mg/organism)**	**Survival (Percent)**	**Mean Growth (mg/organism)**
Control	99	0.20	90	0.65
CF15SD3A	9[b]	0.22	84	0.44[b]
CF15SD4A	98	0.29	76[b]	0.59
CF15SD7A	85[b]	0.22	61[b]	0.34[b]
POS-SD/TOX4B	99	0.24	89	0.65

[a] Eighty organisms (10 organisms x 8 replicates) exposed per sample.
[b] Significantly different (P=0.05) from the laboratory control sample.

Source: QST, 1998.

Table 2. Water Quality Measurement Ranges[a] of Overlying Water During a 10-Day Toxicity Test of Whole Sediment From NAS Cecil Field, Jacksonville, Florida, With the Amphipod, *Hyalella azteca*

Sample ID	**Ammonia (mg/L)**	**Temp (°C)**	**pH (s.u.)[b]**	**DO (mg/L)**	**Cond[c] (μmhos/cm)**
Control	<0.1	22.6 - 23.9	7.4 - 7.6	7.6 - 8.5	210 - 250
CF15SD3A	<0.1	22.7 - 23.9	7.0 - 7.3	7.6 - 8.3	210 - 210
CF15SD4A	<0.1	22.8 - 23.9	6.9 - 7.3	7.7 - 8.0	180 - 210
CF15SD7A	<0.1	22.7 - 23.8	6.7 - 7.4	7.6 - 8.1	190 - 220
POS-SD/TOX4B	<0.1	22.6 - 23.7	7.2 - 7.4	7.2 - 8.1	240 - 250

[a]Range of 11 measurements for each temperature, pH and conductivity.
[b]pH measured in standard units (s.u.).
[c]Conductivity.

Source: QST 1998

Table 3. Water Quality Measurement Ranges[a] of Overlying Water During a 10-Day Toxicity Test of Whole Sediment From NAS Cecil Field, Jacksonville, Florida, With the Midge, *Chironomus tentans*

Sample ID	**Ammonia (mg/L)**	**Temp (°C)**	**pH (s.u.)[b]**	**DO (mg/L)**	**Cond[c] (μmhos/cm)**
Control	<0.1	22.4 - 23.8	7.4 - 7.6	7.6 - 8.5	280 - 320
CF15SD3A	<0.1	22.6 - 23.9	7.0 - 7.2	7.5 - 8.2	260 - 270
CF15SD4A	<0.1	22.7 - 24.0	6.9 - 7.3	7.5 - 8.1	260 - 270
CF15SD7A	<0.1	22.8 - 24.1	6.7 - 7.3	7.6 - 8.1	260 - 280
POS-SD/TOX4B	<0.1	22.8 - 24.0	7.0 - 7.4	7.6 - 8.1	290 - 325

[a]Range of 11 measurements for each temperature, pH and conductivity.
[b]pH measured in standard units (s.u.).
[c]Conductivity.

Source: QST 1998

Table 4. Survival and Growth of *Hyalella azteca* After 10 Days of Exposure to Whole Sediments From NAS Cecil Field, Jacksonville, Florida (Page 1 of 2)

Sample ID	Replicate	Survival (Percent)[a]	Mean Dry Weight (mg)[b]
Control	A	10	0.14
	B	10	0.17
	C	10	0.18
	D	10	0.29
	E	10	0.14
	F	10	0.19
	G	9	0.22
	H	10	0.24
		79 (99)	0.20
CF15SD3A	A	0	NM[d]
	B	1	0.30
	C	1	0.20
	D	0	NM
	E	2	0.30
	F	1	0.20
	G	1	0.10
	H	1	0.20
		7 (9)[c]	0.22
CF15SD4A	A	10	0.28
	B	10	0.31
	C	10	0.34
	D	10	0.36
	E	10	0.25
	F	10	0.23
	G	10	0.22
	H	9	0.31
		79 (99)	0.29
CF15SD7A	A	9	0.16
	B	6	0.17
	C	10	0.27
	D	10	0.33
	E	7	0.17
	F	8	0.24
	G	10	0.21
	H	8	0.22
		68 (85)[c]	0.22

Table 4. Survival and Growth of *Hyalella azteca* After 10 Days of Exposure to Whole Sediments From NAS Cecil Field, Jacksonville, Florida (Page 2 of 2)

Sample ID	Replicate	Survival (Percent)[a]	Mean Dry Weight (mg)[b]
POS-SD/TOX4B	A	10	0.29
	B	10	0.26
	C	10	0.18
	D	10	0.29
	E	10	0.25
	F	10	0.17
	G	9	0.26
	H	10	0.21
		79 (99)	0.24

[a] Ten organisms exposed per replicate (80 organisms/sample). Percent survival in parentheses.
[b] Growth was measured as weight in milligrams by drying organisms at 60 °C for 24 hours and weighing the dry organisms.
[c] Significantly different (P=0.05) from laboratory control sediment.
[d] Not measured due to 100 percent mortality.

Source: QST 1998

Table 5. Survival and Growth of *Chironomus tentans* After 10 Days of Exposure to Whole Sediments From NAS Cecil Field, Jacksonville, Florida (Page 1 of 2)

Sample ID	Replicate	Survival (Percent)[a]	Mean Dry Weight (mg)[b]
Control	A	10	0.55
	B	9	0.70
	C	9	0.78
	D	10	0.63
	E	9	0.61
	F	8	0.66
	G	8	0.70
	H	9	0.60
		72 (90)	0.65
CF15SD3A	A	7	0.54
	B	8	0.44
	C	9	0.50
	D	8	0.36
	E	8	0.46
	F	9	0.37
	G	10	0.40
	H	8	0.46
		67 (84)	0.44[c]
CF15SD4A	A	9	0.47
	B	9	0.55
	C	8	0.64
	D	7	0.57
	E	6	0.63
	F	7	0.60
	G	8	0.61
	H	7	0.64
		61 (76)[c]	0.59
CF15SD7A	A	6	0.30
	B	6	0.37
	C	7	0.36
	D	6	0.37
	E	5	0.32
	F	7	0.33
	G	6	0.35
	H	6	0.35
		49 (61)[c]	0.34[c]

Table 5. Survival and Growth of *Chironomus tentans* After 10 Days of Exposure to Whole Sediments From NAS Cecil Field, Jacksonville, Florida (Page 2 of 2)

Sample ID	Replicate	Survival (Percent)[a]	Mean Dry Weight (mg)[b]
POS-SD/TOX4B	A	9	0.70
	B	10	0.64
	C	8	0.69
	D	9	0.64
	E	10	0.78
	F	8	0.58
	G	8	0.65
	H	9	0.52
		71 (89)	0.65

[a] Ten organisms exposed per replicate (80 organisms/sample). Percent survival in parentheses.
[b] Growth was measured as weight in milligrams by drying organisms at 60 °C for 24 hours and weighing the dry organisms.
[c] Significantly different (P=0.05) from laboratory control sediment.

Source: QST 1998

Appendix A: Chain-of-Custody and Traffic Information

Science & Engineering, Inc.
A CH2M HILL Company
14220 West Newberry Road, Gainesville, FL 32607
Telephone: (352) 332-3318 -- Fax: (352) 332-0507

[redacted]

Chain of Custody Record

Client: ABB-ES
Address: NAS Cecil Field
AVE "G", QTRS "D"
Jacksonville Florida 32215
Phone #: (904) 779-0077 Fax #: (904) 779-7888
P.O. #: SE749111G
Client Contact: AL Stodghill
Project # / Location: Site 15 NAS Cecil Field

Sample Type:
1. Water
2. Soil
3. Sludge
4. Oil
5. Tissue

Other: SEDIMENT

Container Type:
P - Plastic
G - Glass
V - VOC

Preservative:
1. None
2. H2SO4
3. HNO3
4. NaOH
5. HCl

Analyses

Sample I.D. (10 Characters ONLY)	Sample Type	Container Size	Container Type	Container No.	Sampling Date	Sampling Time	Preservative	Lab I.D.	TOX											pH	Specific Conductivity	Temperature	Comments
CF15SD3A	SED.	1-L	G	2	12-17-97	1340	1		✓														
CF15SD4A	SED.	1-L	G	2	12-17-97	1415	1		✓														
CF15SD7A	SED.	1-L	G	2	12-17-97	1515	1		✓														
																							ABB Job #
																							02523-09

Relinquished By:	Date:	Received By:	Date:
Randy Holloway	12-17-97 Time: 18:00	Jill Oancea-Jaw	12-18-97 Time: 14:00
Relinquished By:	Date: -- -- Time: :	Received For Lab By:	Date: -- -- Time: :

[redacted]

SPECIAL INSTRUCTIONS:

Copies: White - Client Canary - Lab Receiving Pink - Lab File Goldenrod - Retained by Sampler

ord

Quanterra Environmental Services

ABB	Project Manager: RAO ANGARA	Date: 12-23-97	Chain Of Custody Number: 69950
536 Kingsley Ave. SUITE 127	Telephone Number (Area Code)/Fax Number: (904) 656-1293	Lab Number	Page 1 of 1
ORANGE PARK, FL 32073	Site Contact: JEFF TARR	Lab Contact	
me: AS Cecil Field (904) 779-0077	Carrier/Waybill Number: FED EXP #801035666713		
urchase Order/Quote No.: P.O. #			

Sample I.D. No. and Description (ntainers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		Analysis (Attach list if more space is needed): HYALELLA AZTECA		CHIRONOMUS TANTANS	Special Instructions/ Conditions of Receipt
S-SD/TOX 4B	12-23-97	1140		X										1		1	Analyze for Both survival and growth as per discussion with RAO ANGARA.

zard Identification: azard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

d Time Required: urs ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

	Date	Time		Date	Time
hed By: [signature]	12-23-97	1355	1. Received By: Jal Qanen-Yan (in chemistry)	12/24/97	1400
hed By			2. Received By		
hed By			3. Received By		

ION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; (- Field Copy

Appendix B: *Hyalella azteca* Sediment Test Raw Data

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

Page: ____
ESE QA Form Number: 018
Effective: APR 1993

Project: 31972496 - 0100-3100 (50)

CR 1-6-97

DAILY LOG

12-30-97 MO - Sediments were stored in refrigerator at 4±2°C prior to use. Each sediment was sifted by hand in a glass tray + mixed (2 jars per sediment). For sediments CF155D3A, -4A, and -7A, twigs + plant debris were removed + the sediments were dark brown to black in color. Sediment POS-SD/TOK 4B was brown in color, sandy, + no debris. No indigenous organisms were observed in any of the sediments. Control sediment was washed with DI water. For each replicate, 100 mL of sediment was placed into the test vessel and 175 mL of overlying water was added. All test vessels were placed in waterbath 2, set to maintain a temperature of 23 ± 1°C.

12-31-97 MO - Overlying water was renewed. Overlying water will be gently aerated (~60 bpm) throughout the test to ensure that DO remains > 4.0 mg/L. H. azteca + C. tentans were in normal condition at test initiation, and were acclimated to test waters + temperature.

1-01-98 MO - Tests monitored + observed; overlying water renewed. Checked airlines.

1-02-98 CR - Test monitored + observed; overlying water renewed.

1-03-98 MO - Test monitored + observed; overlying water renewed.

1-04-98 CR - Test monitored, observed + renewed.

1-05-98 MO - Test monitored + observed; overlying water renewed. Checked all airlines.

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

Page: ____
ESE QA Form Number: 018
Effective: APR 1993

Project: 319724960 50 WF 1-6-98

DAILY LOG

1-6-98. Test monitored, observed + renewed. Airlines checked

1-7-98 MO – Test monitored + observed; overlying water renewed.

1-8-98 MO – Test monitored + observed; overlying water renewed.

1-9-98 MO – Test monitored + observed; overlying water renewed.

1-10-98 MO – H. azteca + C. tentans tests terminated. Test organisms recovered from sediment, H. azteca were transferred to glass vials containing 10% formalin, to be held for length measurements. C. tentans were transferred to weigh pans, rinsed with DI water, + placed in an oven to dry.

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

Page: _____
ESE QA Form: 097A
Effective: August 1994

SUBJECT: TOXICITY TEST DATA SHEET

Client: ABB-ES / NAS Cecil Field

Project Number: 31972496-0100-3100

Test Material

See Page _____ of Sample Receipt Log
Test Material Information

Test Conditions

[ ] Preliminary
[ ] Definitive
[X] Screening

[X] Static [ ] Flow-through

Duration : 10 Days

Test Animal History

Species : H. azteca
Batch Number : 97-84
Age / Life Stage : 2-4 mm
Date Acclimation / Maintenance Began : 12/31/97
See Page 202 of Invertebrate Holding Log for raw data.
Mortality (%) 48 Hrs prior to testing: 0 %

Dilution Water: Hard water (DI/well mix)

Lighting : [X] Fluorescent [ ] Incandescent
Photoperiod : 16 hr Light : 8 hr Dark

Test Container Dimensions (cm): 7.0 L x — W x 13 H
Test Solution Height : 2 cm
Test Containers : [X]Open [ ]Covered
Test Container Volume : 0.45 Liters
Diluent Volume : 0.175 Liters

Test Area Used	Temperature (C)	Salinity (ppt)
Waterbath 2	23 +/-1	NA +/-

Reps / Concentration : 8
Animals / Replicate : 10

Protocol Followed: EPA

Concentrations Based on: [ ] A.I. [X] W.M.

Container Composition: [X] Glass [ ] Plastic

Test Concentrations: (Units = %):	Control	CF15SD3A	CF15SD4A	CF15SD7A	POS-SD/TOX48			
Amount ~~Reference Soil~~ Overlying water Added (mL): MO 12/31/97	175	175	175	175	175			
Amount Test ~~Soil~~ Sediment Added (mL): MO 12/31/97	100 ~~N/A~~ MO	100	100	100	100			

Additional Observations: _____

Data By: MO Date: 12/31/97

FORM: Soil94

QST ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108B
EFFECTIVE: JUNE 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET - WATER QUALITY

SPONSOR: ABB-ENVIRONMENTAL
SAMPLE ID: CONTROL

PROJECT NUMBER: 3197249G-0100-3100
TEST SPECIES: *~~Hyalella azteca~~*

DATE-DAY	REP	TEMP (°C)	HARD/ ALKN	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
12/31/97 0	A	22.6	131/114	<0.1	7.5	8.5	250	1.0mL YTC	MO 1430
1/01/98 1	B	22.6	—	—	7.5	7.7	—	1.0mL YTC	MO 1030
1/02/98 2	C	22.8	—	—	7.5	7.9	—	1.0mL YTC	CR 1100
1/03/98 3	D	23.6	—	—	7.5	7.6	—	1.0mL YTC	MO 1100
1/04/98 4	E	23.0	—	—	7.6	7.8	—	1.0mL YTC	CR 1200
1/05/98 5	F	23.7	—	—	7.4	7.8	—	1.0mL YTC	CR 1300
1/06/98 6	G	23.9	—	—	7.5	7.7	—	1.0mL YTC	CR 1030
1/07/98 7	H	23.6	—	—	7.5	8.0	—	1.0mL YTC	MO 0815
1/08/98 8	A	22.7	—	—	7.5	8.1	—	1.0mL YTC	MO 1045
1/09/98 9	B	22.7	—	—	7.5	8.0	—	1.0mL YTC	MO 1045
1/10/98 10	C	22.9	120/105	<0.1	7.5	8.1	210	1.0mL YTC	MO 0900

OBSERV	REPLICATE								
DATE-DAY	A	B	C	D	E	F	G	H	Initial
12/31/97 0	10A	10A	10A	10A	10A	10A	10A	10A	MO
1/01/98 1	1 EMR	N	N	1 EMR	N	1 EMR	N	1 EMR	MO
1/02/98 2	1 EMR	N	2 EMR	N	1 EMR	N	N	N	CR
1/03/98 3	N	1 EMR	1 EMR	N	1 EMR	1 EMR	N	N	MO
1/04/98 4	N	N	1 EMR	2 EMR	1 EMR	N	N	N	CR
1/05/98 5	N	N	1 EMR	1 EMR	2 EMR	1 EMR	4 EMR	1 EMR	CR
1/06/98 6	1 EMR	N	N	1 EMR	1 EMR	2 EMR	4 EMR	3 EMR	CR
1/07/98 7	2 EMR	2 EMR	3 EMR	5 EMR	N	3 EMR	5 EMR	3 EMR	CR
1/08/98 8	2 EMR	2 EMR	2 EMR	3 EMR	1 EMR	1 EMR	3 EMR	2 EMR	MO
1/09/98 9	2 EMR	2 EMR	2 EMR	3 EMR	1 EMR	1 EMR	2 EMR	2 EMR	MO
1/10/98 10	10A 1 AMP	10A	10A	10A	10A	10A	9A 1 NF	10A	MO

Comments:

KEY: AS = AT SURFACE N= NONE EMR = EMERGENCE A = ALIVE D = DEAD NF = NOT FOUND
REP = REPLICATE COND = CONDUCTIVITY ALK = ALKALINITY AMP = AMPLEXUS
TEMP = TEMPERATURE HARD = HARDNESS YTC = YEAST/ TROUT CHOW/CEROPHYLL

QST ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108B
EFFECTIVE: JUNE 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET - WATER QUALITY

SPONSOR: ABB-ENVIRONMENTAL
SAMPLE ID: CF15SD3A

PROJECT NUMBER: 3197249G-0100-3100
TEST SPECIES: *Hyalella azteca*

DATE-DAY	REP	TEMP (°C)	HARD/ ALK	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
12/31/97 0	A	22.9	107/91		7.0	8.3	210	1.0mL YTC	MO 1430
1/01/98 1	B	22.7	—	—	7.2	7.8	—	1.0mL YTC	MO 1030
1/02/98 2	C	23.2	—	—	7.0	8.1	—	1.0mL YTC	CR 1100
1/03/98 3	D	23.7	—	—	7.3	7.6	—	1.0mL YTC	MO 1100
1/04/98 4	E	23.3	—	—	7.1	7.9	—	1.0mL YTC	CR 1200
1/05/98 5	F	23.8	—	—	7.0	8.0	—	1.0mL YTC	CR 1300
1/06/98 6	G	23.9	—	—	7.2	7.9	—	1.0mL YTC	CR 1030
1/07/98 7	H	23.6	—	—	7.1	7.9	—	1.0mL YTC	MO 0815
1/08/98 8	A	22.7	—	—	7.2	8.0	—	1.0mL YTC	MO 1045
1/09/98 9	B	22.7	—	—	7.2	8.0	—	1.0mL YTC	MO 1045
1/10/98 10	C	22.9	102/95	<0.1	7.3	8.1	210	1.0mL YTC	MO 0900

OBSERV	REPLICATE								
DATE-DAY	A	B	C	D	E	F	G	H	Initial
12/31/97 0	10A	10A	10A	10A	10A	10A	10A	10A	MO
1/01/98 1	N	N	N	N	N	N	N	N	MO
1/02/98 2	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/03/98 3	N	N	N	N	N	N	N	N	MO
1/04/98 4	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/05/98 5	2 AS 7 LETH	3 DEAD	2 DEAD	∩	1 DEAD	∩	1 DEAD	∩	CR
1/06/98 6	2 DEAD	3 DEAD	1 DEAD	1 DEAD	1 AS 1 DEAD	∩	∩	∩	CR
1/07/98 7	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/08/98 8	N	N	N	N	N	N	N	N	MO
1/09/98 9	N	N	N	N	N	N	N	N	MO
1/10/98 10	0A 8NF	1A 3NF	1A 6NF	0A 9NF	2A 6NF	1A, 1D 8NF	1A, 1D 8NF	1A, 2D 7NF	MO

Comments:

KEY: AS = AT SURFACE N= NONE EMR = EMERGENCE A = ALIVE D = DEAD NF = NOT FOUND
REP = REPLICATE COND = CONDUCTIVITY ALK = ALKALINITY AMP = AMPLEXUS
TEMP = TEMPERATURE HARD = HARDNESS YTC = YEAST/ TROUT CHOW/CEROPHYLL

QST ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108B
EFFECTIVE: JUNE 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET - WATER QUALITY

SPONSOR: ABB-ENVIRONMENTAL
SAMPLE ID: CF15SD4A

PROJECT NUMBER: 3197249G-0100-3100
TEST SPECIES: *Hyalella azteca*

DATE-DAY	REP	TEMP (°C)	HARD/ ALK	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
12/31/97 0	A	23.1	109/95	<0.1	6.9	8.0	210	1.0mL YTC	MO 1430
1/01/98 1	B	22.8	—	—	7.2	7.8	—	1.0mL YTC	MO 1030
1/02/98 2	C	23.5	—	—	7.2	7.9	—	1.0mL YTC	CR 1100
1/03/98 3	D	23.7	—	—	7.2	7.7	—	1.0mL YTC	MO 1100
1/04/98 4	E	23.3	—	—	7.1	7.8	—	1.0mL YTC	CR 1200
1/05/98 5	F	23.8	—	—	7.3	7.9	—	1.0mL YTC	CR 1300
1/06/98 6	G	23.9	—	—	7.3	7.7	—	1.0mL YTC	CR 1030
1/07/98 7	H	23.7	—	—	7.2	7.9	—	1.0mL YTC	MO 0815
1/08/98 8	A	22.8	—	—	7.3	8.0	—	1.0mL YTC	MO 1045
1/09/98 9	B	22.8	—	—	7.2	7.9	—	1.0mL YTC	MO 1045
1/10/98 10	C	23.0	101/97	<0.1	7.3	8.0	180	1.0mL YTC	MO 0900

OBSERV	REPLICATE								
DATE-DAY	A	B	C	D	E	F	G	H	Initial
12/31/97 0	10A	10A	10A	10A	10A	10A	10A	10A	MO
1/01/98 1	N	N	N	N	N	N	N	N	MO
1/02/98 2	N	N	N	N	N	N	N	N	CR
1/03/98 3	N	N	N	N	N	N	N	N	MO
1/04/98 4	N	N	N	N	N	N	N	N	CR
1/05/98 5	N	N	N	N	N	N	N	N	CR
1/06/98 6	N	N	N	N	N	N	N	N	CR
1/07/98 7	N	N	N	N	N	N	N	N	CR
1/08/98 8	N	N	N	N	N	N	N	N	MO
1/09/98 9	N	N	N	N	N	N	N	N	MO
1/10/98 10	9A, 1NF	10A	10A	10A	10A	10A	10A	9A, 1NF	MO

Comments:

KEY: AS = AT SURFACE N= NONE EMR = EMERGENCE A = ALIVE D = DEAD NF = NOT FOUND
REP = REPLICATE COND = CONDUCTIVITY ALK = ALKALINITY AMP = AMPLEXUS
TEMP = TEMPERATURE HARD = HARDNESS YTC = YEAST/ TROUT CHOW/CEROPHYLL

QST ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108B
EFFECTIVE: JUNE 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET - WATER QUALITY

SPONSOR: ABB-ENVIRONMENTAL
SAMPLE ID: CF15SD7A

PROJECT NUMBER: 3197249G-0100-3100
TEST SPECIES: *Hyalella azteca*

DATE-DAY	REP	TEMP (°C)	HARD/ ALK	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
12/31/97 0	A	23.2	114/97	<0.1	6.7	7.7	220	1.0mL YTC	MO 1430
1/01/98 1	B	22.7	—	—	7.2	7.7	—	1.0mL YTC	MO 1030
1/02/98 2	C	23.2	—	—	7.3	7.9	—	1.0mL YTC	CR 1100
1/03/98 3	D	23.7	—	—	7.2	7.6	—	1.0mL YTC	MO 1100
1/04/98 4	E	23.5	—	—	7.3	7.7	—	1.0mL YTC	CR 1200
1/05/98 5	F	23.6	—	—	7.3	7.8	—	1.0mL YTC	CR 1300
1/06/98 6	G	23.8	—	—	7.4	7.8	—	1.0mL YTC	CR 1030
1/07/98 7	H	23.6	—	—	7.2	7.8	—	1.0mL YTC	MO 0815
1/08/98 8	A	22.9	—	—	7.3	8.0	—	1.0mL YTC	MO 1045
1/09/98 9	B	22.9	—	—	7.2	7.9	—	1.0mL YTC	MO 1045
1/10/98 10	C	22.9	103/100	<0.1	7.4	8.1	190	1.0mL YTC	MO 0900

OBSERV	REPLICATE								
DATE-DAY	A	B	C	D	E	F	G	H	Initial
12/31/97 0	10A	10A	10A	10A	10A	10A	10A	10A	MO
1/01/98 1	N	N	N	N	N	N	N	N	MO
1/02/98 2	N	N	N	N	N	N	N	N	CR
1/03/98 3	N	N	N	N	N	N	N	N	MO
1/04/98 4	N	N	N	N	N	N	N	N	CR
1/05/98 5	N	N	N	N	N	N	N	N	CR
1/06/98 6	N	N	N	N	N	N	N	N	CR
1/07/98 7	N	N	N	N	N	N	N	N	CR
1/08/98 8	N	N	N	N	N	N	N	N	MO
1/09/98 9	N	N	N	N	N	N	N	N	MO
1/10/98 10	9A, 1NF	10A 6A, 4NF	10A	10A	10A 7A, 3NF	10A 8A, 2NF	10A	8A, 2NF	MO

Comments:

KEY: AS = AT SURFACE N= NONE EMR = EMERGENCE A = ALIVE D = DEAD NF = NOT FOUND
REP = REPLICATE COND = CONDUCTIVITY ALK = ALKALINITY AMP = AMPLEXUS
TEMP = TEMPERATURE HARD = HARDNESS YTC = YEAST/ TROUT CHOW/CEROPHYLL

QST ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108B
EFFECTIVE: JUNE 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET - WATER QUALITY

SPONSOR: ABB-ENVIRONMENTAL
SAMPLE ID: POS-SD/TOX4B

PROJECT NUMBER: 3197249G-0100-3100
TEST SPECIES: *Hyalella azteca*

DATE-DAY	REP	TEMP (°C)	HARD/ ALK	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
12/31/97 0	A	23.3	132/115	<0.1	7.2	8.1	250	1.0 mL YTC	MO 1430
1/01/98 1	B	22.6	—	—	7.3	7.6	—	1.0 mL YTC	MO 1030
1/02/98 2	C	23.6	—	—	7.3	7.8	—	1.0 mL YTC	CR 1100
1/03/98 3	D	23.6	—	—	7.3	7.5	—	1.0 mL YTC	MO 1100
1/04/98 4	E	23.7	—	—	7.3	7.7	—	1.0 mL YTC	CR 1200
1/05/98 5	F	23.4	—	—	7.3	7.2	—	1.0 mL YTC	CR 1300
1/06/98 6	G	23.6	—	—	7.4	8.0	—	1.0 mL YTC	CR 1030
1/07/98 7	H	23.8	—	—	7.4	7.8	—	1.0 mL YTC	MO 0815
1/08/98 8	A	22.8	—	—	7.4	7.9	—	1.0 mL YTC	MO 1045
1/09/98 9	B	22.9	—	—	7.4	7.8	—	1.0 mL YTC	MO 1045
1/10/98 10	C	22.9	130/116	<0.1	7.4	8.0	240	1.0 mL YTC	MO 0900

OBSERV	REPLICATE								
DATE-DAY	A	B	C	D	E	F	G	H	Initial
12/31/97 0	10A	10A	10A	10A	10A	10A	10A	10A	MO
1/01/98 1	N	N	N	N	N	N	N	N	MO
1/02/98 2	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/03/98 3	N	N	N	N	N	N	N	N	MO
1/04/98 4	∩	∩	∩	∩	∩	∩	1 EMR	∩	CR
1/05/98 5	∩	∩	∩	1 EMR	∩	∩	1 EMR	∩	CR
1/06/98 6	∩	1 EMR	1 EMR	1 EMR	∩	∩	∩	1 EMR	CR
1/07/98 7	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/08/98 8	N	1 EMR	N	N	1 EMR	1 EMR	N	N	MO
1/09/98 9	N	N	N	N	1 EMR	1 EMR	N	N	MO
1/10/98 10	10A	10A	10A	10A	10A	10A	9A, 1 NF	10A, 1 AMP	MO

Comments:

KEY: AS = AT SURFACE N= NONE EMR = EMERGENCE A = ALIVE D = DEAD NF = NOT FOUND
REP = REPLICATE COND = CONDUCTIVITY ALK = ALKALINITY AMP = AMPLEXUS
TEMP = TEMPERATURE HARD = HARDNESS YTC = YEAST/ TROUT CHOW/CEROPHYLL

QST ENVIRONMENTAL INC.
TOXICOLOGY LAB
GAINESVILLE, FLORIDA

QA FORM: 017A
EFFECTIVE:
PROJECT NO:

SUBJECT: TEST ORGANISM SURVIVAL AND WEIGHTS

SPONSOR: ABB ENVIRONMENTAL | SPECIES: *Hyalella azteca*

Sample ID	Boat	Rep	No. Alive	Tare Wt (g)	Gross Wt (g)	Net Wt (mg)	Average
CONTROL	1	A	10	1.3885	1.3899	1.4 / 0.14	
	2	B	10	1.3603	1.3620	1.7 / 0.17	
	3	C	10	1.3896	1.3914	1.8 / 0.18	
	4	D	10	1.3616	1.3645	2.9 / 0.29	0.20
	5	E	10	1.3864	1.3878	1.4 / 0.14	
	6	F	10	1.3750	1.3769	1.9 / 0.19	
	7	G	9	1.3749	1.3769	2.0 / 0.22	
	8	H	10	1.3765	1.3789	2.4 / 0.24	
CF15SD3A	9	A	0	1.3698	—	—	
	~~9~~ 10	B	1	1.3787	1.3790	0.3 / 0.30	
	~~8~~ 11	C	1	1.3657	1.3659	0.2 / 0.20	
	~~4~~ 12	D	0	1.3645	—	—	
	~~5~~ 13	E	2	1.3605	1.3611	0.6 / 0.30	0.22
	~~6~~ 14	F	1	1.3839	1.3841	0.2 / 0.20	
	~~7~~ 15	G	1	1.3832	1.3833	0.1 / 0.10	
	~~8~~ 16	H	1	1.3626	1.3628	0.2 / 0.20	
CF15SD4A	17	A	9	1.3693	1.3718	2.5 / 0.28	
	18	B	10	1.3668	1.3699	3.1 / 0.31	
	19	C	10	1.3644	1.3678	3.4 / 0.34	
	20	D	10	1.3805	1.3841	3.6 / 0.36	
	21	E	10	1.3865	1.3890	2.5 / 0.25	0.29
	22	F	10	1.3821	1.3844	2.3 / 0.23	
	23	G	10	1.3652	1.3674	2.2 / 0.22	
	24	H	9	1.3732	1.3760	2.8 / 0.31	

Balance Used: SP180 Calculator Used: RS-DAE By: MO Date: 1/26/98

MO 1/8/98 (WT)

QST ENVIRONMENTAL INC.
TOXICOLOGY LAB
GAINESVILLE, FLORIDA

QA FORM: 017A
EFFECTIVE:
PROJECT NO:

SUBJECT: TEST ORGANISM SURVIVAL AND WEIGHTS

SPONSOR: ABB ENVIRONMENTAL | SPECIES: *Hyalella azteca*

Sample ID	Boat	Rep	No. Alive	Tare Wt (g)	Gross Wt (g)	Net Wt (mg)	Average
CF15SD7A	25	A	9	1.3636	1.3650	1.4 / 0.16	
	26	B	10	1.3721	1.3738	1.7 / 0.17	
	27	C	10	1.3741	1.3768	2.7 / 0.27	
	28	D	10	1.3673	1.3706	3.3 / 0.33	
	29	E	10	1.3730	1.3747	1.7 / 0.17	0.22
	30	F	10	1.3817	1.3841	2.4 / 0.24	
	31	G	10	1.3694	1.3715	2.1 / 0.21	
	32	H	8	1.3639	1.3657	1.8 / 0.22	
POS-SD/ TOX4	33	A	10	1.3753	1.3782	2.9 / 0.29	
	34	B	10	1.3787	1.3813	2.6 / 0.26	
	35	C	10	1.3744	1.3762	1.8 / 0.18	
	36	D	10	1.3610	1.3639	2.9 / 0.29	
	37	E	10	1.3707	1.3732	2.5 / 0.25	0.24
	38	F	10	1.3639	1.3656	1.7 / 0.17	
	39	G	9	1.3601	1.36~~54~~ 2 ⊗	~~3.3~~ 2.3 / ~~0.37~~ 0.26 ⊗	
	40	H	10	1.3621	1.3642	2.1 / 0.21	
		A					
		B					
		C					
		D					
		E					
		F					
		G					
		H					

Balance Used: SP180 Calculator Used: RS ~~DATE~~ By: MO Date: 1/26/98

⊗ MO 1/26/98 (Reweighed).

QST Environmental
Gainesville, Florida

QA Form: 021
Effective: Nov 1997

SUBJECT: WATER HARDNESS WORKSHEET

Sponsor: ABB

Project No.: 31972496-0100

Test Substance: Overlying water

Test Species: H. azteca

Data By: MO

Date: 12/31/97

Time: 1500

Normality of EDTA Titrant: (X) 0.01M ( ) Other: _____

Correction Factor (Based On Standardization Of EDTA Titrant): 1.01

TEST SOLUTION	SAMPLE VOLUME (mL)	DILUTE TO (mL)	INITIAL BURET READING (mL)	FINAL BURET READING (mL)	TOTAL TITRANT USED (mL)	TOTAL HARDNESS (mg/L) [corrected]
Hard water	100	~~0.0~~ MO	0.0	13.0	13.0	131
CF15SD3A	100	—	0.0	10.6	10.6	107
CF15SD4A	100	—	0.0	10.8	10.8	109
CF15SD7A	100	—	0.0	11.3	11.3	114
POS-SD/TOX4B	100	—	0.0	13.1	13.1	132

Calculation of Total Hardness (mg/L as $CaCO_3$): (A x B x 1,000) / Sample Volume (mL)

Where: A = mL of Titrant , and B = mg $CaCO_3$ equivalent to 1.00 mL EDTA Titrant (1 mg $CaCO_3$ = 1 mL EDTA Titrant)

TOTAL HARDNESS x CORRECTION FACTOR = TOTAL HARDNESS [corrected]

QST Environmental
Gainesville, Florida

QA Form: 020
Effective: Nov 1997

SUBJECT: WATER ALKALINITY WORKSHEET

Sponsor: _____ Project No.: 31972496-0100

Test Substance: Overlying water Test Species: H. azteca

Data By: MO Date: 12/31/97 Time: 1500

Normality of H_2SO_4 (Sulfuric Acid) Titrant: (X) 0.02N ( ) Other: _____

Correction Factor (Based On Standardization Of Sulfuric Acid Titrant): 1.02

TEST SOLUTION	SAMPLE VOLUME (mL)	DILUTE TO (mL)	INITIAL BURET READING (mL)	FINAL BURET READING (mL) To pH 4.5	4.2	TOTAL TITRANT USED (mL)	TOTAL ALKALINITY (mg/L) [corrected]
~~Crook Hard~~ Recon water	100	—	0.0	11.2	—	11.2	114
CF15SD3A	100	—	0.0	8.9	—	8.9	91
CF15SD4A	100	—	0.0	9.3	—	9.3	95
CF15SD7A	100	—	0.0	9.5	—	9.5	97
POS-SD/TOX 4B	100	—	0.0	11.3	—	11.3	115

Calculation of Total Alkalinity > 20 mg/L as $CaCO_3$:

Total Alkalinity = (B x N x 50,000) / mL of Sample , Where B = mL Titrated and N = normality of acid

Total Alkalinity x Correction Factor = [corrected] Total Alkalinity (mg/L as $CaCO_3$)

Calculation of Alkalinity < 20 mg/L as $CaCO_3$:

Total Alkalinity =[(2B - C) x N x 50,000] / mL sample, Where B = total mL titrant to pH 4.5, C = total mL titrant to pH 4.2, and N = Normality of acid

Total Alkalinity x Correction Factor = [corrected] Total Alkalinity (mg/L as $CaCO_3$)

3L97250-0100-3100
JPY 1/14/98

Cecil Field Tox Tests--Hyalella Survival
File: a:nas1 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	7.122	1.780	137.786
Within (Error)	35	0.452	0.013	
Total	39	7.574		

Critical F value = 2.69 (0.05,4,30)
Since F > Critical F REJECT Ho: All equal

3197250-0100-3100
JPY 1/15/98

Cecil Field Tox Tests--Hyalella Survival
File: a:nas1 Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	1.392	1.392		
2	CF15SD3A	0.299	0.299	19.225	*
3	CF15SD4A	1.371	1.371	0.358	
4	CF15SD7A	1.197	1.197	3.424	*
5	POS-SD/TOX4B	1.392	1.392	0.000	

Dunnett table value = 2.25 (1 Tailed Value, P=0.05, df=30,4)

Cecil Field Tox Tests--Hyalella Survival
File: a:nas1 Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Control	8			
2	CF15SD3A	8	0.128	9.2	1.093
3	CF15SD4A	8	0.128	9.2	0.020
4	CF15SD7A	8	0.128	9.2	0.195
5	POS-SD/TOX4B	8	0.128	9.2	0.000

Appendix C: *Chironomus tentans* Sediment Test Raw Data

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

Page: _____
ESE QA Form: 097A
Effective: August 1994

SUBJECT: TOXICITY TEST DATA SHEET

Client: ABB-ES / NAS Cecil Field

Project Number: 31972496-0100-3100

Test Material

See Page _____ of Sample Receipt Log
Test Material Information

Test Conditions

[ ] Preliminary
[ ] Definitive
[X] Screening

[X] Static [ ] Flow-through

Duration : 10 Days

Test Animal History

Species : C. tentans
Batch Number : 97-85
Age / Life Stage : 2-3 instar
Date Acclimation / Maintenance Began : 12/31/97
See Page 203 of Invertebrate Holding Log for raw data.
Mortality (%) 48 Hrs prior to testing: 0 %

Dilution Water: Moderately Hard Reconstituted water

Lighting : [X] Fluorescent [ ] Incandescent
Photoperiod : 16 hr Light : 8 hr Dark

Test Container Dimensions: 7 L x — W x 13 H (cm)
Test Solution Height : 2 cm
Test Containers : [X] Open [ ] Covered
Test Container Volume : 0.45 Liters
Diluent Volume : 0.175 Liters

Test Area Used	Temperature (C)	Salinity (ppt)
Waterbath 2	23 +/- 1	NA +/-

Reps / Concentration : 8
Animals / Replicate : 10

Protocol Followed: EPA

Concentrations Based on: [ ] A.I. [X] W.M.

Container Composition: [X] Glass [ ] Plastic

Test Concentrations: (Units = %):	Control	CF15SD3A	CF15SD4A	CF15SD7A	PES-SD/TOXU			
Amount ~~Reference Soil~~ Overlying water Added (mL):	175	175	175	175	175			
Amount Test ~~Soil~~ sediment Added (mL):	100 ~~N/A~~	100	100	100	100			

Additional Observations: Daily renewals

Data By: MO Date: 12/31/97

FORM: Soil94

QST ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108B
EFFECTIVE: JUNE 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET - WATER QUALITY

SPONSOR: ABB-ENVIRONMENTAL
SAMPLE ID: CONTROL

PROJECT NUMBER: 3197249G-0100-3100
TEST SPECIES: *Chironomus tentans*

DATE-DAY	REP	TEMP (°C)	HARD/ ALKN	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
12/31/97 0	A	22.6	89/65	<0.1	7.5	8.5	280	1.0mL YTC	MO 1430
1/01/98 1	B	22.4	—	—	7.5	7.9	—	1.0 mL YTC	MO 1030
1/02/98 2	C	22.8	—	—	7.6	8.0	—	1.0mL YTC	CR 1100
1/03/98 3	D	23.6	—	—	7.6	7.6	—	1.0mL YTC	MO 1100
1/04/98 4	E	23.2	—	—	7.6	7.7	—	1.0mL YTC	CR 1200
1/05/98 5	F	23.6	—	—	7.4	7.9	—	1.0mL YTC	CR 1300
1/06/98 6	G	23.8	—	—	7.4	8.0	—	1.0mL YTC	CR 1030
1/07/98 7	H	23.8	—	—	7.5	7.9	—	1.0mL YTC	MO 0815
1/08/98 8	A	22.6	—	—	7.5	8.0	—	1.0mL YTC	MO 1045
1/09/98 9	B	22.7	—	—	7.5	8.0	—	1.0mL YTC	MO 1045
1/10/98 10	C	22.8	95/69	<0.1	7.5	8.2	320	1.0mL YTC	MO 0900

OBSERV	REPLICATE								
DATE-DAY	A	B	C	D	E	F	G	H	Initial
12/31/97 0	10A	10A	10A	10A	10A	10A	10A	10A	MO
1/01/98 1	1EMR	N	N	N	N	N	1EMR	N	MO
1/02/98 2	1EMR	N	1EMR	N	N	N	N	N	CR
1/03/98 3	N	N	N	N	1EMR	N	2EMR	1EMR	MO
1/04/98 4	N	N	N	N	N	N	N	1EMR	CR
1/05/98 5	2EMR	1EMR	N	N	N	N	N	N	CR
1/06/98 6	1EMR	N	N	1EMR	2EMR	N	1EMR	1EMR	CR
1/07/98 7	N	N	2EMR	1EMR	N	N	1EMR	N	CR
1/08/98 8	N	N	1EMR	N	1EMR	N	N	1EMR	MO
1/09/98 9	N	N	1EMR	1EMR	N	N	1EMR	N	MO
1/10/98 10	10A	9A, 1NF	9A, 1D	10A	9A, 1NF	8A, 1D, 1NF	8A, 2NF	9A, 1NF	MO

Comments:

KEY: AS = AT SURFACE N= NONE EMR = EMERGENCE A = ALIVE D = DEAD NF = NOT FOUND
REP = REPLICATE COND = CONDUCTIVITY ALK = ALKALINITY AMP = AMPLEXUS
TEMP = TEMPERATURE HARD = HARDNESS YTC = YEAST/ TROUT CHOW/CEROPHYLL

QST ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108B
EFFECTIVE: JUNE 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET - WATER QUALITY

SPONSOR: ABB-ENVIRONMENTAL
SAMPLE ID: CF15SD3A

PROJECT NUMBER: 3197249G-0100-3100
TEST SPECIES: *Chironomus tentans*

DATE-DAY	REP	TEMP (°C)	HARD/ ALK	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
12/31/97 0	A	23.0	72/57	<0.1	7.0	8.2	260	1.0mL YTC	MO 1430
1/01/98 1	B	22.6	—	—	7.1	7.7	—	1.0mL YTC	MO 1030
1/02/98 2	C	23.3	—	—	7.0	7.8	—	1.0mL YTC	CR 1100
1/03/98 3	D	23.6	—	—	7.1	7.7	—	1.0mL YTC	MO 1100
1/04/98 4	E	23.4	—	—	7.0	7.5	—	1.0mL YTC	CR 1200
1/05/98 5	F	23.9	—	—	7.0	7.9	—	1.0mL YTC	CR 1300
1/06/98 6	G	23.9	—	—	7.0	7.9	—	1.0mL YTC	CR 1030
1/07/98 7	H	23.8	—	—	7.1	7.9	—	1.0mL YTC	MO 0815
1/08/98 8	A	22.8	—	—	7.2	8.0	—	1.0mL YTC	MO 1045
1/09/98 9	B	22.8	—	—	7.2	7.9	—	1.0mL YTC	MO 1045
1/10/98 10	C	22.8	77/60	<0.1	7.2	8.1	270	1.0mL YTC	MO 0900

OBSERV	REPLICATE								
DATE-DAY	A	B	C	D	E	F	G	H	Initial
12/31/97 0 MO	10A	10A	10A	10A	10A	10A	10A	10A	MO
1/01/98 1	N	N	N	N	N	N	N	N	MO
1/02/98 2	N	N	N	N	N	N	N	N	CR
1/03/98 3	N	N	N	N	N	N	N	N	MO
1/04/98 4	N	N	N	N	N	N	N	N	CR
1/05/98 5	N	N	N	N	N	N	N	N	CR
1/06/98 6	N	N	N	N	N	N	N	N	CR
1/07/98 7	N	N	N	N	N	N	N	N	CR
1/08/98 8	N	N	N	N	N	N	N	N	MO
1/09/98 9	N	N	N	N	N	N	N	N	MO
1/10/98 10	7A, 3NF	8A, 1D INF	9A, 1NF	8A, 2NF	8A, 1D INF	9A, 1NF	10A	8A, 1D, 1NF	MO

Comments:

KEY: AS = AT SURFACE N= NONE EMR = EMERGENCE A = ALIVE D = DEAD NF = NOT FOUND
REP = REPLICATE COND = CONDUCTIVITY ALK = ALKALINITY AMP = AMPLEXUS
TEMP = TEMPERATURE HARD = HARDNESS YTC = YEAST/ TROUT CHOW/CEROPHYLL

QST ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108B
EFFECTIVE: JUNE 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET - WATER QUALITY

SPONSOR: ABB-ENVIRONMENTAL
SAMPLE ID: CF15SD4A

PROJECT NUMBER: 3197249G-0100-3100
TEST SPECIES: *Chironomus tentans*

DATE-DAY	REP	TEMP (°C)	HARD/ ALK	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
12/31/97 0	A	23.2	71/57	<0.1	6.9	8.0	260	1.0mL YTC	MO 1430
1/01/98 1	B	22.7	—	—	7.1	7.8	—	1.0mL YTC	MO 1030
1/02/98 2	C	23.5	—	—	7.0	7.9	—	1.0mL YTC	CR 1100
1/03/98 3	D	23.6	—	—	7.2	7.5	—	1.0mL YTC	MO 1100
1/04/98 4	E	23.5	—	—	7.1	7.7	—	1.0mL YTC	CR 1200
1/05/98 5	F	23.9	—	—	6.9	7.7	—	1.0mL YTC	CR 1300
1/06/98 6	G	24.0	—	—	7.1	7.8	—	1.0mL YTC	CR 1030
1/07/98 7	H	23.9	—	—	7.1	7.9	—	1.0mL YTC	MO 0815
1/08/98 8	A	22.8	—	—	7.2	7.9	—	1.0mL YTC	MO 1045
1/09/98 9	B	22.8	—	—	7.2	7.9	—	1.0mL YTC	MO 1045
1/10/98 10	C	22.9	73/64	<0.1	7.3	8.1	270	1.0mL YTC	MO 0900

OBSERV	REPLICATE								
DATE-DAY	A	B	C	D	E	F	G	H	Initial
12/31/97 0	10A	10A	10A	10A	10A	10A	10A	10A	MO
1/01/98 1	N	N	N	N	N	N	N	N	MO
1/02/98 2	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/03/98 3	N	N	N	N	N	N	N	N	MO
1/04/98 4	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/05/98 5	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/06/98 6	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/07/98 7	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/08/98 8	N	N	N	N	N	N	N	N	MO
1/09/98 9	N	N	N	N	N	N	N	N	MO
1/10/98 10	9A, 1NF	9A, 1NF	8A, 2NF	7A, 1D 2NF	6A, 4NF	7A, 3NF	8A, 2NF	7A, 1D, 2NF	MO

Comments: Odor of rotten eggs (H_2S ?)

KEY: AS = AT SURFACE N= NONE EMR = EMERGENCE A = ALIVE D = DEAD NF = NOT FOUND
REP = REPLICATE COND = CONDUCTIVITY ALK = ALKALINITY AMP = AMPLEXUS
TEMP = TEMPERATURE HARD = HARDNESS YTC = YEAST/ TROUT CHOW/CEROPHYLL

QST ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108B
EFFECTIVE: JUNE 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET - WATER QUALITY

SPONSOR: ABB-ENVIRONMENTAL
SAMPLE ID: CF15SD7A

PROJECT NUMBER: 3197249G-0100-3100
TEST SPECIES: *Chironomus tentans*

DATE-DAY	REP	TEMP (°C)	HARD/ ALK	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
12/31/97 0	A	23.0	71/59	<0.1	6.7	7.9	260	1.0mL YTC	MO 1430
1/01/98 1	B	22.9	—	—	7.1	7.7	—	1.0mL YTC	MO 1030
1/02/98 2	C	23.6	—	—	7.0	7.9	—	1.0mL YTC	CR 1100
1/03/98 3	D	23.7	—	—	7.2	7.6	—	1.0mL YTC	MO 1100
1/04/98 4	E	23.6	—	—	7.1	7.7	—	1.0mL YTC	CR 1200
1/05/98 5	F	23.8	—	—	7.0	7.7	—	1.0mL YTC	CR 1300
1/06/98 6	G	24.1	—	—	7.2	7.8	—	1.0mL YTC	CR 1030
1/07/98 7	H	24.0	—	—	7.2	7.8	—	1.0mL YTC	MO 0815
1/08/98 8	A	22.9	—	—	7.2	7.9	—	1.0mL YTC	MO 1045
1/09/98 9	B	22.8	—	—	7.2	7.8	—	1.0mL YTC	MO 1045
1/10/98 10	C	23.0	72/65	<0.1	7.3	8.1	280	1.0mL YTC	MO 0900

OBSERV	REPLICATE								
DATE-DAY	A	B	C	D	E	F	G	H	Initial
12/31/97 0	10A	10A	10A	10A	10A	10A	10A	10A	MO
1/01/98 1	N	N	N	N	N	N	N	N	MO
1/02/98 2	N	N	N	N	N	N	N	N	CR
1/03/98 3	N	N	N	N	N	N	N	N	MO
1/04/98 4	N	N	N	N	N	N	N	N	CR
1/05/98 5	N	N	N	N	N	N	N	N	CR
1/06/98 6	N	N	N	N	N	N	N	N	CR
1/07/98 7	N	N	N	N	N	N	N	N	CR
1/08/98 8	N	N	N	N	N	N	N	N	MO
1/09/98 9	N	N	N	N	N	N	N	N	MO
1/10/98 10	6A, 4NF	6A, 4NF	7A, 3NF	6A, 4NF	5A, 5NF	7A, 3NF	6A, 4NF	6A, 4NF	MO

Comments:

KEY: AS = AT SURFACE N= NONE EMR = EMERGENCE A = ALIVE D = DEAD NF = NOT FOUND
REP = REPLICATE COND = CONDUCTIVITY ALK = ALKALINITY AMP = AMPLEXUS
TEMP = TEMPERATURE HARD = HARDNESS YTC = YEAST/ TROUT CHOW/CEROPHYLL

QST ENVIRONMENTAL
TOXICOLOGY LAB: GAINESVILLE, FL

QA FORM NO: 108B
EFFECTIVE: JUNE 1997

SUBJECT: SEDIMENT TOXICITY DATA SHEET - WATER QUALITY

SPONSOR: ABB-ENVIRONMENTAL
SAMPLE ID: POS-SD/TOX4B

PROJECT NUMBER: 3197249G-0100-3100
TEST SPECIES: *Chironomus tentans*

DATE-DAY	REP	TEMP (°C)	HARD/ ALK	NH_3 (ppm)	pH (s.u.)	DO (mg/L)	COND (µmhos/cm)	FEEDING	INITIAL/TIME
12/31/97 0	A	22.8	92/67	<0.1	7.2	8.1	290	1.0mL YTC	MO 1430
1/01/98 1	B	22.8	—	—	7.2	7.6	—	1.0mL YTC	MO 1030
1/02/98 2	C	23.7	—	—	7.2	7.9	—	1.0mL YTC	CR 1100
1/03/98 3	D	23.8	—	—	7.2	7.6	—	1.0mL YTC	MO 1100
1/04/98 4	E	23.6	—	—	7.2	7.7	—	1.0mL YTC	CR 1200
1/05/98 5	F	23.8	—	—	7.0	7.7	—	1.0mL YTC	CR 1300
1/06/98 6	G	24.0	—	—	7.2	7.8	—	1.0mL YTC	CR 1030
1/07/98 7	H	23.9	—	—	7.3	7.8	—	1.0mL YTC	MO 0815
1/08/98 8	A	22.8	—	—	7.3	7.8	—	1.0mL YTC	MO 1045
1/09/98 9	B	22.9	—	—	7.3	7.9	—	1.0mL YTC	MO 1045
1/10/98 10	C	23.1	101/73	<0.1	7.4	8.1	325	1.0mL YTC	MO 0900

OBSERV	REPLICATE								
DATE-DAY	A	B	C	D	E	F	G	H	Initial
12/31/97 0	10A	10A	10A	10A	10A	10A	10A	10A	MO
1/01/98 1	N	N	N	N	N	N	N	N	MO
1/02/98 2	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/03/98 3	N	N	N	N	N	N	N	N	MO
1/04/98 4	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/05/98 5	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/06/98 6	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/07/98 7	∩	∩	∩	∩	∩	∩	∩	∩	CR
1/08/98 8	N	N	N	N	N	N	N	N	MO
1/09/98 9	N	N	N	N	N	N	N	N	MO
1/10/98 10	9A, 1NF	10A	8A, 2NF	9A, 1NF	10A	8A, 2NF	8A, 2NF	9A, 1NF	MO

Comments:

KEY: AS = AT SURFACE N= NONE EMR = EMERGENCE A = ALIVE D = DEAD NF = NOT FOUND
REP = REPLICATE COND = CONDUCTIVITY ALK = ALKALINITY AMP = AMPLEXUS
TEMP = TEMPERATURE HARD = HARDNESS YTC = YEAST/ TROUT CHOW/CEROPHYLL

QST ENVIRONMENTAL INC.
TOXICOLOGY LAB
GAINESVILLE, FLORIDA

QA FORM: 017A
EFFECTIVE:
PROJECT NO:

SUBJECT: TEST ORGANISM SURVIVAL AND WEIGHTS

SPONSOR: ABB ENVIRONMENTAL | SPECIES: *Chironomus tentans*

Sample ID	Boat	Rep	No. Alive	Tare Wt (g)	Gross Wt (g)	Net Wt (mg)	Average
CONTROL	41	A	10	1.3702	1.3757	5.5/0.55	
	42	B	9	1.3810	1.3873	6.3/0.70	
	43	C	9	1.3747	1.3817	7.0/0.78	
	44	D	10	1.3660	1.3723	6.3/0.63	0.65
	45	E	9	1.3690	1.3745	5.5/0.61	
	46	F	8	1.3831	1.3884	5.3/0.66	
	47	G	8	1.3789	1.3845	5.6/0.70	
	48	H	9	1.3624	1.3678	5.4/0.60	
CF15SD3A	49	A	7	1.4125	1.4163	3.8/0.54	
	50	B	8	1.4125	1.4160	3.5/0.44	
	51	C	9	1.4119	1.4164	4.5/0.50	
	52	D	8	1.4173	1.4202	2.9/0.36	
	53	E	8	1.4022	1.4059	3.7/0.46	0.44
	54	F	9	1.4210	1.4243	3.3/0.37	
	55	G	10	1.4145	1.4185	4.0/0.40	
	56	H	8	1.3992	1.4029	3.7/0.46	
CF15SD4A	57	A	9	1.3572	1.3614	4.2/0.47	
	58	B	9	1.3719	1.3769	5.0/0.55	
	59	C	8	1.3776	1.3827	5.1/0.64	
	60	D	7	1.4034	1.4074	4.0/0.57	
	61	E	6	1.4033	1.4071	3.8/0.63	0.59
	62	F	7	1.4135	1.4177	4.2/0.60	
	63	G	8	1.4128	1.4177	4.9/0.61	
	64	H	7	1.4089	1.4134	4.5/0.64	

Balance Used: SP180 Calculator Used: RS-DATE By: MO Date: 1/10/98

QST ENVIRONMENTAL INC.
TOXICOLOGY LAB
GAINESVILLE, FLORIDA

QA FORM: 017A
EFFECTIVE:
PROJECT NO:

SUBJECT: TEST ORGANISM SURVIVAL AND WEIGHTS

SPONSOR: ABB ENVIRONMENTAL | SPECIES: *Chironomus tentans*

Sample ID	Boat	Rep	No. Alive	Tare Wt (g)	Gross Wt (g)	Net Wt (mg)	Average
CF15SD7A	65	A	6	1.4150	1.4168	1.8/0.30	0.34
	66	B	6	1.4193	1.4215	2.2/0.37	
	67	C	7	1.4088	1.4113	2.5/0.36	
	68	D	6	1.4007	1.4029	2.2/0.37	
	69	E	5	1.3957	1.3973	1.6/0.32	
	70	F	7	1.4044	1.4067	2.3/0.33	
	71	G	6	1.4153	1.4174	2.1/0.35	
	72	H	6	1.4136	1.4157	2.1/0.35	
POS-SD/ TOX4	73	A	9	1.4214	1.4277	6.3/0.70	0.65
	74	B	10	1.4187	1.4251	6.4/0.64	
	75	C	8	1.4163	1.4218	5.5/0.69	
	76	D	9	1.4142	1.4200	5.8/0.64	
	77	E	10	1.4145	1.4223	7.8/0.78	
	78	F	8	1.4024	1.4070	4.6/0.58	
	79	G	8	1.4130	1.4182	5.2/0.65	
	80	H	9	1.4127	1.4174	4.7/0.52	
		A					
		B					
		C					
		D					
		E					
		F					
		G					
		H					

Balance Used: SP180 ~~RS-DAE~~ mo 1/21/98 Calculator Used: ~~RS-DAE~~ By: MO Date: 1/10/98

QST Environmental
Gainesville, Florida

QA Form: 021
Effective: Nov 1997

SUBJECT: WATER HARDNESS WORKSHEET

Sponsor: ABB-ES

Project No.: 31972496-0100

Test Substance: Overlying water

Test Species: C. tentans

Data By: MS

Date: 12/31/97

Time: 1500

Normality of EDTA Titrant: (✓) 0.01M ( ) Other: _____

Correction Factor (Based On Standardization Of EDTA Titrant): 1.01

TEST SOLUTION	SAMPLE VOLUME (mL)	DILUTE TO (mL)	INITIAL BURET READING (mL)	FINAL BURET READING (mL)	TOTAL TITRANT USED (mL)	TOTAL HARDNESS (mg/L) [corrected]
Hard water (good hard)	100	—	0.0	8.8	8.8	89
CF15SD3A	100	—	0.0	7.1	7.1	72
CF15SD4A	100	—	0.0	7.0	7.0	71
CF15SD7A	100	—	0.0	7.0	7.0	71
POS-SD/TOX 4B	100	—	0.0	9.1	9.1	92

Calculation of Total Hardness (mg/L as $CaCO_3$): (A x B x 1,000) / Sample Volume (mL)

Where: A = mL of Titrant , and B = mg $CaCO_3$ equivalent to 1.00 mL EDTA Titrant (1 mg $CaCO_3$ = 1 mL EDTA Titrant)

TOTAL HARDNESS x CORRECTION FACTOR = TOTAL HARDNESS [corrected]

QST Environmental
Gainesville, Florida

QA Form: 020
Effective: Nov 1997

SUBJECT: WATER ALKALINITY WORKSHEET

Sponsor: ABB-ES

Project No.: 31972496-0100

Test Substance: Overlying water

Test Species: C. tentans

Data By: MO

Date: 12/31/97

Time: 1500

Normality of H_2SO_4 (Sulfuric Acid) Titrant: (X) 0.02N ( ) Other: _____

Correction Factor (Based On Standardization Of Sulfuric Acid Titrant): 1.02

TEST SOLUTION	SAMPLE VOLUME (mL)	DILUTE TO (mL)	INITIAL BURET READING (mL)	FINAL BURET READING (mL) To pH 4.5	4.2	TOTAL TITRANT USED (mL)	TOTAL ALKALINITY (mg/L) [corrected]
Mod Hard Recon water	100	—	0.0	6.4	—	6.4	65
CF15SD3A	100	—	0.0	5.6	—	5.6	57
CF15SD4A	100	—	0.0	5.6	—	5.6	57
CF15SD7A	100	—	0.0	5.8	—	5.8	59
PDS-SD/TOX 4B	100	—	0.0	6.6	—	6.6	67

Calculation of Total Alkalinity > 20 mg/L as $CaCO_3$:

Total Alkalinity = (B x N x 50,000) / mL of Sample , Where B = mL Titrated and N = normality of acid

Total Alkalinity x Correction Factor = [corrected] Total Alkalinity (mg/L as $CaCO_3$)

Calculation of Alkalinity < 20 mg/L as $CaCO_3$:

Total Alkalinity =[(2B - C) x N x 50,000] / mL sample. Where B = total mL titrant to pH 4.5, C = total mL titrant to pH 4.2, and N = Normality of acid

Total Alkalinity x Correction Factor = [corrected] Total Alkalinity (mg/L as $CaCO_3$)

3197250-0100-3100
JFY 1/14/98

Cecil Field Tox Tests--Chironomid Survival
File: a:nas2 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	44.500	11.125	15.270
Within (Error)	35	25.500	0.729	
Total	39	70.000		

Critical F value = 2.69 (0.05,4,30)
Since F > Critical F REJECT Ho: All equal

3G7250-0100-3100
JY 1/14/98

Cecil Field Tox Tests--Chironomid Survival
File: a:nas2 Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	9.000	9.000		
2	CF15SD3A	8.375	8.375	1.464	
3	CF15SD4A	7.625	7.625	3.222	*
4	CF15SD7A	6.125	6.125	6.736	*
5	POS-SD/TOX4B	8.875	8.875	0.293	

Dunnett table value = 2.25 (1 Tailed Value, P=0.05, df=30,4)

Cecil Field Tox Tests--Chironomid Survival
File: a:nas2 Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Control	8			
2	CF15SD3A	8	0.960	10.7	0.625
3	CF15SD4A	8	0.960	10.7	1.375
4	CF15SD7A	8	0.960	10.7	2.875
5	POS-SD/TOX4B	8	0.960	10.7	0.125

3197250-0100-3100
JDY 1/8/98

Cecil Field Tox Tests--Chironomid Growth
File: a:nas3 Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	0.605	0.151	39.321
Within (Error)	35	0.135	0.004	
Total	39	0.739		

Critical F value = 2.69 (0.05,4,30)
Since F > Critical F REJECT Ho: All equal

3197250-0100-3100
JY 1/14/98

Cecil Field Tox Tests--Chironomid Growth
File: a:nas3 Transform: NO TRANSFORM

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.654	0.654		
2	CF15SD3A	0.441	0.441	6.855	*
3	CF15SD4A	0.589	0.589	2.097	
4	CF15SD7A	0.344	0.344	10.000	*
5	POS-SD/TOX4B	0.650	0.650	0.121	

Dunnett table value = 2.25 (1 Tailed Value, P=0.05, df=30,4)

Cecil Field Tox Tests--Chironomid Growth
File: a:nas3 Transform: NO TRANSFORM

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Control	8			
2	CF15SD3A	8	0.070	10.7	0.212
3	CF15SD4A	8	0.070	10.7	0.065
4	CF15SD7A	8	0.070	10.7	0.310
5	POS-SD/TOX4B	8	0.070	10.7	0.004

Appendix D: Reference Toxicant Test Raw Data

3147250-0100-3100
JPY 1/14/98

TRIMMED SPEARMAN-KARBER METHOD. VERSION 1.5

DATE: 1/14/98 TEST NUMBER: 1 DURATION: 96 h
TOXICANT : CdCl2
SPECIES: H. azteca

RAW DATA:

Concentration (ug/L)	Number Exposed	Mortalities
.00	10	1
8.00	10	2
16.00	10	3
32.00	10	10
64.00	10	10
128.00	10	10

SPEARMAN-KARBER TRIM: 11.11%

SPEARMAN-KARBER ESTIMATES: LC50: 19.64
95% LOWER CONFIDENCE: 15.32
95% UPPER CONFIDENCE: 25.18

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

QST ENVIRONMENTAL INC.
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
QST QA FORM NO: 097A REFTOX
EFFECTIVE: AUGUST 1997

REFERENCE TOXICANT TEST DATA SHEET

Client: Misc.	Project Number: Ref TOX
Test Material	**Test Conditions**
Amount of 0.0165 g CdCl2 (g) Volume of Milli-Q Water: 1000 (mL) Date Prepared: 1/06/98	[X] Definitive [X] Static [ ] Screening Duration: 96 Hours
Test Organism History	Dilution Water: Hard water
Species: H. azteca Batch Number: 97-84 Age/Life Stage: 2-4 mm Date of Acclimation/Maintenance: 12/31/97 See Page 202 of Insect Holding Log Mortality 48 hours prior to test: 0 (%) 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: 23 ± 1 °C Test Salinity: NA ± ppt
Test Area Used: ~~SOP A-004~~ MO 1/6/98 waterbath 3	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: µg/L)	Control	8	16	32	64	128	
Amount Dilution Water Added (mL)	250	249.8	249.6	249.2	248.4	246.2	
Amount of Reftox Stock Added (mL)	—	0.2	0.4	0.8	1.6	3.2	

Additional Observations:_____

Data By: MO Date: 1/6/98

QST ENVIRONMENTAL INC.
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
QST QA FORM NO: 097 REFTOX
EFFECTIVE: AUGUST 1997

REFERENCE TOXICANT TEST DATA: DAY 0 - 2

Client: MISC	Project Number: Ref TOX	Species: H. azteca

DAY 0

Nominal Concentration (µg/L)	Date: 1/06/98		Time: 1430		Analyst: MO/CR	
	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	22.2	—	8.5	7.6
8	10	N	—	—	—	—
16	10	N	—	—	—	—
32	10	N	—	—	—	—
64	10	N	—	—	—	—
128	10	N	—	—	—	—

DAY 1

Nominal (µg/L) Concentration	Date: 1/07/98		Time: 1700		Analyst: MO	
	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	9	1 Dead	23.2	—	8.5	7.6
8	10	N	—	—	—	—
16	9	1 Dead	—	—	—	—
32	7	3 Dead	—	—	—	—
64	2	8 Dead	—	—	—	—
128	1	9 Dead	—	—	—	—

DAY 2

Nominal Concentration	Date: 1/08/98		Time: 1100		Analyst: MO	
	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	9	N	22.8	—	8.4	7.5
8	9	1 Dead	—	—	—	—
16	8	1 Dead	—	—	—	—
32	5	2 Dead	—	—	—	—
64	0	2 Dead	—	—	8.0	7.5
128	0	1 Dead	—	—	7.8	7.4

QST ENVIRONMENTAL INC.
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
QST QA FORM NO: 097 REFTOX
EFFECTIVE: AUGUST 1997

REFERENCE TOXICANT TEST DATA: DAY 3 AND 4

Client: MBC	Project Number: Ref Tox	Species: H. azteca

DAY 3

Nominal Concentration	Date: 1/09/98		Time: 0900		Analyst: MO	
	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	9	n	22.9	—	8.2	7.5
8	9	n	—	—	—	—
16	8	n	—	—	—	—
32	1	4 DEAD	—	—	—	—
—	—	—	—	—	—	—

DAY 4

Nominal Concentration	Date: 1/10/98		Time: 1200		Analyst: MO	
	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	9	N	22.6	—	8.2	7.5
8	8	1 Dead	—	—	—	—
16	7	1 Dead	—	—	—	—
32	0	1 Dead	—	—	8.0	7.5

SUMMARY

Nominal Concentration	Number Dead
Control	1
8	2
16	3
32	10
64	10
128	10

COMMENTS:

5197250-0102-3(02)
JPY 1/14/98

TRIMMED SPEARMAN-KARBER METHOD. VERSION 1.5

DATE: 1/14/98 TEST NUMBER: 2 DURATION: 96 h
TOXICANT : CdCl2
SPECIES: C. tentans

RAW DATA: -- ----	Concentration (ug/L)	Number Exposed	Mortalities
	.00	10	0
	125.00	10	0
	250.00	10	1
	500.00	10	7
	1000.00	10	10
	2000.00	10	10

SPEARMAN-KARBER TRIM: .00%

SPEARMAN-KARBER ESTIMATES: LC50: 406.13
95% LOWER CONFIDENCE: 319.43
95% UPPER CONFIDENCE: 516.35

QST ENVIRONMENTAL INC.
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
QST QA FORM NO: 097A REFTOX
EFFECTIVE: AUGUST 1997

REFERENCE TOXICANT TEST DATA SHEET

Client: Misc.	Project Number: Ref Tox
Test Material	**Test Conditions**
Amount of $CdCl_2$: 0.0165 (g)	[X] Definitive [X] Static
Volume of Milli-Q Water: 1000 (mL)	
Date Prepared: 1/06/98	[ ] Screening Duration: 96 Hours
Test Organism History	Dilution Water: Mod Hard Recon water
Species: C. tentans	Lighting: [X] Fluorescent [ ] Incandescent
Batch Number: 97-85	Photoperiod: 16 Hr Light 8 Hr Dark
Age/Life Stage: 2-3 mode	Test Vessel Dimensions: 100 (mm) L X — W 50 H
Date of Acclimation/Maintenance: 12/31/97	Test Solution Height: 4 (cm)
See Page 203 of Invert Holding Log	Test Vessel Volume: 0.34 (L)
Mortality 48 hours prior to test: 0 (%)	Test Solution Volume: 0.25 (L)
Replicates/Concentration: 1	Test Temperature: 23 ± 1 °C
No. Of Organisms/Replicate: 10	Test Salinity: NA ± ppt
Test Area Used: Waterbath 2	Test Vessel Composition: [X] Glass [ ] Plastic
Test Concentrations Based on: [X] Whole Material [ ] Active Ingredient	Test Protocol/Guideline Followed: Sof-A-004

Test Concentrations: (Units: ug/L)	Control	125	250	500	1000	2000	
Amount Dilution Water Added (mL)	250	246.87	243.75	237.5	225	200	
Amount of Reftox Stock Added (mL)	—	3.13	6.25	12.5	25	50	

Additional Observations:_____

Data By: MO Date: 1/06/98

QST ENVIRONMENTAL INC.
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
QST QA FORM NO: 097 REFTOX
EFFECTIVE: AUGUST 1997

REFERENCE TOXICANT TEST DATA: DAY 0 - 2

Client: Misc	Project Number: Ref Tox	Species: C. tentans

DAY 0

Nominal Concentration (µg/L)	Date: 1/06/98		Time: 1430		Analyst: MO	
	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	22.2	—	8.6	7.5
125	10	N	—	—	—	—
250	10	N	—	—	—	—
500	10	N	—	—	—	—
1000	10	N	—	—	—	—
2000	10	N	—	—	—	—

DAY 1

Nominal (µg/L) Concentration	Date: 1/07/98		Time: 1700		Analyst: MO	
	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	23.3	—	8.4	7.5
125	10	N	—	—	—	—
250	10	N	—	—	—	—
500	8	2 Dead	—	—	—	—
1000	7	3 Dead	—	—	—	—
2000	6	4 Dead	—	—	—	—

DAY 2

Nominal Concentration	Date: 1/08/98		Time: 1100		Analyst: MO	
	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	22.8	—	8.4	7.5
125	10	N	—	—	—	—
250	10	N	—	—	—	—
500	5	3 Dead	—	—	—	—
1000	4	3 Dead	—	—	—	—
2000	5	1 Dead	—	—	—	—

QST ENVIRONMENTAL INC.
TOXICOLOGY LABORATORY
GAINESVILLE, FLORIDA

PAGE:_____
QST QA FORM NO: 097 REFTOX
EFFECTIVE: AUGUST 1997

REFERENCE TOXICANT TEST DATA: DAY 3 AND 4

Client: MBC	Project Number: Ref Tox	Species: C. tentans

DAY 3						
(ug/L) Nominal Concentration	Date: 1/09/98		Time: 0900		Analyst: CR	
	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	22.7	—	8.0	7.5
125	10	N	—	—	—	—
250	9	1 DEAD	—	—	—	—
500	3	2 DEAD	—	—	—	—
1000/2000	1/2	3 DEAD/3 DEAD	—	—	—	—

DAY 4	Date: 1/10/98		Time: 1250		Analyst: MO	
Nominal Concentration	# Alive	Observ.	Temp. (°C)	Sal (ppt)	DO (mg/L)	pH
Control	10	N	22.5	—	7.9	7.4
125	10	N	—	—	—	—
250	9	N	—	—	—	—
500	3	1 Leth	—	—	—	—
1000	0	1 Dead	—	—	7.7	7.4
2000	0	2 Dead	—	—	7.6	7.5

SUMMARY

Nominal Concentration	Number Dead
Control	0
125	0
250	1
500	7
1000	10
2000	10

(ug/L)

COMMENTS:

ATTACHMENT C

ANALYTICAL DATA SET

NAS CECIL FIELD -- SAL TAYLOR CREEK JP-5 SPILL CONTAINMENT AREAS
TOTAL PETROLEUM HYDROCARBON DATA -- REPORT REQUEST NO. 9713

Lab Sample Number:	JR84821			
Site	NORTH FUEL FARM			
Locator	POSSD4B			
Collect Date:	23-DEC-97			
	VALUE	QUAL	UNITS	DL
TPH C8-C40	10	U	mg/kg	10

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE