APPENDIX E

BENTHIC ENUMERATION DATA

COMMENCEMENT BAY DAMAGE ASSESSMENT STUDIES:

Hylebos Waterway Sediment Toxicity Study Test results

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EVS Project No: 2/618-02.1

April 1995

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TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

Sediment toxicity tests using the amphipod, *Rhepoxynius abronius*, the polycheate; *Neanthes* spp.; and larvae of the echinoderm, *Dendraster excentricus*, were conducted based on methods described in the combined Quality Assurance Project Plan and Laboratory Analysis Plan (QAPP/LAP) (EVS, 1994). Thirty sediment samples were collected between May 23 and June 1, 1994. Samples were identified as follows:

DAC-HY-1T	DAC-HY-11T	DAC-HY-21T
DAC-HY-2T	DAC-HY-12T	DAC-HY-22T
DAC-HY-3T	DAC-HY-13T	DAC-HY-23T
DAC-HY-4T	DAC-HY-14T	DAC-HY-24T
DAC-HY-5T	DAC-HY-15T	DAC-HY-25T
DAC-HY-6T	DAC-HY-16T	DAC-HY-26T
DAC-HY-7T	DAC-HY-17T	DAC-HY-27T
DAC-HY-8T	DAC-HY-18T	DAC-HY-28T
DAC-HY-9T	DAC-HY-19T	DAC-CR-2T
DAC-HY-10T	DAC-HY-20T	DAC-CR-2AT

The sediments were transported to the laboratory on May 28 and June 2, 1994 and stored at 4°C in the dark until testing was initiated. Due to the large number of samples, the sediments were divided into two batches. The amphipod and *Neanthes* bioassays were initiated on May 31 and June 3, 1994 and the larval bioassay was initiated on June 8, and June 9, 1994.

2.0 METHODS

This section provides a brief description of the test methods. Detailed laboratory SOPs for each test were are included in the combined QAPP/LAP (EVS 1994).

2.1 Amphipod Bioassay (*Rhepoxynius abronius*)

Adult amphipods were collected from West Beach, Whidbey Island, Washington, and acclimated

to the test water temperature and salinity for four days prior to testing. For each bioassay replicate, 20 amphipods were exposed to a 2-cm layer of sediment (test and reference) in a 1-liter chamber filled with clean seawater (800 ml). Each chamber was examined on a daily basis for dead amphipods, amphipods emerged from the sediment (either floating on water surface or lying on tope of the sediment), and abnormal behavioral responses (e.g., failure to rebury). All observations were recorded in the laboratory notebook. Five replicate analyses were conducted for each test sample. After the 10-day exposure period, the amphipods in each test chamber were sieved from the sediment and the survivors counted. Percent mortality was determined relative to the total of 20 individuals added to each chamber at the beginning of the test. The ability of survivors to rebury was determined by exposing them to clean control sediment and recording the number that failed to rebury after a 1-hour period. Percent non-reburial was determined relative to the number of survivors in each test chamber. Effective mortality was determined from the sum of dead individuals plus those survivors that were not able to rebury.

QA/QC procedures for the amphipod bioassay include the use of a reference sediment, positive and negative controls, and daily measurement of water quality conditions (i.e., temperature, salinity, pH, dissolved oxygen) in each test chamber. A performance standard of no more than 10 percent mortality in the control replicates was to assess test acceptability. If the control standard is exceed (i.e., mortality greater than 10 percent for the controls) then the data will either be rejected, or, based on evaluation of other performance measures (e.g., positive control and reference sediment survival rates), the data may be qualified and accepted for analysis. In the present study, cadmium chloride was used as the reference toxicant and a sediment from West Beach, Whidbey Island, Washington was used as the negative control.

2.2 Juvenile Polychaete Bioassay

Neanthes spp. were obtained from laboratory cultures. Upon receipt of test animals, they were acclimated to test water temperature and salinity for a period of 2 days. Animals were fed (TetraMin®) during the acclimation period and weight 0.5 to 1.0 mg (dry weight) at the start of the test. The bioassays were conducted using a static-renewal system. Five replicates were prepared for each sample. Each exposure chamber consisted of a 1-liter jar, 2-cm of sediment, and 800-ml of clean seawater. Five juvenile worms were randomly added to each exposure chamber. All chambers were examined one hour after addition of test animals. All animals that did not appear to be burrowing were replaced. Approximately 40 mg of TetraMin® was added to each chamber every second day. Every third day, one-third of the overlying water in each chamber was exchanged with fresh seawater to prevent water quality deterioration. At the beginning of the test, three subsamples of worms (five worms per subsample) were randomly selected to provide an estimate of initial worm biomass. Dry weights (nearest 0.1 mg) were obtained after drying these worms for 24 hours at 50°C. After the 20-day exposure period, the contents of each replicate chamber was sieved (0.5 mm) and the number of survivors recorded. Percent mortality was determined relative to the total of five individuals added to each chamber

at the start of the test. Final worm weight for each replicate was determined by drying all survivors at 50°C for 24 hours and weighing to the nearest 0.1 mg.

QA/QC procedures for the juvenile polychaete bioassay include the use of a reference sediment, positive and negative controls, and daily measurement of water quality conditions (i.e., temperature, salinity, pH, dissolved oxygen) in each test chamber. Water quality measurements were made just prior to seawater placement. A performance standard of no more than 10 percent mortality in the control replicates was used to assess test acceptability. If the control standard is exceed (i.e., mortality greater than 10 percent for the controls) then the data will either be rejected, or, based on evaluation of other performance measures (e.g., positive control and reference sediment survival rates), the data may be qualified and accepted for analysis. In the present study, cadmium chloride was used as the reference toxicant and a sediment from West Beach, Whidbey Island, Washington, was used as the negative control. No performance criteria have been established for the growth endpoint for this test.

2.3 Echinoderm Larvae Bioassay

Stocks of mature, adult echinoderms were obtained from the EVS marine laboratory. Adult sand dollars were spawned in the laboratory by injecting 0.5M KCl into the coelomic cavity. Prior to spawning of the adults, five replicate test beakers were prepared for each sample. Twenty grams (20 g) of sediment were added to each beaker; clean seawater was added up to 1 liter to make a final concentration in all containers of 20 grams (wet weight) of sediment per liter of seawater. Sediments were suspended by vigorous shaking for 10 seconds then allowed to settle for four hours prior to adding the embryos. For each bioassay replicate, approximately 20,000 to 40,000 embryos were added to a 1-liter test chamber within 2 hours of fertilization. The embryo concentration at test initiation (T_0 hours) was confirmed by collecting replicate 10 ml samples from control cultures and preserving them in 5-percent buffered formalin. After a 48-hour incubation period, the water and larvae overlying the settled sediment in each beaker was decanted into a clean 1-liter beaker and the water mixed thoroughly. A 10-ml aliquot was removed from each sample and placed into a vial. The contents of vial were preserved in 5-percent buffered formalin. Preserved samples were examined for normal and abnormal larval development. Abnormal development is defined as failure to develop the fully shelled, hinged, D-shaped prodissoconch I stage. Percent survival for each replicate bioassay was based on the number of larvae surviving in each test container relative to the initial number; percent abnormal development for each replicate was based on the number of survivors that are abnormal.

QA/QC procedures for the echinoderm larval bioassay include the use of a reference sediment, positive and negative controls, and measurement of water quality conditions (i.e., temperature, salinity, pH, dissolved oxygen). Water quality measurements were made daily in the replicates prepared specifically for monitoring water quality. Ammonia-nitrogen was measured in a subsample of water from the water quality control beaker for each sediment sample and from the

seawater control at the beginning and end of the exposure period. The test was considered valid if more than 30 percent of the negative control organisms die and control abnormalities exceed 10 percent. In the present study, both cadmium chloride and sodium dodecyl sulphate were used as the reference toxicants; sediment from West Beach, Whidbey Island, Washington, was used as the negative control.

3.0 RESULTS

This section presents a summary of the test results and the water quality parameters. In addition, any deviations from the test protocol are noted and the corrective action taken noted.

3.1 Amphipod Bioassay (*Rhepoxynius abronius*)

Results of the sediment toxicity tests are summarized in Tables 1 and 2. Raw data and statistical printouts are provided in Appendix A. Mean Survival in the two control sediments for Setup #1 were both 97%. Mean survival in the two control sediments for Setup #2 was 96% and 93 %. All these results met the specified control criteria. Survival in the Hylebos Waterway test sediments ranged from 67-97% in Setup #1 and in Setup #2 from 56-93.8 %. Percent reburial ranged from 84-96% in Setup #1 and in Setup #2 from 85-100%.

Replicate C for Control Sample 2, Setup #1 was misseeded with 1 extra amphipod. Therefore, calculations for Control Sample 2 was based on 101 total amphipods. Replicates C,D, and E for sample DAC-HY-19T were misseeded with 40 amphipods each. Therefore, calculations for sample DAC-HY-19T were based on 160 total amphipods. Replicate B for sample DAC-HY-23T and replicate D for sample DAC-HY-2AT were each misseeded with 40 amphipods. Therefore, calculations for sample DAC-HY-23T and DAC-HY-2AT were based on 120 total amphipods. Replicate C for sample DAC-HY-7T was tipped over on Day 5 of testing and was therefore removed from statistical analysis.

Water quality parameters for both setups were in the following ranges:

temperature	15-16 °C;
dissolved oxygen	7.0-8.9 mg/L;
pH	7.5-8.4;
salinity	27-31 ppt.

The 96-h LC50 value (the concentration at which 50% mortality occurred) for the reference toxicant was determined using the EFFL software program (Stephan, 1977). The 96-h LC50 value for cadmium was 1.113 mg/L for Setup #1 and 1.056 mg/L for Setup #2. The approximate 95% confidence limits were calculated using the binomial test and were determined to be 0.320 and 1.800 mg/L for both setups.

Table 1. Summary of *Rhepoxynius abronius* (Setup #1) sediment toxicity test results.

Sample ID	Mean Survival (%)	Mean Reburial (%)
Control 1	97	100
DAC-HY-13T	89	96
DAC-HY-14T	97	84
DAC-HY-15T	86	94
DAC-HY-16T	88	92
DAC-HY-18T	86	95
DAC-HY-19T	91	92
DAC-HY-21T	73	85
DAC-HY-22T	85	91
DAC-HY-24T	67	94
Control 2	97	100
DAC-HY-17T	84	89
DAC-HY-20T	84	96
DAC-HY-23T	84	86

Table 2. Summary of *Rhepoxynius abronius* (Setup #2) sediment toxicity test results.

Sample ID	Mean Survival (%)	Mean Reburial (%)
Control 1	96	99
DAC-HY-4T	79	97
DAC-HY-6T	87	95
DAC-HY-7T	93.8	92
DAC-HY-9T	84	94
DAC-HY-10T	56	98
DAC-HY-12T	77	97
DAC-HY-26T	81	85
DAC-HY-27T	86	88
DAC-HY-28T	72	92
Control 2	93	98
DAC-HY-1T	77	96
DAC-HY-2T	88	91
DAC-HY-3T	86	97
DAC-HY-5T	77	97
DAC-HY-8T	74	96
DAC-HY-11T	86	100
DAC-HY-25T	87	97
DAC-CR-2T	85	100
DAC-CR-2AT	72	96

00523

3.2 Juvenile Polychaete Bioassay

Results of the sediment toxicity tests are summarized in Tables 3 and 4. Raw data and statistical printouts are provided in Appendix B. Mean Survival in the two control sediments for Setup #1 were both 100%. Mean survival in the two control sediments for Setup #2 were also both 100%. All these results met the specified control criteria. Survival in the Hylebos Waterway test sediments ranged from 88-100% in Setup #1 and in Setup #2 from 92-100%. Mean individual biomass ranged from 9.40-14.18 mg in Setup #1 and in Setup #2 from 6.15-12.58 mg.

Replicate A for sample DAC-HY-21T was misseeded with 6 organisms. Replicate B for sample DAC-HY-27T was double seeded with 10 organisms. Replicate C for sample DAC-HY-27T was missed in the seeding process. All calculations for this sample (DAC-HY-27T) are based on four replicates. The following replicates were missing small pieces of one or more organisms: DAC-HY-9T-A; DAC-HY-28T-D; DAC-HY-1T-B,D; DAC-HY-8T-A; DAC-HY-5T-C; DAC-HY-25T-A,C; DAC-HY-21T-E; and DAC-HY-13T-C.

Water quality parameters for both setups were in the following ranges:

temperature	20-22 °C;
dissolved oxygen	1.1-7.6 mg/L;
pH	7.1-8.4;
salinity	26-33 ppt.

The 96-h LC50 value (the concentration at which 50% mortality occurred) for the reference toxicant was determined using the EFFL software program (Stephan, 1977). The 96-h LC50 value for cadmium was 7.955 mg/L for Setup #1 and 6.721 mg/L for Setup #2. The approximate 95% confidence limits were calculated using the binomial test and were determined to be 5.600 and 10.000 mg/L for Setup #1 and 3.200 and 10.000 for Setup #2.

3.3 Echinoderm Larvae Bioassay

Results of the sediment toxicity tests are summarized in Tables 5 and 6. Raw data and statistical printouts are provided in Appendices A and B. Mean percent mortality in the two control sediments for Setup #1 were -20.0 and -23.2%. Mean percent mortality in the two control seawaters for Setup #1 were -12.2 and -26.1%. Mean percent mortality in the two control sediments for Setup #2 were -6.5 and -9.4%. Mean percent mortality in the two control seawaters for Setup #2 were -10.1 and -11.0%. All these results met the specified control criteria (PSEP, 1991). Mean percent mortality in the Hylebos Waterway test sediments ranged from -33.2 to 50.4% in Setup #1 and in Setup #2 from -9.3 to 33.4%. Mean percent abnormality ranged from 3.2-17.9% in Setup #1 and in Setup #2 from 4.2-10.9%.

Water quality parameters for both setups were in the following ranges:

temperature	15.5-16.0 °C;
dissolved oxygen	5.0-8.1 mg/L;
pH	7.0-7.8;
salinity	30-32 ppt.

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Table 3. Summary of *Neanthes arenaceodentata* (Setup #1) sediment toxicity test results.

Sample ID	Mean Survival (%)	Mean Individual Biomass (mg)
Control 1	100	10.94
DAC-HY-13T	100	12.64
DAC-HY-14T	100	12.64
DAC-HY-15T	92	12.12
DAC-HY-16T	100	9.40
DAC-HY-18T	88	11.30
DAC-HY-19T	100	11.78
DAC-HY-21T	100	13.07
DAC-HY-22T	96	10.89
DAC-HY-24T	100	14.18
Control 2	100	11.65
DAC-HY-17T	100	10.60
DAC-HY-20T	100	10.62
DAC-HY-23T	100	11.49

Table 4. Summary of *Neanthes arenaceodentata* (Setup #2) sediment toxicity test results.

Sample ID	Mean Survival (%)	Mean Individual Biomass (mg)
Control 1	100	10.22
DAC-HY-4T	100	10.14
DAC-HY-6T	100	11.42
DAC-HY-7T	100	10.20
DAC-HY-9T	100	9.98
DAC-HY-10T	96	9.33
DAC-HY-12T	100	10.73
DAC-HY-26T	100	10.07
DAC-HY-27T	100	6.15
DAC-HY-28T	100	10.00
Control 2	100	9.67
DAC-HY-1T	100	10.12
DAC-HY-2T	96	7.36
DAC-HY-3T	100	10.37
DAC-HY-5T	92	12.58
DAC-HY-8T	96	11.48
DAC-HY-11T	100	9.10
DAC-HY-25T	96	9.18
DAC-CR-2T	92	9.93
DAC-CR-2AT	92	9.01

Table 5. Summary of *Dendraster excentricus* (Setup #1) sediment toxicity test results.

Sample ID	Mean Mortality (%)	Mean Abnormal (%)
Control 1	-20.0	4.7
DAC-HY-8T	2.6	8.7
DAC-HY-9T	-12.6	17.9
DAC-HY-10T	26.5	8.7
DAC-HY-11T	17.9	3.2
DAC-HY-12T	8.2	4.5
DAC-HY-13T	19.7	8.4
DAC-HY-15T	6.6	9.2
DAC-HY-16T	1.7	7.8
DAC-HY-23T	21.7	8.1
Control 2	-23.2	4.8
DAC-HY-17T	-17.9	3.4
DAC-HY-18T	3.2	5.6
DAC-HY-19T	-25.1	3.4
DAC-HY-20T	50.4	13.6
DAC-HY-21T	-33.2	3.5
DAC-HY-22T	2.7	4.9

Table 6. Summary of *Dendraster excentricus* (Setup #2) sediment toxicity test results.

Sample ID	Mean Mortality (%)	Mean Abnormal (%)
Control 1	-6.5	5.0
DAC-HY-2T	-6.3	8.5
DAC-HY-5T	6.4	8.8
DAC-HY-24T	24.6	7.7
DAC-HY-26T	-9.2	10.9
DAC-CR-2T	33.4	9.1
DAC-CR-2AT	-1.9	6.6
Control 2	-9.4	5.6
DAC-HY-1T	-9.3	8.0
DAC-HY-3T	5.6	9.6
DAC-HY-4T	17.8	4.2
DAC-HY-6T	4.9	8.8
DAC-HY-7T	6.6	7.4
DAC-HY-14T	8.2	4.2
DAC-HY-25T	29.7	9.8
DAC-HY-27T	25.8	9.8
DAC-HY-28T	7.8	3.4

The 48-h LC50 value (the concentration at which 50% mortality occurred) for the reference toxicant was determined using the EFFL software program (Stephan, 1977). The 48-h LC50 value for cadmium was 3.980 mg/L for Setup #1 and 9.108 mg/L for Setup #2. The approximate 95% confidence limits were calculated using the binomial test and were determined to be 3.200 and 5.600 mg/L for Setup #1 and 5.600 and + ∞ for Setup #2.

4.0 QA/QC REVIEW OF BIOASSAY DATA

4.1 Amphipod Bioassay (*Rhepoxynius abronius*)

Sediment testing using *R. abronius* were initiated on May 31 and June 3, 1994. These initiation dates were within the recommended holding time of 14 days. The tests were performed within the recommended water quality parameters, met minimum control survival standards, and the reference toxicant LC_{50} was within laboratory test history limits.

Replicates from three samples and one control were misseeded with twice the number of animals (i.e., 40 instead of 20). This was noted and all subsequent calculations for those samples were based on the actual number of animals placed in the jar. For one sample one replicate jar was lost during the test, so calculation of mean survival for this sample was based on four replicates.

4.2 Juvenile Polychaete Bioassay

Sediment testing using *Neanthes* were initiated on May 31 and June 3, 1994. These initiation dates were within the recommended holding time of 14 days. The tests were performed within the recommended water quality parameters, met minimum control survival standards, and the reference toxicant LC_{50} was within laboratory test history limits.

Replicates from two samples were misseeded with more animals than specified in the protocols. This was noted and all subsequent calculations for those samples were based on the actual number of animals placed in the jar. For one sample, one replicate jar (replicate C for sample DAC-HY-27T) was not seeded during the test, so calculation of mean survival for this sample was based on four replicates.

4.3 Echinoderm Larvae Bioassay

Sediment testing using the echinoderm larvae were initiated on June 8 and 9, 1994. These initiation dates were not within the recommended holding time of 14 days for samples DAC-HY-13 and DAC-HY-14. Tests were initiated on day 15 for both samples.

The tests were performed within the recommended water quality parameters, met minimum control survival standards, and the reference toxicant LC_{50} was within laboratory test history limits.

4.4 Overall Summary

All data are deemed acceptable for use as outlined in the QAPP/LAP (EVS, 1994). None of the data require qualifications, although it is recommended that the deviations in bioassay testing discussed in this review be presented and discussed in the data report.

5.0 REFERENCES

EVS, 1994. Commencement Bay Damage Assessment Studies: combined quality assurance project plan and laboratory analysis plan. Prepared by EVS cosultants, Seattle, WA. for the National Oceanic and Atmospheric Administration, Damage Assessment and Restoration Center, Seattle, WA.

Stephan, C.E. 1977. Methods for Calculating an LC_{50}. F.L. Mayer and J.L. Hamelink (eds.), Aquatic Toxicity and Hazard Evaluation ASTM STP 634, American Society of Testing and Materials, Philadelphia, PA, pp.65-84.

APPENDIX A
Amphipod Bioassay
RAW DATA

EVS CONSULTANTS

Amphipod Survival and Emergence Data

Client:	NOAA – Setup #1	**Test Species:**	*Rhepoxynius abronius*
Project #:	9/618–02.4	**Date Initiated:**	May 31, 1994
Work Order:	940225	**Date Terminated:**	June 10, 1994
Test Type:	10–d static marine sediment		
		Number of Test Organisms:	20

Sample ID	Rep	No. Survivors	No. Emerged Days 1–10	No. Failing to Reburrow	Mean Survival (%)	Mean Emergence (#/jar/day)	Reburial (%)
Control 1	A	20	0	0	97.0	0.2	100
	B	20	0	0			
	C	18	8	0			
	D	20	1	0			
	E	19	1	0			
DAC–HY–13T	A[1]	16	5	1	89.0	0.9	96
	B	19	8	0			
	C[1]	16	19	0			
	D	18	7	1			
	E	20	6	2			
DAC–HY–14T	A	20	2	1	97.0	0.8	84
	B	19	8	2			
	C	19	5	2			
	D	19	17	7			
	E	20	8	4			
DAC–HY–15T	A	16	11	0	86.0	0.7	94
	B	18	10	2			
	C	18	6	1			
	D	17	4	1			
	E	17	6	1			
DAC–HY–16T	A	16	5	1	88.0	0.5	92
	B	19	6	0			
	C	18	4	1			
	D	18	7	2			
	E	17	3	3			

1. A 0.5–cm crab was found in each of these replicates (DAC–HY–13T–A,C).

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EVS CONSULTANTS

Amphipod Survival and Emergence Data

Client:	NOAA – Setup #1	Test Species:	*Rhepoxynius abronius*
Project #:	9/618–02.4	Date Initiated:	May 31, 1994
Work Order:	940225	Date Terminated:	June 10, 1994
Test Type:	10–d static marine sediment		
		Number of Test Organisms:	20

Sample ID	Rep	No. Survivors	No. Emerged Days 1–10	No. Failing to Reburrow	Mean Survival (%)	Mean Emergence (#/jar/day)	Reburial (%)
DAC–HY–18T	A	17	5	1	86.0	0.8	95
	B	16	5	2			
	C	18	14	0			
	D	18	9	1			
	E	17	9	0			
DAC–HY–19T	A	19	5	0	91.0	1.1	92
	B	17	5	1			
	C[2]	37	16	6			
	D[2]	35	16	3			
	E[2]	37	13	2			
DAC–HY–21T	A	19	9	2	73.0	1.2	85
	B	16	8	1			
	C	14	18	3			
	D	(8)	16	2			
	E	16	9	3			
DAC–HY–22T	A	18	1	2	85.0	0.4	91
	B	16	8	3			
	C	19	5	2			
	D	13	1	1			
	E	19	4	0			
DAC–HY–24T	A	13	17	1	67.0	2.3	94
	B	12	21	0			
	C	12	36	0			
	D	13	13	2			
	E	17	28	1			

2. These replicates (DAC–HY–19T–C,D,E) appear to have been misseeded with 40 amphipods each. Calculations for this sample (DAC–HY–19T) were based on 160 total amphipods.

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EVS CONSULTANTS

Amphipod Survival and Emergence Data

Client:	NOAA – Setup #1	**Test Species:**	*Rhepoxynius abronius*
Project #:	9/618–02.4	**Date Initiated:**	May 31, 1994
Work Order:	940225	**Date Terminated:**	June 10, 1994
Test Type:	10–d static marine sediment		
		Number of Test Organisms:	20

Sample ID	Rep	No. Survivors	No. Emerged Days 1–10	No. Failing to Reburrow	Mean Survival (%)	Mean Emergence (#/jar/day)	Reburial (%)
Control 2	A	19	6	0	97.0	0.3	100
	B	20	0	0			
	C[3]	21	0	0			
	D	19	9	0			
	E	19	0	0			
DAC–HY–17T	A	15	5	0	84.0	0.2	89
	B	16	2	1			
	C	18	1	2			
	D	18	0	3			
	E	17	1	3			
DAC–HY–20T	A	18	5	0	84.0	0.7	96
	B	19	10	0			
	C	14	9	2			
	D	17	11	0			
	E	16	2	1			
DAC–HY–23T	A	16	2	1	84.0	1.0	86
	B[4]	34	16	6			
	C	17	8	2			
	D	16	14	2			
	E	18	11	3			

3. This replicate (Control 2–C) appears to have been misseeded with one extra amphipod. Calculations have been based on 101 total amphipods.

4. This replicate (DAC–HY–23T–B) appears to have been misseeded with 40 amphipods. Calculations have been based on 120 total amphipods.

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EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-12
Temperature Hg. Thermometer

Client: N.O.A.A.
EVS Project No.: 9/619-02.4
EVS W.O. No.: 940225
Day 0: May 31, 1994
Day 10: June 10, 1994.
Test Species: L. abronius
Source/Collection Date: May 25, 1994
West Beach, Whidbey Island WA.

SAMPLE I.D. Control 1

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	0	0	0	0	0	0	20	0	16	28	7.8	7.7
B	0	0	0	0	0	0	0	0	0	0	20	0	16	28	7.8	7.7
C	1	1	1	1	1	1	1	0	0	0 #1	18	0	16	28	7.8	7.7
D	0	0	0	0	1	0	0	0	0	0	20	0	16	28	7.8	7.7
E	1	0	0	0	0	0	0	0	0	0	19	0	16	29	7.9	7.7
Tech'n	MM	RD	RD	MC	SAT	MC	MM	RD	RD	RD	RD	RD	RD	RD	RD	RD

(# dead:# missing) - A(0:0) B(0:0) C(0:2) D(0:0) E(0:1)

SAMPLE I.D. DAC-HY-13T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	0	1	0	1	3	0	16 ②	1	16	29	8.1	7.9
B	0	0	0	0	0	0	0	1	2	5	19	0	16	29	7.9	7.8
C	0	1	3	2	1	1	2	2	4	3	16 ②	0	16	29	7.8	7.8
D	0	1	0	0	0	1	1	2	2	0	18	1	16	29	7.9	7.9
E	0	0	1	0	0	0	0	1	2	2	20	2	16	29	7.8	7.8
Tech'n	MM	RD	RD	MC	SAT	MC	MM	RD	RD	RD	SAT	SAT	RD	RD	RD	RD

(# dead:# missing) - A(1:3) B(0:1) C(0:4) D(0:2) E(0:0)

SAMPLE I.D. DAC-HY-16T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	1	0	0	0	2	1	0	1	SAT 16	1	16	30	8.1	8.0
B	0	0	0	0	0	0	0	3	1	1	19	0	16	29	8.2	7.9
C	0	0	1	0	0	0	0	2	0	1	18	1	16	29	8.0	8.0
D	1	0	1	0	0	1	0	1	1	2	18	2	16	29	8.2	8.0
E	0	0	1	0	0	0	1	0	1	0	SAT 17	3	16	30	8.2	8.0
Tech'n	MM	RD	RD	MC	SAT	MC	MM	RD	RD	RD	SAT	SAT	RD	RD	RD	RD

(# dead:# missing) - A(0:4) B(0:1) C(0:2) D(0:2) E(0:3)

① Heater (reimbursed.)

② ≈0.5cm crab found within sediment SAT.

00541 July 14, 1994

EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-12
Temperature Hg Thermometer

Client: N.O.A.A.
EVS Project No.: 9/619-02.4
EVS W.O. No.: 940225
Day 0: May 31, 1994
Day 10: June 10, 1994
Test Species: R. abronius
Source/Collection Date: May 25, 1994
West Beach, Whidbey Island WA

SAMPLE I.D. DAC-HY-21T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	1,1②	0	0	0	0	0	4	2	1	19	2	16	30	7.5	8.2
B	0	2	1	0	0	1	0	1	2	1	16	1	16	30	7.7	8.3
C	1,1②	6	1,1②	0	0	0	1	1	2	4	14	3	16	29	7.1	7.9
D	7	1②	6	2②	0	0	0	0	0	0	8	2	16	31	7.5	8.3
E	0	1	0	0	0	0	1	5	1	1	16	3	16	30	7.6	8.3
Tech'n	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

(# dead:# missing) - A(0:1) B(2:2) C(2:4) D(2:10) E(0:4)

SAMPLE I.D. DAC-HY-24T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	1	1	1	0	0	1	2	2	6	3	13	1	16	29	7.9	8.0
B	1	1	1	2	1	2	3	4	5	1	12	0	16	29	7.8	7.9
C	1	0	6	4	5	3	2	6	5	4	12	0	16	29	7.8	8.1
D	0	1	0	1	0	0	2	3	3	3	13	2	16	29	7.6	7.8
E	0	②	2	1	1	2	4	1	9	7	17	1	16	29	7.6	8.1
Tech'n	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

(# dead:# missing) - A(0:7) B(4:4) C(2:6) D(0:2) E(0:3)

SAMPLE I.D. DAC-HY-19T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	0	0	2	1	1	1	19	0	16	29	7.8	7.9
B	1	0	0	0	0	0	0	1	2	1	17	1	16	30	7.9	8.0
C	1	0	1	0	0	0	4	3	4	3	37③	6	16	31	7.6	7.8
D	4,3②	1②	3	1	0	1	0	1	1	1	35③	3	16	30	7.8	7.7
E	1①	4,6②	0	1	1	1	0	2	0	1	37③	2	16	29	8.0	7.8
Tech'n	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

(# dead:# missing) - A(0:1) B(0:3) C(1:2) D(0:5) E(0:3)

① floater (resubmerged)
② floater (didn't resubmerge)
③ double seeded, divided by 2 for statistical analysis.

EBM July 14/94

00542

f:_Vorc\data\amphipod.1

EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-12
Temperature Hg Thermometer

Client: N.O.A.A.
EVS Project No.: 9/619-02.4
EVS W.O. No.: 940225
Day 0: May 31 1994
Day 10: June 10, 1994
Test Species: R. abronius
Source/Collection Date: May 25, 1994
West Beach, Whidbey Island, WA.

SAMPLE I.D. DAC-HY-14T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	0	0	0	1	0	1	20	1	16	30	8.1	7.8
B	0	0	0	0	0	1	1	1	4	1	19	2	16	30	7.8	7.7
C	0	0	0	0	0	0	0	1	4	0	19	2	16	31	8.0	7.8
D	0	0	1	1	0	3	2	4	1	4	19	7	16	29	7.9	7.7
E	0	0	1	0	0	0	1	1	3	2	20	4	16	30	8.0	7.8
Tech'n																

(# dead:# missing) - A(0:0) B(0:1) C(0:1) D(1:0) E(0:0)

SAMPLE I.D. DAC-HY-18T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	1	0	0	1	2	1	17	1	16	31	8.0	7.9
B	1	2	1	0	0	0	0	0	1	0	16	2	16	30	8.0	8.0
C	0	0	1	1	0	0	2	2	2	6	19	0	16	30	7.8	7.8
D	0	0	3	2	1	0	0	1	1	1	18	1	16	30	7.8	7.8
E	0	0	0	1	0	1	1	4	2	0	17	0	16	30	7.8	7.8
Tech'n											KLV	KLV				

(# dead:# missing) - A(3:0) B(2:2) C(2:0) D(2:0) E(3:0)

SAMPLE I.D. DAC-HY-15T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	1	3	1	2	3	1	16	KLV 0	15.5	30	8.2	7.8
B	0	0	0	0	0	2	2	1	3	2	18 KLV	2	15.5	31	8.0	7.8
C	0	0	1	0	0	0	0	2	1	2	18	1	15.5	31	8.0	7.9
D	0	0	0	0	1	0	1	0	2	0	17	1	15.5	30	8.0	7.9
E	0	0	0	0	0	0	1	2	2	1	17	1	15.5	31	7.9	7.9
Tech'n											KLV	KLV				

(# dead:# missing) - A(3:1) B(2:0) C(2:0) D(2:1) E(3:0)

① floater

EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-12
Temperature Hg Thermometer

Client: N.O.A.A.
EVS Project No.: 9168-02.4
EVS W.O. No.: 940225
Day 0: May 31 1994
Day 10: June 10, 1994
Test Species: L. obtusiusculus
Source/Collection Date: May 25, 1994
West Beach, Whidbey Island Wa.

SAMPLE I.D. DAC-HY-22T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	0	0	0	0	1	0	18	2	15.5	30	8.0	7.9
B	0	0	0	1	1	1	2	0	3	0	16	3	15.5	30	8.0	7.9
C	0	0	0	0	0	0	2	2	1	0	19	2	15.5	30	7.7	7.8
D	0	0	0	0	0	0	1	0	0	0	13	1	15.5	29	7.6	7.9
E	0	0	0	0	0	0	0	2	1	1	18 19	0	15.5	29	8.1	7.9
Tech'n																

(# dead:# missing) - A(1:1) B(0:4) C(0:1) D(0:7) E(0:1)

SAMPLE I.D. Control 2

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	1④	1②	1	0	0	1	0	0	1	0	19	0	15.5	29	8.0	7.7
B	0	0	0	0	0	0	0	0	0	0	20	0	15.5	28	8.2	7.8
C	0	0	0	0	0	0	0	0	0	0	20	0	15.5	29	8.2	7.8
D	1③	1②	1	0	0	1	1	1	1	1	19	0	15.5	29	8.2	7.8
E	0	0	0	0	0	0	0	0	0	0	20 19	0	15.5	28	8.2	7.8
Tech'n																

(# dead:# missing) - A(0:1) B(0:0) C(1:0) D(0:1) E(0:0) F(0:1)

SAMPLE I.D. DAC-HY-23T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	0	0	1	0	0	1	17	1	15.5	30	7.8	7.8
B	1	2	0	0	0	0	3	1	4	5	34④	6	15.5	29	7.8	7.7
C	1①	0	0	4	0	0	1	0	1	1	17	2	15.5	30	8.0	7.8
D	0	0	0	2	0	1	2	2	6	1	16	2	15.5	29	7.7	7.7
E	1①	0	2	1	0	0	4	2	1	1②	18	3	15.5	30	7.8	7.8
Tech'n																

(# dead:# missing) - A(1:3) B(3:3) C(1:2) D(1:3) E(0:2)

① Mouth (resubmerged) ② dead ③ 21 EVS amphipods found ④ double seeded

00544

Control duplicate

EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-12
Temperature Hg Thermometer

Client: N.D.A.A.
EVS Project No.: 9/619-02.4
EVS W.O. No.: 940225
Day 0: May 31, 1994
Day 10: June 10, 1994
Test Species: R. abronius
Source/Collection Date: May 25, 1994
West Beach, Whidbey Island WA

SAMPLE I.D. DAC-H4-20T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	1	0	0	0	2	2	KW 18	0	15.5	30	7.6	7.9
B	0	0	0	0	0	0	2	2	2	4	KW 2019	0	15.5	30	7.8	8.0
C	0	1	0	0	0	0	1	2	3	2	14	2	15.5	29	7.9	7.9
D	0	0	1	0	0	2	2	2	1	1	17	0	15.5	30	7.6	7.8
E	0	0	0	1	0	0	0	0	0	0	16	1 KW	15.5	30	7.9	8.0
Tech'n	MM	PJ	PJ	MM	MM	MM	MM	PJ	PJ	PJ	KLV	KLV	PJ	PJ	PJ	PJ

(# dead:# missing) - A(0:1) B(0:0) C(0:0) D(1:2) E(2:2)

SAMPLE I.D. DAC-H4-17T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. °(°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	1	0	1	0	0	0	1	1	1	0	15	0	15.5	29	7.8	7.9
B	0	1	0	0	0	0	0	1	0	0	16	1	15.5	29	7.8	7.9
C	0	0	0	0	0	0	0	0	0	1	18	2	15.5	30	7.6	7.9
D	0	0	0	0	0	0	0	0	0	0	18	3	15.5	29	8.0	7.9
E	0	0	1	0	0	0	0	0	0	0	17	3	15.5	29	7.8	7.9
Tech'n	MM	PJ	PJ	MM	MM	MM	MM	PJ	PJ	PJ	KLV	KLV	PJ	PJ	PJ	PJ

(# dead:# missing) - A(2:0 KW 3) B(2:2) C(2:0) D(2:0) E(1:2)

SAMPLE I.D. _____

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A																
B																
C																
D																
E																
Tech'n																

(# dead:# missing) - A(:) B(:) C(:) D(:) E(:)

Monitor.

00545

EVS CONSULTANTS
ACUTE TOXICITY TEST DATA

#1 Page No. 8/9

SAMPLE ID: Cadmium Cl. (Coletz Lettox) lot #94-009
DATE COLLECTED (Hold. ch.): April 26, 1994.
TEST DATE/TIME: May 31, 1994
NO. ORGANISMS/VOLUME: 10 / 1L

PROJECT NAME: NOAA
EVS PROJECT NO.: 91618-02.4
WORK ORDER NO.: 940225
TEST SPECIES: Rhepoxinius abronius
SOURCE & BATCH: Whidbey Island May 25/94 West Beach, WA

CONC'N (mg/L) Cd	PERCENT SURVIVAL (1 to 96 hours) 1	2	4	24	48	72	96	DISSOLVED OXYGEN (mg/L) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	pH 0	24	48	72	96	SALINITY (ppt) 0	96
3.2	100			100	100	70	0	8.2	8.2	8.6	8.3	7.6	17	15.5	15.5	15.5	15.5	7.8	7.8	8.0 (~~7.8~~)	8.0	7.7	27	28
1.8	100			100	100	90①	10	8.2	8.2	8.7	8.3	7.6	17	15.5	15.5	15.5	15.5	7.8	7.8	7.9	7.9	7.7	27	28
1.0	100			100	80	60	60	8.2	8.6	8.6	8.3	7.6	17	15.5	15.5	15.5	15.5	7.8	7.9	7.9	7.8	7.8	27	28
0.56	100			100	100	100②	70	8.2	8.2	8.6	8.2	7.6	17	15.5	15.5	15.5	15.5	7.8	7.9	7.8	7.9	7.7	27	27
0.32	100			100	100	100	90	8.2	8.2	8.6	8.2	7.8	17	15.5	15.5	15.5	15.5	7.8	7.8	7.9	7.9	7.7	26	28
0.18	100			100	100	100	90	8.2	8.1	9.0	9.2	7.6	17	15.5	15.5	15.5	15.5	7.8	7.9	7.9	7.8	7.6	27	29
0.10	100			100	100	100	90	8.0	8.1	8.7	8.0	7.5	17	15.5	15.5	15.5	15.5	7.8	7.9	7.9	7.8	7.7	27	28
Control	100			100	100	100	90	8.2	8.0	8.6	8.2	7.5	16	15.5	15.5	15.5	15.5	7.8	7.8	7.8	7.9	7.6	27 (~~28~~)	28
Technician	MM.			MM.	B	RJ/CS	CS/A	B	MM.	B	RJ/CS	EJT/LS	B	MM	B	RJ/CS	EJT/LS	B	MM	B	RJ/CS	EJT/LS	B	BK

SAMPLE DESCRIPTION

COMMENTS: Cd Cl₂ stock solution at 1000 mg/L
① on floater

TEST SET UP BY: MM, B

DATA VERIFIED BY: Judith Crane

DATE VERIFIED: August 12, 1994

EVS ENVIRONMENT CONSULTANTS

00546

LC50:STEPHEN IBM/AT VERS 1.0

FILE: 9/618-02.4 940225 NOAA-Setup #1

TEST: Reference Toxicant
SPECIES: Rhepoxynius abronius
CHEMICAL: Cadmium
CARRIER: Seawater

DATE: May 31, 1994
DURATION: 96 hr
CARRIER CONC: 30 ppt

Sample: Reference Toxicant

Conc	Number exposed	Number dead	Percent dead	Binomial prob(percent)
3.20	10	10	100.0	0.0977
1.80	10	9	90.0	1.0742
1.00	10	4	40.0	37.6953
0.56	10	3	30.0	17.1875
0.32	10	1	10.0	1.0742
0.18	10	1	10.0	1.0742
0.10	10	1	10.0	1.0742

The binom test shows that 0.320 and 1.800 can be used as statistically sound at 95 conf since the actual conf level associated with these limits is 97.852

An approx LC50 is 1.113 mg/L Cd

------RESULTS USING THE MOVING AVERAGE METHOD----------

span	g	lc50	95% conf limits	
5	0.083877	0.828	0.593	1.240
4	0.167754	0.879	0.604	1.212
3	0.269420	0.914	0.648	1.486
2	0.509802	0.982	0.574	1.612
1	0.720682	1.113	0.329	1.438

Probit warning:no convergence in 25 iterations

00547

certified JLC
Aug 12, 1994

E.V.S. CONSULTANTS - AMPHIPOD SEDIMENT BIOASSAYS
DAILY WATER QUALITY CHEMISTRY MONITORING

Water Quality Instruments Used

D.O. Meter II-A-19.
pH Meter II-A-26.
Salinity II-C-12.
Temperature Hg. Thermometer

Client: N.O.A.A. Setup # (1)
EVS Project No.: 9/618-02.4
EVS W.O. No.: 940225
Day 0: May 31, 1994
Day 10: June 10, 1994
Test Species: R. abronius.
Source and Collection Date: May 25 1994 Whidbey Island, West Beach, WA.

SAMPLE I.D.	TEMPERATURE (C)											SALINITY (ppt)											DISSOLVED OXYGEN (mg/L)											pH										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
Control	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	16	27	27	27	27	28	28	27	27	28	27	27	8.3	8.3	8.2	8.2	7.8	8.1	8.2	7.8	8.2	8.0		7.8	7.7	7.9	7.6	7.7	7.7	7.8	7.7	7.9	7.7
DAC-HY-13T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	16	27	28	27	28	28	28	28	29	29	28	29	8.4	8.0	8.4	8.2	7.7	8.1	8.1	8.0	7.7	8.1	8.0	7.8	7.8	7.8	7.9	7.7	7.7	7.6	7.9	7.8	7.9	8.0
DAC-HY-16T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	16	28	28	28	29	28	29	29	29	29	28	28	8.1	8.1	8.4	8.1	7.5	7.6	8.2	7.6	7.5	8.0	8.2	7.8	7.8	7.8	7.9	7.7	8.0	8.2	8.1	8.2	8.2	8.2
DAC-HY-21T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	16	28	28	27	28	29	28	28	30	29	29	29	8.0	8.9	8.2	8.0	7.5	8.0	8.4	7.7	7.6	8.0	8.1	7.8	7.8	7.8	7.9	7.7	8.0	8.2	8.1	8.3	8.3	8.3
DAC-HY-24T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	16	27	28	27	28	29	28	28	30	28	29	29	8.0	9.0	8.1	8.0	7.6	7.7	8.5	7.9	7.8	8.1	7.8	7.8	7.8	7.8	7.9	7.7	8.0	8.1	8.2	8.3	8.3	8.3
DAC-HY-19T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	16	28	29	27	28	29	29	29	30	29	28	29	8.4	8.0	8.4	8.2	7.6	8.1	8.6	7.9	7.8	8.1	7.8	7.8	7.8	7.8	8.0	7.7	8.3	8.1	8.3	8.2	8.3	8.0
DAC-HY-14T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	16	28	28	27	29	29	28	29	30	29	28	30	8.2	8.1	8.2	8.2	7.6	8.1	8.1	7.9	7.9	8.2	8.0	7.8	7.9	7.7	8.0	7.8	7.9	7.9	7.9	8.0	8.0	8.0
DAC-HY-18T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	16	28	28	28	28	29	29	29	30	29	28	29	8.2	8.0	8.4	8.3	7.5	7.7	8.8	8.0	7.6	8.2	7.8	7.8	7.9	7.7	8.0	7.8	7.9	7.9	7.7	7.8	7.9	7.9
DAC-HY-15T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	15.5	29	29	27	29	29	28	30	32	30	29	29	8.4	9.3	8.4	8.4	7.6	8.0	8.8	8.0	7.5	8.1	8.0	7.8	7.9	7.9	7.9	7.7	8.0	8.3	7.8	8.0	8.2	8.1
DAC-HY-22T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	15.5	29	29	27	28	29	29	29	29	28	29	29	7.4	8.0	8.5	8.2	7.6	8.1	8.3	7.9	7.7	8.1	7.9	7.8	7.9	7.9	7.9	7.6	7.9	7.9	7.9	8.0	8.1	8.1
Technician	RM																																											

Comments/Adjustments Made: (1) II-C-11 refractometer used.

All entries are to be made with black, ball-point pen. Cross out errors with a single line and initial and date corrections. Do not use "White-Out".

E.V.S. CONSULTANTS - AMPHIPOD SEDIMENT BIOASSAYS
DAILY WATER QUALITY CHEMISTRY MONITORING

Client: NOAA
EVS Project No.: 9/618-024
EVS W.O. No.: 990225
Day 0: May 31, 1994
Day 10: June 10, 1994
Test Species: R. abronius
Source and Collection Date: May 25, 1994 West Beach, Whidbey Island WA.

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-12
Temperature Hg. Thermometer

SAMPLE I.D.	TEMPERATURE (°C)											SALINITY (ppt)											DISSOLVED OXYGEN (mg/L)											pH										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
Control	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	16	28	28	27	28	29	28	29	29	29	30	29	8.3	8.2	8.5	8.3	7.7	8.1	8.9	7.8	8.0	8.4	8.2	7.8	7.9	7.9	7.9	7.7	7.7	7.8	7.8	7.9	7.9	7.8
DAC-HY-23T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	15.5	29	29	27	28	28	28	28	29	28	29	29	8.3	8.0	8.4	8.2	7.6	8.1	8.8	7.9	7.8	8.2	7.8	7.8	7.8	7.9	7.7	7.7	7.8	7.8	7.7	7.9	7.9	7.9
DAC-HY-20T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	15.5	28	28	27	29	29	28	29	30	28	29	29	8.2	8.2	8.5	8.3	7.7	8.1	8.8	7.9	7.8	8.1	7.8	7.8	7.9	7.9	7.7	8.0	7.9	7.8	7.9	7.8	8.0	8.0
DAC-HY-17T	15.5	15	15.5	15.5	15.5	16	15.5	15.5	15.5	15.5	15.5	28	28	27	29	29	28	29	29	29	29	30	8.2	8.2	8.4	8.2	7.6	8.0	8.8	7.9	7.8	8.3	8.1	7.9	7.9	8.0	7.9	7.7	7.9	7.9	7.8	7.8	7.9	7.9
Technician																																												

Comments/Adjustments Made: ① II-C-11 used refractometer used.

All entries are to be made with black, ball-point pen. Cross out errors with a single line and initial and date corrections. Do not use "White-Out".

July 14/94

00549

at the start of the test. Final worm weight for each replicate was determined by drying all survivors at 50°C for 24 hours and weighing to the nearest 0.1 mg.

QA/QC procedures for the juvenile polychaete bioassay include the use of a reference sediment, positive and negative controls, and daily measurement of water quality conditions (i.e., temperature, salinity, pH, dissolved oxygen) in each test chamber. Water quality measurements were made just prior to seawater placement. A performance standard of no more than 10 percent mortality in the control replicates was used to assess test acceptability. If the control standard is exceed (i.e., mortality greater than 10 percent for the controls) then the data will either be rejected, or, based on evaluation of other performance measures (e.g., positive control and reference sediment survival rates), the data may be qualified and accepted for analysis. In the present study, cadmium chloride was used as the reference toxicant and a sediment from West Beach, Whidbey Island, Washington, was used as the negative control. No performance criteria have been established for the growth endpoint for this test.

2.3 Echinoderm Larvae Bioassay

Stocks of mature, adult echinoderms were obtained from the EVS marine laboratory. Adult sand dollars were spawned in the laboratory by injecting 0.5M KCl into the coelomic cavity. Prior to spawning of the adults, five replicate test beakers were prepared for each sample. Twenty grams (20 g) of sediment were added to each beaker; clean seawater was added up to 1 liter to make a final concentration in all containers of 20 grams (wet weight) of sediment per liter of seawater. Sediments were suspended by vigorous shaking for 10 seconds then allowed to settle for four hours prior to adding the embryos. For each bioassay replicate, approximately 20,000 to 40,000 embryos were added to a 1-liter test chamber within 2 hours of fertilization. The embryo concentration at test initiation (T_0 hours) was confirmed by collecting replicate 10 ml samples from control cultures and preserving them in 5-percent buffered formalin. After a 48-hour incubation period, the water and larvae overlying the settled sediment in each beaker was decanted into a clean 1-liter beaker and the water mixed thoroughly. A 10-ml aliquot was removed from each sample and placed into a vial. The contents of vial were preserved in 5-percent buffered formalin. Preserved samples were examined for normal and abnormal larval development. Abnormal development is defined as failure to develop the echinopluteus stage. Percent survival for each replicate bioassay was based on the number of larvae surviving in each test container relative to the initial number; percent abnormal development for each replicate was based on the number of survivors that are abnormal.

QA/QC procedures for the echinoderm larval bioassay include the use of a reference sediment, positive and negative controls, and measurement of water quality conditions (i.e., temperature, salinity, pH, dissolved oxygen). Water quality measurements were made daily in the replicates prepared specifically for monitoring water quality. Ammonia-nitrogen was measured in a subsample of water from the water quality control beaker for each sediment sample and from the

1988 Triumph Street, Vancouver, B.C., Canada V5L 1K5
FAX: (604) 253-6700 TEL: (604) 253-4188

Rhepoxynius 9/618-02.4
W.O.# 940225

analytical
service
laboratories
ltd.

Setup #1 Day 0

CHEMICAL ANALYSIS REPORT

Date: June 8, 1994

ASL File No. D9740

Report On: 9/618.02.4 Water Analysis

Report To: **EVS Environment Consultants**
195 Pemberton Avenue
North Vancouver, BC
V7P 2R4

Attention: **Ms. Kathie Vilkas**

Received: June 1, 1994

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:

Heather A. Ross, B.Sc.
Project Chemist

Katherine Thomas, B.Sc.
Project Chemist

00553

Rhepoxynius 4/1618-02.4 — Setup #1 Day 0
W.O. # 940225

RESULTS OF ANALYSIS - Water

File No. D9740

		DAC-HY-13	DAC-HY-14	DAC-HY-15	DAC-HY-16	DAC-HY-17
Nutrients						
Ammonia Nitrogen	N	0.639	0.569	0.680	0.424	0.294
Inorganic Parameters						
Sulphide	S	0.06	<0.02	<0.02	<0.02	0.04

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00554

Khepokynus 4/1618-02.4 Setup 1 Day 0
W.O. # 940225

RESULTS OF ANALYSIS - Water

File No. D9740

		DAC-HY-18	DAC-HY-19	DAC-HY-20	DAC-HY-21	DAC-HY-22
Nutrients						
Ammonia Nitrogen	N	0.600	2.45	0.522	0.677	0.572
Inorganic Parameters						
Sulphide	S	0.05	<0.02	<0.02	<0.02	0.03

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00555

Khoronuptus 7/1018-02-T Setup #1 Day 0
W.O.# 940225

RESULTS OF ANALYSIS - Water

File No. D9740

		DAC-HY-23	DAC-HY-24	Control 1	Control 2
Nutrients					
Ammonia Nitrogen	N	0.583	0.654	0.499	0.506
Inorganic Parameters					
Sulphide	S	<0.02	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00556

Khazoryunias 9/6/18+02.4 Setup #1 Day 0
W.O. 940225

METHODOLOGY File No. D9741

Samples were analyzed by methods acceptable to the appropriate regulatory agency. Outlines of the methodologies utilized are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 18th Ed. published by the American Public Health Association, 1992. Further details are available on request.

End of Report

00557

1988 Triumph Street, Vancouver, B.C., Canada V5L 1K5

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FAX: (604) 253-6700 TEL: (604) 253-4188

Rhepoxynius 9/618-02.4 JUN 27 1994 Setup # 1 Day 10
D.F. # 940225

CHEMICAL ANALYSIS REPORT

Date: June 20, 1994

ASL File No. E1114

Report On: 9/618-02.4 Water Analysis

Report To: **EVS Environment Consultants**
195 Pemberton Avenue
North Vancouver, BC
V7P 2R4

Attention: **Ms. Kathie Vilkas**

Received: June 10, 1994

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:

Heather A. Ross, B.Sc.
Project Chemist

Katherine Thomas, B.Sc.
Project Chemist

00558

Rhepoxynius 9/618-02.4 Setup #1 Day 10
W.O.# 940225

REMARKS

File No. E1114

As indicated on the sample submission form, these samples are identified as "Day 10, Teardown (June 10, 1994), Rhipox #1".

00559

Rheoxynius 71018-02-T
W.O.# 940225

Setup # 1 Day 10

RESULTS OF ANALYSIS - Water

File No. E1114

		DAC-HY-13 R	DAC-HY-14 R	DAC-HY-15 R	DAC-HY-16 R	DAC-HY-17 R
		94 06 10	94 06 10	94 06 10	94 06 10	94 06 10
Nutrients						
Ammonia Nitrogen	N	0.12	0.19	0.07	0.13	0.41
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	<0.02

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

06560

Rheopectinus 9/618-024
W.O.# 940225

Setup #1 Day 10

RESULTS OF ANALYSIS - Water

File No. E1114

		DAC-HY-18 R	DAC-HY-19 R	DAC-HY-20 R	DAC-HY-21 R	DAC-HY-22 R
		94 06 10	94 06 10	94 06 10	94 06 10	94 06 10
Nutrients						
Ammonia Nitrogen	N	0.33	1.34	0.80	2.05	1.23
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	0.03

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00561

Rhepoxynius 9/18-024
W.O. # 940225

Setup # 1 Day 10

RESULTS OF ANALYSIS - Water

File No. E1114

		DAC-HY-23 R 94 06 10	DAC-HY-24 R 94 06 10	Control 1 R 94 06 10	Control 2 R 94 06 10
Nutrients					
Ammonia Nitrogen	N	0.79	1.06	1.62	1.53
Inorganic Parameters					
Sulphide S		<0.02	<0.02	<0.02	<0.02

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00562

Rhepoxynius 9/618-024
W.O. # 940225

Setup # 1 Day 10

METHODOLOGY

File No. E1114

Samples were analyzed by methods acceptable to the appropriate regulatory agency. Outlines of the methodologies utilized are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 18th Ed. published by the American Public Health Association, 1992. Further details are available on request.

End of Report

00563

EVS CONSULTANTS

Amphipod Survival and Emergence Data

Client:	NOAA – Setup #2	**Test Species:**	*Rhepoxynius abronius*
Project #:	9/618–02.4	**Date Initiated:**	June 3, 1994
Work Order:	940225	**Date Terminated:**	June 13, 1994
Test Type:	10–d static marine sediment		
		Number of Test Organisms:	20

Sample ID	Rep	No. Survivors	No. Emerged Days 1–10	No. Failing to Reburrow	Mean Survival (%)	Mean Emergence (#/jar/day)	Reburial (%)
Control 1	A	19	9	1	96.0	0.5	99
	B	20	1	0			
	C	18	7	0			
	D	19	8	0			
	E	20	1	0			
DAC–HY–4T	A	17	8	0	79.0	1.2	97
	B	16	13	0			
	C	15	12	1			
	D	15	14	1			
	E	16	13	0			
DAC–HY–6T	A	18	4	0	87.0	0.8	95
	B	17	12	2			
	C	16	13	1			
	D	18	6	1			
	E	18	4	0			
DAC–HY–7T	A	20	7	2	93.8	0.9	92
	B	20	13	2			
	C[1]	–	–	–			
	D	17	7	1			
	E	18	10	1			
DAC–HY–9T	A	16	17	2	84.0	1.1	94
	B	19	9	0			
	C	16	5	0			
	D	16	15	2			
	E	17	7	1			

1. This replicate (DAC–HY–7T–C) was tipped over on Day 5 of testing and has therefore been removed from statistical analysis.

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00564

for data entry only

Certified

EVS CONSULTANTS

Amphipod Survival and Emergence Data

Client:	NOAA – Setup #2	**Test Species:**	*nius*
Project #:	9/618–02.4	**Date Initiate**	
Work Order:	940225	**Date Termir**	
Test Type:	10–d static marine sediment		
		Number of	0

Sample ID	Rep	No. Survivors	No. Emerged Days 1–10	No. Failing to Reburrow	Mean Survival (%)	Mean Emergence (#/jar/day)	Reburial (%)
DAC–HY–10T	A	10	14	0	56.0	0.7	98
	B	12	3	0			
	C	12	2	0			
	D	9	8	0			
	E	13	6	1			
DAC–HY–12T	A	13	12	1	77.0	1.4	97
	B	17	16	1			
	C	15	14	0			
	D	14	16	0			
	E	18	14	0			
DAC–HY–26T	A	15	11	2	81.0	1.5	85
	B	17	13	4			
	C	16	20	2			
	D	19	20	2			
	E	14	10	2			
DAC–HY–27T	A	19	12	3	86.0	1.7	88
	B	15	14	1			
	C	16	37	4			
	D	18	18	1			
	E	18	3	1			
DAC–HY–28T	A	13	6	0	72.0	1.3	92
	B	12	16	1			
	C	19	13	4			
	D	16	18	1			
	E	12	10	0			

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00565 CA data entry only

Certified JLC
Nov 17, 1994

EVS CONSULTANTS

Amphipod Survival and Emergence Data

Client:	NOAA – Setup #2	Test Species:	*Rhepoxynius abronius*
Project #:	9/618–02.4	Date Initiated:	June 3, 1994
Work Order:	940225	Date Terminated:	June 13, 1994
Test Type:	10–d static marine sediment	Number of Test Organisms:	20

Sample ID	Rep	No. Survivors	No. Emerged Days 1–10	No. Failing to Reburrow	Mean Survival (%)	Mean Emergence (#/jar/day)	Reburial (%)
Control 2	A	17	8	1	93.0	0.6	98
	B	18	9	0			
	C	20	3	0			
	D	18	7	0			
	E	20	1	1			
DAC–HY–1T	A	15	7	1	77.0	0.6	96
	B	15	5	2			
	C	15	7	0			
	D	18	4	1			
	E	14	1	1			
DAC–HY–2T	A	17	9	0	88.0	0.6	91
	B	18	4	0			
	C	16	14	2			
	D	19	5	4			
	E	18	0	2			
DAC–HY–3T	A	17	2	1	86.0	0.3	97
	B	16	1	0			
	C	16	5	1			
	D	18	4	0			
	E	19	2	1			
DAC–HY–5T	A	16	1	0	77.0	0.6	97
	B	15	6	1			
	C	14	5	1			
	D	14	13	0			
	E	18	4	0			

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00566

certified for data entry
Dec 17, 1994

EVS CONSULTANTS

Amphipod Survival and Emergence Data

Client: NOAA – Setup #2
Project #: 9/618–02.4
Work Order: 940225
Test Type: 10–d static marine sediment

Test Species: *Rhepoxynius abronius*
Date Initiated: June 3, 1994
Date Terminated: June 13, 1994

Number of Test Organisms: 20

Sample ID	Rep	No. Survivors	No. Emerged Days 1–10	No. Failing to Reburrow	Mean Survival (%)	Mean Emergence (#/jar/day)	Reburial (%)
DAC–HY–8T	A	15	17	1	74.0	0.8	96
	B	15	1	1			
	C	16	3	0			
	D	14	12	1			
	E	14	5	0			
DAC–HY–11T	A	19	1	0	86.0	0.3	100
	B	17	2	0			
	C	13	6	0			
	D	19	2	0			
	E	18	3	0			
DAC–HY–25T	A	16	6	0	87.0	0.9	97
	B	18	5	0			
	C	18	17	1			
	D	18	6	2			
	E	17	13	0			
DAC–CR–2T	A	18	7	1	85.0	0.5	100
	B	20	0	0			
	C[2]	17	5	0			
	D	17	10	0			
	E[3]	14	5	0			
DAC–CR–2AT	A[3]	2	1	0	72.5	0.6	96
	B[3]	17	15	2			
	C[3]	17	8	0			
	D[4]	34	3	1			
	E	17	3	0			

2. This replicate (DAC–CR–2T–C) had a small crab in it.
3. These replicates (DAC–CR–2T–E and DAC–CR–2AT–A,B,C) had several small starfish found in them.
4. This replicate (DAC–CR–2AT–D) appears to have been misseeded with 40 amphipods.
Calculations for this sample (DAC–CR–2AT) have been based on 120 total amphipods.

00567

certified for data entry 17 JUN 94

EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-11
Temperature Hg Thermometer

Client: N.O.A.A. set up #2
EVS Project No.: 9/618-02.4
EVS W.O. No.: 9#0225
Day 0: June 3, 1994
Day 10: June 13, 1994
Test Species: R. abronius
Source/Collection Date: May 29 1994
West Beach, Whidbey Island, WA

SAMPLE I.D. Control 1

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	1	1	0	1	1	1	1	1	2	19	1	15.5	29	8.2	7.8
B	0	0	0	1	0	0	0	0	0	0	20	0	15.5	28	8.0	7.7
C	0	0	0	0	0	0	1	2	2	2	18	0	15.5	29	8.6	7.9
D	0	1	1	0	1	1	1	1	1	1	19	0	15.5	29	8.3	7.9
E	0	0	0	1	0	0	0	0	0	0	20	0	15.5	29	8.4	7.9
Tech'n																

(# dead:# missing) - A(0:1) B(0:0) C(2:0) D(1:0) E(0:0)

SAMPLE I.D. DAC-HY-9T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	1	2	1	0	3	2	2	4	2	16	2	15.5	30	7.4	8.2
B	0	0	1	0	0	2	1	2	1	2	19	0	15.5	31	7.6	8.3
C	0	0	0	0	1	1	0	1	2	0	16	0	15.5	30	7.9	8.0
D	0	0	1	0	2	2	3	1	2	4	16	2	15.5	30	8.0	8.0
E	0	0	2	1	0	1	0	0	0	3	17	1	15.5	31	7.5	8.1
Tech'n																

(# dead:# missing) - A(0:4) B(0:1) C(0:4) D(1:3) E(0:3)

SAMPLE I.D. DAC-HY-7T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	0	2	1	2	1	1	20	2	15.5	30	7.8	8.0
B	0	0	1	2	0	1	1	3	4	1	20	2	15.5	31	8.0	8.0
C	0	1	6	5	X											
D	0	0	1	1	0	1	1	0	1	2	17	1	15.5	31	8.1	8.0
E	0	1	2	0	0	1	1	1	1	3	18	1	15.5	31	8.0	8.0
Tech'n																

(# dead:# missing) - A(0:0) B(0:0) C(1:2) D(1:2) E(0:2)

(1) C. Rep C aborted (tipped over), omitted from Statistical analysis.

EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-11
Temperature Hg Thermometer

Client: N.O.A.A. setup #2
EVS Project No.: 9/618-02.4
EVS W.O. No.: 940225
Day 0: June 3, 1994
Day 10: June 13, 1994
Test Species: R. abronius
Source/Collection Date: May 27, 1994
West Beach, Whidbey Island WA.

SAMPLE I.D. OAC-HY-12T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	1	1	2	3	2	0	0	1	2	0	13	1	15.5	30	7.9	7.7
B	0	0	1	2	4	1	1	1	2	4	17	1	15.5	32	7.8	7.8
C	0	2	1	2	4	0	0	0	4	1	15	0	15.5	31	7.8	7.8
D	0	1	2	1	3	2	1	0	4	2	14	0	15.5	31	8.2	7.9
E	0	0	3	1	1	1	3	0	1	4	18	0	15.5	32	7.9	7.7
Tech'n	MN	SDT	RCF KLV	MN	MN	MN	MN	MN	MN	DK SM	KLV	KLV	MN	DK	DK/SM	DK/SM

(# dead:# missing) - A(0:7) B(3:0) C(2:3) D(3:3) E(2:0)

SAMPLE I.D. OAC-HY-26T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	2	0	1	1	1	0	4	2	15	2	15.5	32	8.4	8.1
B	0	0	1	0	2	2	2	1	3	2	17	4	15.5	32	8.2	8.1
C	0	0	1	0	2	0	3	2	12	0	16	2	15.5	31	8.3	7.9
D	2	0	3	1	1	2	1	2	6	2	19	2	15.5	32	8.2	8.1
E	0	0	0	0	1	1	1	1	4	2	14	2	15.5	31	8.1	8.0
Tech'n	MN	SDT	RCF KLV	MN	MN	MN	MN	MN	MN	DK SM	KLV	KLV	MN	DK	DK/SM	DK/SM

(# dead:# missing) - A(1:4) B(0:3) C(0:4) D(0:1) E(0:6)

SAMPLE I.D. OAC-HY-4T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	1	1	2	3	1	0	17	0	15.5	31	8.4	8.0
B	0	0	2	0	1	1	2	1	0	6	16	0	15.5	30	8.1	7.9
C	0	1	1	1	2	1	2	2	2	0	15	1	15.5	31	8.2	7.9
D	0	0	2	1	0	1	0	1	6	3	15	1	15.5	31	8.2	8.0
E	0	0	2	0	0	3	1	0	3	4	16	0	15.5	31	8.3	8.0
Tech'n	MN	SDT	RCF KLV	MN	MN	MN	MN	MN	MN	DK SM	KLV	KLV	MN	DK	DK/SM	DK/SM

(# dead:# missing) - A(3:0) B(2:2) C(3:2) D(2:3) E(4:0)

00569

EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-20
Salinity II-C-11
Temperature Hg Thermometer

Client: N.O.A.A. Std. 4/12
EVS Project No.: 9/618-02.4
EVS W.O. No.: 940225
Day 0: June 3, 1994
Day 10: June 13, 1994
Test Species: R. abronius
Source/Collection Date: May 29, 1994
West Beach, Whidbey Island, Wa

SAMPLE I.D. OAC-HY-10T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	2	3	0	0	2	1	4	2	10	0	15.5	30	8.4	8.3
B	0	0	2	1	0	0	0	0	0	0	12	0	15.5	32	8.4	8.3
C	0	0	2	0	0	0	0	0	0	0	12	0	15.5	30	8.3	8.4
D	0	0	2	2	0	2	0	1	1	0	9	0	15.5	31	8.5	8.2
E	0	0	0	0	0	1	0	0	2	3	13	1	15.5	32	8.4	8.5
Tech'n	JM	DK	CKP	JM	JM	PZ	JM	JM	JM	DK/JM	KLV	KLV	15.5 JM	DK	DK/JM	DK/JM

(# dead:# missing) - A(3:7) B(8:8) C(6:2) D(3:8) E(1:6)

SAMPLE I.D. OAC-HY-28T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	1	0	1	1	0	2	1	13	0	15.5	31	8.1	8.3
B	0	0	1	0	0	2	3	4	4	2	12	1	15.5	29	8.2	8.1
C	0	0	1	0	2	1	1	1	5	2	19	4	15.5	30	8.4	7.9
D	0	0	2	0	2	4	2	1	4	3	16	1	15.5	29	7.6	7.9
E	0	0	0	0	2	1	2	1	3	1	12	0	15.5	29	8.0	8.1
Tech'n	JM	CKP	CKP	JM	JM	PZ	JM	JM	JM	JM	PZ	PZ	JM	DK	DK/JM	DK/JM

(# dead:# missing) - A(2:5) B(3:5) C(0:1) D(1:3) E(1:7)

SAMPLE I.D. OAC-HY-27T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	1	0	0	0	0	1	1	0	7	2	19	3	15.5	31	8.2	7.9
B	0	0	2	1	0	3	2	3	2	1	15	1	15.5	31	8.4	7.9
C	2	1	8	9	7	2	0	2	6	0	16	4	15.5	30	8.4	7.9
D	2	1	2	1	0	3	2	3	3	1	18	1	15.5	31	8.3	7.8
E	1	0	0	0	0	0	0	1	1	0	18	1	15.5	32	8.3	7.8
Tech'n	JM	CKP	CKP	JM	JM	PZ	JM	JM	JM	JM	CKP	CKP	JM	DK	DK/JM	DK/JM

(# dead:# missing) - A(1:0) B(3:2) C(1:3) D(2:0) E(2:0)

CKP July 14, 1994

EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter H-A-19
pH Meter H-A-26
Salinity H-C-11
Temperature Hg Thermometer

Client: N.O.A.A. setup #2
EVS Project No.: 9/618-02.4
EVS W.O. No.: 940225
Day 0: June 3, 1994
Day 10: June 13, 1994
Test Species: R. abronius
Source/Collection Date: May 29, 1994
West Beach, Whidbey Island, WA

SAMPLE I.D. DAC-HY-6T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	1	0	0	0	2	1	0	0	18	0	15.5	31	8.6	8.1
B	0	0	1	0	2	0	3	2	3	1	17	2	15.5	31	8.0	8.0
C	2	1	2	1	2	2	0	1	2	1	16	1	15.5	31	8.2	8.0
D	0	0	0	1	2	2	1	0	0	0	18	1	15.5	30	8.2	8.0
E	0	0	0	1	0	1	0	0	0	2	18	0	15.5	30	8.6	8.0
Tech'n	MH	RK	CSB	MH	MH	MH	MH	MH	MH	MH	KLV	KLV	MH	RK	MH	MH

(# dead:# missing) - A(1:1) B(0:3) C(0:4) D(2:0) E(2:0)

SAMPLE I.D. Control 2

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	1	1	1	1	1	0	0	0	1	2	17	1	15.5	29	8.2	7.8
B	0	0	0	0	1	1	2	1	2	2	18	0	15.5	29	8.4	8.0
C	0	0	0	1	1	0	1	0	0	0	20	0	15.5	30	8.0	7.9
D	0	0	3	2	2	0	0	0	0	0	18	0	15.5	30	8.4	7.9
E	0	1	0	0	0	0	0	0	0	0	20	1	15.5	30	8.5	7.9
Tech'n	MH	RK	CSB	MH	MH	MH	MH	MH	MH	MH	KLV	KLV	MH	RK	MH	MH

(# dead:# missing) - A(3:0) B(2:0) C(0:0) D(1:1) E(0:0)

SAMPLE I.D. DAC-HY-25T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	2	0	1	0	2	1	16	0	15.5	30	7.6	8.2
B	0	1	0	0	0	0	0	0	4	0	18	0	15.5	30	8.2	8.1
C	1	1	0	0	1	1	4	4	2	1	18	1	15.5	29	7.4	7.9
D	0	0	0	0	0	0	1	0	3	2	18	2	15.5	31	7.8	8.2
E	1	0	2	1	1	0	2	1	3	2	17	0	15.5	30	8.0	8.0
Tech'n	MH	RK	CSB	MH	MH	MH	MH	MH	MH	MH	RJ	RJ	MH	MH	RK	MH

(# dead:# missing) - A(0:4) B(0:2) C(1:1) D(0:2) E(1:2)

EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-11
Temperature Hg Thermometer

Client: N.O.A.A. Set 4 of 2
EVS Project No.: 9/618-02.4
EVS W.O. No.: 940225
Day 0: June 3, 1994
Day 10: June 13, 1994
Test Species: R. abronius
Source/Collection Date: May 29, 1994
West Beach, Whidbey Island, WA

SAMPLE I.D. DAC-HY-11T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	1	0	0	0	0	0	0	0	19	Ø	15.5	31	8.5	8.0
B	0	0	1	0	0	0	1	0	0	0	17	Ø	15.5	30	7.7	8.0
C	2	0	0	0	0	1	1	1	1	0	13	Ø	15.5	30	8.4	8.0
D	0	0	0	0	1	0	0	0	1	0	19	Ø	15.5	31	7.4	8.0
E	0	0	0	0	2	1	0	0	0	0	18	Ø	15.5	31	7.5	8.0
Tech'n	MA	RM	KLV	gm	gm	gm	gm	gm	gm	gm	KLV	KLV	gm	DK/gm	DK/gm	DK/gm

(# dead:# missing) - A(1:Ø) B(3:Ø) C(5:2) D(1:Ø) E(2:Ø)

SAMPLE I.D. DAC-HY-8T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	3	2	2	2	2	0	1	2	2	1	15 ②	1	15.5	31	8.2	8.1
B	0	0	0	0	1	0	0	0	0	0	15	1	15.5	32	8.2	8.1
C	1	0	0	0	0	1	0	1	0	0	~~14~~	0	15.5	32	8.4	8.1
D	0	0	0	1	4	3	1	1	2	0	14	1	15.5	31	8.2	8.1
E	0	1	1	1	1	0	0	0	1	0	14	0	15.5	31	8.4	8.1
Tech'n	MA	RM	KLV	gm	gm	gm	gm	gm	gm	gm	gm	gm	gm	DK/gm	gm	gm

(# dead:# missing) - A(1:4) B(~~2~~ 3:3) C(4:~~0~~ 0) D(3:3) E(4:2)

SAMPLE I.D. DAC-HY-#5T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	1	0	0	0	0	0	0	0	16	0	15.5	32	8.5	8.0
B	0	0	0	0	0	0	0	0	6	0	15	1	15.5	30	8.3	8.0
C	3	0	0	0	0	0	0	0	1	1	14	1	15.5	31	8.2	7.9
D	0	0	1	~~2~~ 2	2	0	3	3	2	0	14	0	15.5	30	8.0	7.9
E	0	0	0	0	0	1	1	1	0	1	18	0	15.5	30	8.2	8.0
Tech'n	MA	RM	KLV	gm	gm	gm	gm	0	gm	gm	gm	gm	gm	DK/gm	gm	gm

(# dead:# missing) - A(2:2) B(1:4) C(0:6) D(0:6) E(0:2)

Debris

② many baby forms found.

00572

July 14/94

EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-24
Salinity II-C-11
Temperature Hg Thermometer

Client: N.O.A.A. Setup #2
EVS Project No.: 9/618-02.4
EVS W.O. No.: 940225
Day 0: June 3, 1994
Day 10: June 13, 1994
Test Species: R. abronius
Source/Collection Date: May 29, 1994
West Beach, Whidbey Island WA

SAMPLE I.D. OAC-HY-3T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	0	0	1	1	0	0	17	1	15.5	32	8.2	8.1
B	0	0	0	0	1	0	0	0	0	0	16	0	15.5	32	8.2	8.0
C	0	0	0	0	0	0	0	0	3	2	16	1	15.5	31	8.3	8.0
D	1	0	0	0	1	0	0	0	1	1	18	0	15.5	31	8.4	8.0
E	0	0	0	0	0	1	0	1	0	0	19	1	15.5	31	8.4	8.0
Tech'n																

(# dead:# missing) - A(0 : 2) B(0 : 4) C(2 : 2) D(1 : 1) E(1 : 0)

SAMPLE I.D. OAC-HY-2T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	1	2	1	1	1	1	1	17	0	15.5	30	8.4	8.2
B	0	0	0	0	1	1	0	1	0	1	18	0	15.5	31	8.4	7.9
C	0	1	4	2	4	0	0	0	3	0	16	2	15.5	31	8.3	8.0
D	0	1	0	1	1	0	0	0	0	2	19	4	15.5	31	8.4	8.0
E	0	0	0	0	0	0	0	0	0	0	17	2	15.5	31	8.3	7.9
Tech'n																

(# dead:# missing) - A(2 : 1) B(1 : 1) C(2 : 2) D(0 : 1) E(2 : 1)

SAMPLE I.D. OAC-HY-1T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	3	1	0	0	0	2	1	0	15	1	15.5	31	8.3	7.8
B	0	1	3	1	0	0	0	0	0	0	15	2	15.5	30	8.4	7.8
C	0	0	6	0	2	1	0	2	1	1	15	0	15.5	30	8.4	7.9
D	0	0	1	0	0	0	1	0	1	1	18	1	15.5	32	8.4	7.8
E	0	0	1	0	0	0	0	0	0	0	14	1	15.5	31	8.5	7.9
Tech'n																

(# dead:# missing) - A(1 : 4) B(3 : 2) C(1 : 4) D(1 : 1) E(2 : 4)

00573

July 14 94

EVS CONSULTANTS - AMPHIPOD SEDIMENT TOXICITY TESTS
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-11
Temperature Hg Thermometer

Client: N.O.A.A. 5x1 up #2
EVS Project No.: 9/618-02.4
EVS W.O. No.: 940225
Day 0: June 3, 1994
Day 10: June 13, 1994
Test Species: R. abronius
Source/Collection Date: May 27, 1994
West Beach, Whidbey Island WA

SAMPLE I.D. DAC-CR-2T

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	2	4	1	0	0	0	0	0	0	18	1	15.5	30	8.0	7.9
B	0	0	0	0	0	0	0	0	0	0	20	0	15.5	30	8.1	7.9
C	1	1	0	0	0	0	0	0	3	0	17①	0	15.5	31	7.8	8.0
D	0	3	3		0	0	0	1	0	1	17	0	15.5	31	8.4	8.0
E	0	2	2	1	0	0	0	0	0	0	14②	0	15.5	32	8.4	7.9
Tech'n																

(# dead:# missing) - A(0:2) B(6:0) C(0:3) D(0:3) E(0:6)

SAMPLE I.D. DAC-CR-2AT

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A	0	0	0	0	1	0	0	0	0	0	2⑤	0	15.5	31	8.4	7.9
B	3	2	2	2	4		0	0	0	2	17④	2	15.5	31	8.4	7.9
C	0	0	1	0	1	1	1	2	1	1	17③	0	15.5	30	8.2	7.9
D	0	0	1	1	0	0	0	1	0	0	34⑤	1	15.5	31	8.4	7.9
E	0	0	0	0	2	0	0	0	0	1	17	0	15.5	31	8.4	7.9
Tech'n																

(# dead:# missing) - A(0:18) B(0:3) C(0:3) D(0:6) E(3:0)

SAMPLE I.D. _____

Rep.	Number of Amphipods Emerged From Sediments at Days 1-10										Number Alive at Day 10	Number Failing to Rebury	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	Sal. (ppt)	D.O. (mg/L)	pH
A																
B																
C																
D																
E																
Tech'n																

(# dead:# missing) - A(:) B(:) C(:) D(:) E(:)

① a little crab found
② three small starfish found
③ one small starfish found
④ double seeded

f:\..\forms\datash\amphipod.1

00574

7/11/94

E.V.S. CONSULTANTS - AMPHIPOD SEDIMENT BIOASSAYS
DAILY WATER QUALITY CHEMISTRY MONITORING

Page No. 1/1

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-11
Temperature Hg Thermometer

Client: N.O.A.A. Set 4 #2
EVS Project No.: 9/618-02.4
EVS W.O. No.: 940225
Day 0: June 3, 1994
Day 10: June 13, 1994
Test Species: R. abronius
Source and Collection Date: May 29, 1994
West Beach, Whidbey Island, WA

SAMPLE I.D.	TEMPERATURE (°C)											SALINITY (ppt)											DISSOLVED OXYGEN (mg/L)											pH										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
Control 1	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	29	30	29	31	30	29	29	29	30	28	8.3	7.6	8.2	8.3	7.8	8.0	8.2	8.1	8.2	8.1	8.4	7.8	7.5	7.7	7.6	7.7	7.7	7.8	7.6	7.8	7.7	7.9
OAC-HY-9T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	29	30	29	31	30	30	29	30	31	29	8.3	7.6	8.2	8.2	8.0	7.9	8.1	7.9	8.0	7.8	8.2	7.8	7.6	7.9	7.8	7.9	7.8	8.0	8.1	8.3	8.1	8.3
OAC-HY-7T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	30	30	29	30	31	30	30	30	31	31	8.3	7.6	8.2	8.2	7.4	8.0	8.0	7.9	8.4	7.6	7.8	7.8	7.9	7.8	7.7	7.8	7.9	8.1	7.9	8.1	7.9	8.1
OAC-HY-12T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	31	30	29	31	31	30	30	30	31	30	8.2	7.6	7.6	8.2	7.8	7.8	8.1	8.0	8.2	7.7	7.8	7.8	7.7	7.7	7.7	7.8	7.7	7.8	7.9	8.1	7.9	8.1
OAC-HY-26T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	31	30	29	31	31	30	30	30	31	31	8.3	7.6	8.2	8.2	7.8	7.8	8.1	8.0	8.3	8.0	8.1	7.8	7.6	7.8	7.7	7.7	7.7	7.8	8.0	7.8	7.9	8.2
OAC-HY-4T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	30	30	30	31	29	30	30	31	31	31	7.9	7.5	8.2	8.2	7.8	7.9	8.2	8.0	8.2	8.0	8.3	7.8	7.6	7.8	7.8	7.8	7.9	8.1	8.0	8.1	8.2	8.3
OAC-HY-10T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	30	30	30	31	30	31	32	30	31	30	8.2	7.5	7.7	8.3	8.0	8.0	8.1	8.0	8.1	8.2	8.4	8.0	7.8	8.0	7.9	7.9	8.1	8.0	8.2	8.2	8.3
OAC-HY-28T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	30	30	30	30	30	30	31	31	31	31	8.0	7.6	8.1	8.2	7.8	7.8	8.2	8.0	8.2	7.8	8.5	7.8	7.6	7.8	7.8	7.6	7.9	7.9	8.3	8.2	8.3
OAC-HY-27T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	30	30	30	30	30	30	30	30	31	31	8.0	7.7	8.1	8.2	7.8	7.8	8.2	8.0	8.2	7.8	8.5	7.8	7.6	7.7	7.8	7.7	7.7	7.9	7.9	8.1	8.0	8.1
OAC-HY-6T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	30	30	30	31	30	30	31	31	31	31	8.3	7.5	8.2	8.2	8.0	8.0	8.0	8.0	7.8	8.1	8.5	7.9	7.7	7.8	7.9	7.8	7.9	8.0	7.9	8.2	8.0	8.1
Technician																																												

Comments/Adjustments Made: ① Salinity meter used: II-C-12 ② All Samples measured at 15.5°C ③ Airline affected
④ used II-A-16 as (Oyster) pH meter since II-A-26 not working

All entries are to be made with black, ball-point pen. Cross out errors with a single line and initial and date corrections. Do not use "White-Out".

Cert 7/14/94

00575

DAILY WATER QUALITY CHEMISTRY MONITORING

Water Quality Instruments Used

D.O. Meter II-A-19
pH Meter II-A-26
Salinity II-C-11
Temperature Hg Thermometer

Client: N.O.A.A. Setup #2
EVS Project No.: 91618-02.4
EVS W.O. No.: 940225
Day 0: June 3, 1994
Day 10: June 13, 1994
Test Species: R. abronius
Source and Collection Date: May 29, 1994
West Beach, Whidbey Island, WA.

SAMPLE I.D.	TEMPERATURE (°C)											SALINITY (ppt)											DISSOLVED OXYGEN (mg/L)											pH										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
Control 2	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	31	30	31	30	30	31	29	30	31	29	8.2	7.5	8.-	8.4	7.6	8.0	8.0	8.1	8.2	8.1	8.4	7.8	7.7	7.7	7.8	7.6	7.7	7.8	7.9	7.8	7.8	8.0
OAC-HY-25T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	30	29	31	30	30	31	30	30	31	30	7.4	7.1	7.7	8.0	7.4	6.9	8.0	7.8	8.0	8.2	7.1	7.7	7.5	7.8	7.3	7.1	7.6	8.0	8.0	8.3	8.3	8.4
OAC-HY-11T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	31	31	30	31	31	31	31	30	31	31	30	8.2	7.4	8.-	8.2	8.0	7.8	8.1	8.2	8.2	8.2	8.2	7.8	7.9	7.9	7.8	7.8	7.8	7.9	8.-	8.0	8.0	8.0
OAC-HY-8T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	30	30	31	31	31	30	31	32	31	31	8.1	7.3	7.2	8.2	7.7	7.8	8.0	8.1	8.7	8.2	8.2	7.9	7.9	7.7	7.9	7.9	7.9	8.1	8.1	8.3	8.1	8.3
OAC-HY-5T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	29	30	31	30	31	30	31	31	31	31	8.2	7.6	8.-	8.3	7.7	7.8	8.2	8.2	8.2	8.1	8.2	7.9	7.9	7.7	7.9	7.8	7.8	8.0	7.9	8.0	7.9	8.0
OAC-HY-3T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	31	30	30	31	30	31	30	31	31	31	31	8.0	7.4	8.1	8.3	7.8	7.8	8.0	8.2	8.4	7.9	8.2	7.9	7.6	7.7	7.8	7.8	7.8	8.0	8.0	8.2	8.0	7.9
OAC-HY-2T	15.5	16	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	31	31	30	31	31	31	32	31	30	31	31	8.4	7.6	8.2	8.3	7.8	7.8	8.2	8.2	8.4	8.0	8.4	7.8	7.9	7.8	7.7	7.8	7.8	7.9	8.1	8.0	8.2	8.2
OAC-HY-1T	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	30	29	31	31	30	31	32	31	31	30	8.3	7.6	7.6	8.2	7.8	8.1	8.2	8.3	8.2	8.4	8.4	7.9	7.9	7.8	7.7	7.6	7.9	7.9	8.1	8.0	8.2	8.2
OAC-CR-2T	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	30	30	31	30	31	32	31	32	31	31	7.6	7.5	7.7	8.1	7.8	7.8	8.0	8.1	8.2	8.2	8.4	7.8	7.7	8.-	7.9	7.9	7.8	7.9	7.9	8.1	8.0	8.0
OAC-CR-2AT	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	30	31	30	31	32	32	31	32	32	31	31	8.4	7.6	7.7	8.2	8.0	7.7	8.1	8.2	8.3	7.9	8.4	7.9	7.7	7.9	7.8	7.6	7.8	7.9	8.0	7.9	8.9	8.0
																							8.3																					
Technician																																												

Comments/Adjustments Made: ① Salinity meter used: II-C-12 ② All Samples read at 15.5°C ③ possibly not aerating enough ④ used II-A-16 mg (owsw) pH meter since II-A-26 not working

All entries are to be made with black, ball-point pen. Cross out errors with a single line and initial and date corrections. Do not use "White-Out".

Copy July 14 94

SAMPLE I.D. Cadmium Ref tox

DATE ~~COLLECTED~~ April 26 - May 3/94 lot #: 94-C09

TEST DATE/TIME June 3/94

NO. ORGANISMS/VOLUME 10/1L

EVS CONSULTANTS
ACUTE TOXICITY TEST DATA

PROJECT NAME NOAA #2

EVS PROJECT NO. 9168-02.4

WORK ORDER NO. 940225

TEST SPECIES Rhepoxinius abronius

SOURCE & BATCH Whidbey Island, May 29/94 West Beach, WA

CONCN (mg/L) Cd.	PERCENT SURVIVAL (1 to 96 hours)							DISSOLVED OXYGEN (mg/L)					TEMPERATURE (°C)					pH					SALINITY (ppt)	
	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
3.2				100	100	10	0	8.2	7.5	7.8	8.9	8.0	16	15.5	15.5	15.5	15.5	7.7	7.7	7.8	7.8	7.8	29	30 29
1.8				100	100	90	10	8.2	7.7	8.0	8.8	8.0	16	15.5	15.6	15.5	15.5	7.8	7.7	7.9	7.8	7.8	29	31
1.0				100	100	100 90	Spill	8.2	7.9	8.0	9.0	8.0	16	15.5	15.5	15.5	15.5	7.7	7.6	7.9	7.9	7.8	29	31
0.56				100	100	100	80	8.2	7.6	7.9	9.0	7.8	16	15.5	15.5	15.5	15.5	7.7	7.7	7.8	7.8	7.8	29	31
0.32				100	100	90	90	8.2	7.7	7.9	9.0	7.8	16	15.5	15.5	15.5	15.5	7.7	7.7	7.8	7.9	7.8	29	30
0.18				100	100	100	90	8.2	7.7	8.0	9.0	8.0	16	15.5	15.5	15.5	15.5	7.7	7.7	7.9	7.8	7.8	29	30
0.10				100	100	100	90	8.2	7.4	7.9	8.8	8.0	16	15.5	15.5	15.5	15.5	7.7	7.7	7.8	7.8	7.8	29	30
Control				100	100	100	100	8.2	7.6	7.9	8.7	8.0	16	15.5	15.5	15.5	15.5	7.7	7.7	7.9	7.8	7.8	29	29
Technician				MM	SK	KLV	PLD	MM	EJT LS	ESS LS	CEB MM	PLD	MM	EJT LS	SK	MM	MM	MM	EJT LS	ESS LS	CEB	PLD	MM	PLD

SAMPLE DESCRIPTION * 100% survival, however 11 animals seeded

COMMENTS

TEST SET UP BY: CEB, MM

DATA VERIFIED BY: Judy Crane

DATE VERIFIED: Aug 12, 1994

EVS ENVIRONMENT CONSULTANTS

LC50:STEPHEN IBM/AT VERS 1.0

FILE: 9/618-02.4 940225 NOAA-Setup #2

TEST: Reference Toxicant
SPECIES: Rhepoxynius abronius
CHEMICAL: Cadmium
CARRIER: Seawater

DATE: June 3, 1994
DURATION: 96 hr
CARRIER CONC: 30 ppt

Sample: Reference Toxicant

Conc	Number exposed	Number dead	Percent dead	Binomial prob(percent)
3.20	10	10	100.0	0.0977
1.80	10	9	90.0	1.0742
1.00	11	5	45.5	50.0000
0.56	10	2	20.0	5.4687
0.32	10	1	10.0	1.0742
0.18	10	1	10.0	1.0742
0.10	10	1	10.0	1.0742

The binom test shows that 0.320 and 1.800 can be used as statistically sound at 95 conf since the actual conf level associated with these limits is 97.852

An approx LC50 is 1.056 mg/L Cd

------RESULTS USING THE MOVING AVERAGE METHOD----------

span	g	lc50	95% conf limits	
5	0.083877	0.857	0.615	1.287
4	0.167754	0.909	0.633	1.254
3	0.269420	0.952	0.682	1.574
2	0.370773	0.990	0.671	1.441
1	0.849440	1.056	0.062	1.389

Probit warning:no convergence in 25 iterations

00578

Certified QC
Nov. 12, 1994

1988 Triumph Street, Vancouver, B.C., Canada V5L 1K5

analytical
service
laboratories
ltd.

FAX: (604) 253-6700 TEL: (604) 253-4188

Rheokinus 9/618-02.4
D.O. # 940225

Setup II 2 Day 0

CHEMICAL ANALYSIS REPORT

Date: June 13, 1994

ASL File No. D9893

Report On: 9/618-02.4 Water Analysis

Report To: **EVS Environment Consultants**
195 Pemberton Avenue
North Vancouver, BC
V7P 2R4

Received: June 6, 1994

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:

Heather A. Ross, B.Sc.
Project Chemist

Katherine Thomas, B.Sc.
Project Chemist

00579

Rheoxymicus 9/618-02.4
W.O. # 940225

Setup #2 Day 0

RESULTS OF ANALYSIS - Water

File No. D9893

		DAC-HY-4T	DAC-HY-4TN	DAC-HY-5T	DAC-HY-5TN	DAC-HY-6T
		94 06 02	94 06 02	94 06 02	94 06 02	94 06 02
Nutrients						
Ammonia Nitrogen	N	0.690	0.860	0.930	0.840	0.580
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00500

Rheopoxynius 9/618-02.4 W.O.# 940225

Setup #2 Day 0

RESULTS OF ANALYSIS - Water

File No. D9893

		DAC-HY-6TN	DAC-HY-7T	DAC-HY-7TN	DAC-HY-8T	DAC-HY-8TN
		94 06 02	94 06 02	94 06 02	94 06 02	94 06 02
Nutrients						
Ammonia Nitrogen	N	0.570	0.560	0.670	0.670	0.680
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00581

Rhepoxynius 9/618-02.4 Setup #2 Day 0
W.O. # 940225

RESULTS OF ANALYSIS - Water

File No. D9893

		DAC-HY-9T	DAC-HY-9TN	DAC-HY-10T	DAC-HY-10TN	DAC-HY-11T
		94 06 02	94 06 02	94 06 02	94 06 02	94 06 02
Nutrients						
Ammonia Nitrogen	N	0.680	0.730	0.710	0.720	0.580
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00582

Rhepoxynius 9/618-02.4 W.O.# 940225

Setup #2 Day 0

RESULTS OF ANALYSIS - Water

File No. D9893

		DAC-HY-11TN	DAC-HY-12T	DAC-HY-12TN	DAC-HY-25T	DAC-HY-25TN
		94 06 02	94 06 02	94 06 02	94 06 02	94 06 02
Nutrients						
Ammonia Nitrogen	N	0.640	0.380	0.480	0.260	1.00
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00583

Rhepoxynius 9/618-02.4 Setup # 2 Day 0
W.O. # 940225

RESULTS OF ANALYSIS - Water

File No. D9893

		DAC-HY-26T	DAC-HY-26TN	DAC-HY-27T	DAC-HY-27TN	DAC-HY-28T
		94 06 02	94 06 02	94 06 02	94 06 02	94 06 02
Nutrients						
Ammonia Nitrogen	N	0.590	0.750	0.600	0.700	0.740
Inorganic Parameters						
Sulphide	S	<0.02	0.03	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00584

Rhepoxynius 9/618-024
W.O. # 940225

Setup #2 Day 0

RESULTS OF ANALYSIS - Water

File No. D9893

		DAC-HY-28TN	Control 1	Control 1N	Control 2	Control 2N
		94 06 02	94 06 02	94 06 02	94 06 02	94 06 02
Nutrients						
Ammonia Nitrogen	N	0.850	0.260	0.280	0.240	0.230
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00585

Chiegodynus 9/618-02.4 Setup #2 Day 0
D.O.F 940225

RESULTS OF ANALYSIS - Water

File No. D9893

		DAC-HY-3T	DAC-HY-3TN	DAC-HY-2T	DAC-HY-2TN	DAC-HY-1T
		94 06 02	94 06 02	94 06 02	94 06 02	94 06 02
Nutrients						
Ammonia Nitrogen	N	0.480	0.570	0.260	0.190	0.130
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00586

Rhepoxynius 9/618-02.4
W.O. # 940225

Setup #2 Day 0

RESULTS OF ANALYSIS - Water

File No. D9893

		DAC-HY-1TN	DAC-CR-2T	DAC-CR-2TN	DAC-CR-2AT	DAC-CR-2ATN
		94 06 02	94 06 02	94 06 02	94 06 02	94 06 02
Nutrients						
Ammonia Nitrogen	N	0.220	0.180	0.420	0.096	0.250
Inorganic Parameters						
Sulphide	S	<0.02	0.03	0.04	0.03	0.03

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00587

Dilepoxymius 9/6/8-02:4 Setup #2 Day 0
W.O. # 940225

METHODOLOGY

File No. D9893

Samples were analyzed by methods acceptable to the appropriate regulatory agency. Outlines of the methodologies utilized are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 18th Ed. published by the American Public Health Association, 1992. Further details are available on request.

End of Report

00588

1988 Triumph Street, Vancouver, B.C., Canada V5L 1K5

analytical service laboratories ltd.

FAX: (604) 253-6700 TEL: (604) 253-4188

Rhegozynuis 9/618-02.4
W.O. # 940225

Setup # 2 Day 10

JUN 27 199[illegible]

CHEMICAL ANALYSIS REPORT

Date:	June 20, 1994
ASL File No.	E1142
Report On:	9/618-02.4 Water Analysis
Report To:	**EVS Environment Consultants** 195 Pemberton Avenue North Vancouver, BC V7P 2R4
Attention:	**Ms. Kathie Vilkas**
Received:	June 13, 1994

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:

Heather A. Ross, B.Sc.
Project Chemist

Katherine Thomas, B.Sc.
Project Chemist

00589

Rhepoxynius 91018-02.4
WO# 940225

Setup #2 Day 10

REMARKS

File No. E1142

As indicated on the sample submission form, these samples are identified as "Day 10 Teardown (June 13, 1994), Rhipox".

00590

Rheobuynus 9/618-02.4
WO # 940225

Setup #2 Day 10

RESULTS OF ANALYSIS - Water

File No. H1142

		Control #1 R	DAC-HY-9T R	DAC-HY-7T R	DAC-HY-12T R	DAC-HY-26T R
		94 06 13	94 06 13	94 06 13	94 06 13	94 06 13
Nutrients						
Ammonia Nitrogen	N	1.62	1.19	1.48	0.91	1.96
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	<0.02

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00591

Khopoxynius 9/618-02.4 W.O.# 940225

Section 2 - Day 10

ASL

RESULTS OF ANALYSIS - Water

File No. E1142

		DAC-HY-4T R 94 06 13	DAC-HY-10T R 94 06 13	DAC-HY-28T R 94 06 13	DAC-HY-27T R 94 06 13	DAC-HY-6T R 94 06 13
Nutrients						
Ammonia Nitrogen	N	1.22	1.45	2.43	2.28	0.97
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	<0.02

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00592

Rheoxymus 9/618-02.4
W.O.# 940225

Detg 2nd 2 Day 10

ASL

RESULTS OF ANALYSIS - Water

File No. E1142

		DAC-HY-25T R	Control 2 R	DAC-HY-11T R	DAC-HY-8T R	DAC-HY-5T R
		94 06 13	94 06 13	94 06 13	94 06 13	94 06 13
Nutrients						
Ammonia Nitrogen	N	2.61	1.89	0.23	1.65	1.16
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	0.02	<0.02	<0.02

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00593

Rhepoxynius 9/618-02.4
WO. # 940225

Daty #2 Day 10

RESULTS OF ANALYSIS - Water

File No. E1142

		DAC-HY-2T R	DAC-HY-3T R	DAC-HY-1T R	DAC-CR-2T R	DAC-CR-2AT R
		94 06 13	94 06 13	94 06 13	94 06 13	94 06 13
Nutrients						
Ammonia Nitrogen	N	0.22	2.46	0.10	1.66	0.07
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	<0.02

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00594

Rhegozynuis 9/618-024
W.O.# 940225

Setup #2 Day 10

METHODOLOGY

File No. E1142

Samples were analyzed by methods acceptable to the appropriate regulatory agency. Outlines of the methodologies utilized are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 18th Ed. published by the American Public Health Association, 1992. Further details are available on request.

End of Report

00595

APPENDIX B
Juvenile Polychaete Bioassay
RAW DATA

EVS CONSULTANTS

Dry Weight Data

Client:	NOAA – Setup #1	**Test Species:**	*Neanthes arenaceodentata*
Project #:	9/618–02.4	**Date Initiated:**	May 31, 1994
Work Order:	940225	**Date Terminated:**	June 20, 1994
Test Type:	20–d sediment toxicity test		
		Number of Animals/rep:	5

Sample ID	Rep	Survivors	# of Animals Weighed	Pan Weight (g)	Final Weight (pan + biomass) (g)	Total Biomass (mg)	Individual Biomass (mg)	Mean Survival (%)	Mean Individual Biomass (mg)
Initial Dry Weight N–A	A	5	5	0.9890	0.9894	0.40	0.08	100.00	0.15
Initial Dry Weight N–B	B	5	5	0.9862	0.9868	0.60	0.12		
Initial Dry Weight N–C	C	5	5	0.9886	0.9899	1.30	0.26		

00597

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Certified – data entry only JLC Aug. 15, 1994

EVS CONSULTANTS

Dry Weight Data

Client:	NOAA – Setup #1	Test Species:	*Neanthes arenaceodentata*
Project #:	9618–02.4	Date Initiated:	May 31, 1994
Work Order:	940225	Date Terminated:	June 20, 1994
Test Type:	20–d sediment toxicity test		
		Number of Animals/rep:	5

Sample ID	Rep	Survivors	# of Animals Weighed	Pan Weight (g)	Final Weight (pan + biomass) (g)	Total Biomass (mg)	Individual Biomass (mg)	Mean Survival (%)	Mean Individual Biomass (mg)
Control 1	A	5	5	0.9980	1.0626	64.60	12.92	100.00	10.94
	B	5	5	0.9966	1.0490	52.40	10.48		
	C	5	5	0.9961	1.0503	54.20	10.84		
	D	5	5	0.9942	1.0568	62.60	12.52		
	E	5	5	0.9941	1.0338	39.70	7.94		
DAC–HY–14T	A	5	5	0.9874	1.0431	55.70	11.14	100.00	12.64
	B	5	5	0.9905	1.0495	59.00	11.80		
	C	5	5	0.9876	1.0575	69.90	13.98		
	D	5	5	0.9861	1.0493	63.20	12.64		
	E	5	5	0.9860	1.0542	68.20	13.64		
DAC–HY–15T	A	4	4	0.9888	1.0483	59.50	14.88	92.00	12.12
	B	4	4	0.9839	1.0307	46.80	11.70		
	C	5	5	0.9868	1.0338	47.00	9.40		
	D	5	5	0.9828	1.0566	73.80	14.76		
	E	5	5	0.9865	1.0358	49.30	9.86		
DAC–HY–17T	A	5	5	0.9937	1.0410	47.30	9.46	100.00	10.60
	B	5	5	0.9974	1.0493	51.90	10.38		
	C	5	5	0.9954	1.0514	56.00	11.20		
	D	5	5	0.9981	1.0518	53.70	10.74		
	E	5	5	1.0016	1.0578	56.20	11.24		
DAC–HY–19T	A	5	5	0.9942	1.0446	50.40	10.08	100.00	11.78
	B	5	5	0.9966	1.0634	66.80	13.36		
	C	5	5	0.9942	1.0607	66.50	13.30		
	D	5	5	0.9932	1.0511	57.90	11.58		
	E	5	5	0.9978	1.0508	53.00	10.60		

00598

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EVS CONSULTANTS

Dry Weight Data

Client:	NOAA – Setup #1	Test Species:	*Neanthes arenaceodentata*
Project #:	9618–02.4	Date Initiated:	May 31, 1994
Work Order:	940225	Date Terminated:	June 20, 1994
Test Type:	20–d sediment toxicity test		
		Number of Animals/rep:	5

Sample ID	Rep	Survivors	# of Animals Weighed	Pan Weight (g)	Final Weight (pan + biomass) (g)	Total Biomass (mg)	Individual Biomass (mg)	Mean Survival (%)	Mean Individual Biomass (mg)
DAC–HY–20T	A	5	5	0.9917	1.0341	42.40	8.48	100.00	10.62
	B	5	5	0.9848	1.0328	48.00	9.60		
	C	5	5	0.9932	1.0996	46.40	9.28		
	D	5	5	0.9921	1.0593	67.20	13.44		
	E	5	5	0.9970	1.0586	61.60	12.32		
DAC–HY–21T	A[1]	6	6	0.9986	1.0751	76.50	12.75	100.00	13.07
	B	5	5	0.9953	1.0567	61.40	12.28		
	C	5	5	0.9905	1.0568	66.30	13.26		
	D	5	5	0.9912	1.0638	72.60	14.52		
	E[2]	5	5	0.9898	1.0524	62.60	12.52		
DAC–HY–22T	A	5	5	0.9893	1.0185	29.20	5.84	96.00	10.89
	B	4	4	0.9903	1.0347	44.40	11.10		
	C	5	5	0.9875	1.0440	56.50	11.30		
	D	5	5	0.9878	1.0693	81.50	16.30		
	E	5	5	0.9878	1.0373	49.50	9.90		
DAC–HY–23T	A	5	5	0.9954	1.0588	63.40	12.68	100.00	11.49
	B	5	5	0.9940	1.0456	51.60	10.32		
	C	5	5	0.9857	1.0475	61.80	12.36		
	D	5	5	0.9857	1.0380	52.30	10.46		
	E	5	5	0.9930	1.0511	58.10	11.62		
R & D Control	A	5	5	0.9954	1.0516	56.20	11.24	100.00	12.15
	B	5	5	0.9938	1.0586	64.80	12.96		
	C	5	5	0.9976	1.0633	65.70	13.14		
	D	5	5	0.9955	1.0531	57.60	11.52		
	E	5	5	0.9964	1.0558	59.40	11.88		

1. This replicate (DAC–HY–21T–A) was misseeded with 6 organisms.
2. In the following replicates, a small portion of one organism was missing (DAC–HY–21T–E).

00599

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EVS CONSULTANTS

Dry Weight Data

Client:	NOAA -- Setup #1	Test Species:	*Neanthes arenaceodentata*
Project #:	9/618-02.4	Date Initiated:	May 31, 1994
Work Order:	940225	Date Terminated:	June 20, 1994
Test Type:	20-d sediment toxicity test	Number of Animals/rep:	5

Sample ID	Rep	Survivors	# of Animals Weighed	Pan Weight (g)	Final Weight (pan + biomass) (g)	Total Biomass (mg)	Individual Biomass (mg)	Mean Survival (%)	Mean Individual Biomass (mg)
Control 2	A	5	5	0.9863	1.0451	58.80	11.76	100.00	11.65
	B	5	5	0.9883	1.0285	40.20	8.04		
	C	5	5	0.9885	1.0596	71.10	14.22		
	D	5	5	0.9853	1.0323	47.00	9.40		
	E	5	5	0.9858	1.0600	74.20	14.84		
DAC-HY-13T	A	5	5	0.9930	1.0710	78.00	15.60	100.00	12.64
	B	5	5	0.9940	1.0617	67.70	13.54		
	C[a]	5	5	0.9937	1.0544	60.70	12.14		
	D	5	5	0.9866	1.0328	46.20	9.24		
	E	5	5	0.9856	1.0489	63.30	12.66		
DAC-HY-16T	A	5	5	1.0066	1.0520	45.40	9.08	100.00	9.40
	B	5	5	1.0085	1.0435	35.00	7.00		
	C	5	5	1.0062	1.0658	59.60	11.92		
	D	5	5	1.0052	1.0436	38.40	7.68		
	E	5	5	0.9997	1.0563	56.60	11.32		
DAC-HY-18T	A	4	4	1.0025	1.0600	57.50	14.38	88.00	11.30
	B	5	5	1.0018	1.0560	54.20	10.84		
	C	5	5	1.0021	1.0538	51.70	10.34		
	D	5	5	1.0033	1.0641	60.80	12.16		
	E	3	3	1.0030	1.0293	26.30	8.77		
DAC-HY-24T	A	5	5	0.9890	1.0664	77.40	15.48	100.00	14.18
	B	5	5	0.9868	1.0484	61.60	12.32		
	C	5	5	0.9908	1.0618	71.00	14.20		
	D	5	5	0.9838	1.0578	74.00	14.80		
	E	5	5	0.9892	1.0596	70.40	14.08		

3. In the following replicates, a small portion of one organism was missing (DAC-HY-13T-C).

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7/6

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

00601

Client NOAA
EVS Project Number 9/618-004
EVS W.O. No. 940225

Start Date (Day 0) May 31/94
End Date June 20/94
Test Type/Species Ampelisca (20 day)

Subset #1

Sample I.D.	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.		pH	Dissolved Oxygen (mg/L)	Temp. (°C)	Cond. (µmhos/cm) ☐ Salinity (ppt) ☑
Control Sed #1	A	N1	5	0	5	0			7.8	7.3	20	29
	B	N2	5	0	5	0			7.9	7.5	20	29
	C	N3	5	0	5	0			7.8	7.3	20	28
	D	N4	5	0	5	0			7.7	7.3	20	28
	E	N5	5	0	5	0			7.9	7.3	20	28
Control Sed #2	A	N6	5	0	5	0			7.9	7.4	20	27
	B	N7	5	0	5	0			7.9	7.4	20	27
	C	N8	5	0	5	0			7.9	7.4	20	28
	D	N9	5	0	5	0			7.9	7.5	20	28
	E	N10	5	0	5	0			7.9	7.4	20	28
DAC - Hg - 20T	A	N11	5	0	5	0			7.7	6.6	20	31
	B	N12	5	0	5	0			7.7	7.3	20	32
	C	N13	5	0	5	0			7.9	7.2	20	31
	D	N14	5	0	5	0			7.9	6.8	20	30
	E	N15	5	0	5	0			7.6	6.6	20	31
							Technician's Initials		MJ	MJ	✓	MJ

Water Quality Instruments: pH II-A-16 #4 D.O. II-A-3 Cond./Salinity II-C-12

ratioed DLC

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA
EVS Project Number 91618-02-04
EVS W.O. No. 940225

Start Date (Day 0) May 31/94
End Date June 20/94
Test Type/Species Neanthes (20 day)

3 Rep H1

Sample I.D.	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	pH	Dissolved Oxygen (mg/L)	Temp. (°C)	Cond. (µmhos/cm) ☐ Salinity (ppt) ☑
SAC-Hy-17T	A	16	5	0	5	0	3	7.6	6.8	20	30
	B	17	5	0	5	0	3	7.8	7.0	20	30
	C	18	5	0	5	0	3	7.8	7.1	20	29
	D	19	5	0	5①	0	3	7.4	7.5	20	29
	E	20	5	0	5	0	3	7.8	7.5	20	31
DAC-Hy-23T	A	21	5	0	5	0	3	7.5	6.6	20	30
	B	22	5	0	5	0	3	7.8	7.0	20	31
	C	23	5	0	5	0	3	7.6	6.9	20	30
	D	24	5	0	5	0	3	7.7	7.2	20	30
	E	25	5	0	5	0	3	7.7	7.4	20	30
DAC-Hy-22T	A	26	5	0	5	0	PH	7.7	6.4	20	29
	B	27	4	0	4	1	PH	7.8	7.3	20	29
	C	28	5	0	5	0	PH	7.9	7.2	20	30
	D	29	5	0	5	0	PH	7.8	7.3	20	30
	E	30	5	0	5	0	PH	7.9	7.4	20	31
							Technician's Initials	PH 6/15	PH 6/16	PH	PH

Water Quality Instruments: pH II-A-16 #9 D.O. II-A-3 Cond/Salinity II-C-12

LL-DAC

3/6

00603

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA
EVS Project Number 9/618-004
EVS W.O. No. 940225

Start Date (Day 0) May 31/94
End Date June 20/94
Test Type/Species Macoma (20 day)

Sub rep #1

Sample I.D.	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.		pH	Dissolved Oxygen (mg/L)	Temp. (°C)	Cond. (µmhos/cm) ☐ Salinity (ppt) ☑
DAC-Hg-4T	A	31	5	0	5	0			7.5	6.7	20	30
	B	32	5	0	5	0			7.7	7.1	20	30
	C	33	5	0	5 ①	0			7.8	7.2	20	31
	D	34	5	0	5	0			7.7	7.2	20	31
	E	35	5	0	5 ①	0			7.7	7.0	20	31
DAC-Hg-15T	A	36	4	0	4	1			7.4	6.5	20	30
	B	37	4	0	4 ②	1			7.6	6.5	20	31
	C	38	5	0	5	0			7.6	6.5	20	30
	D	39	5	0	5	0			7.8	7.3	20	31
	E	40	5	0	5	0			7.5	6.4	20	30
DAC-Hg-19T	A	41	5	0	5	0			7.8	7.0	20	30
	B	42	5	0	5	0			7.8	7.2	20	31
	C	43	5	0	5	0			7.7	6.4	20	30
	D	44	5	0	5	0			7.9	6.8	20	31
	E	45	5	0	5	0			7.9	7.1	20	30
						Technician's Initials			MD 2d	MD 6th	6th	MD

N-37 (DAC-Hg-15T-B) portion of tail in pan with worms
NO Missing bOMacs MD

Water Quality Instruments: pH II-A-16 #9 D.O. II-A-3 Cond./Salinity II-C-12

(N-33+35 DAC-Hg-4T-E) ① a small piece missing from two rear thecs (MD) — end of tail flipped under end legs

4/6

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

10000

Client NOAA
EVS Project Number 9/618-02-04
EVS W.O. No. 940225

Start Date (Day 0) May 31/94
End Date June 20/94
Test Type/Species Dunaliella (20 day)

Setup #1

Sample I.D.	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.		pH	Dissolved Oxygen (mg/L)	Temp. (°C)	Cond. (µmhos/cm) ☐ Salinity (ppt) ☐
~~DA~~ D Controls	A	46	5	0	5	0	S		7.9	7.4	20	27
	B	47	5	0	5	0	S		7.4	7.4	20	27
	C	48	5	0	5	0	S		7.8	7.4	20	27
	D	49	5	0	5	0	S		7.7	7.0	20	27
	E	50	5	0	5	0	S		8.0	7.2	20	28
								Technician's Initials	S	S	S	S

Water Quality Instruments: pH IV-A-16 & 9 D.O. IV-A-3 Cond./Salinity IV-C-12

5/6

00605

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA
EVS Project Number 9168-004
EVS W.O. No. 940225

Start Date (Day 0) May 31/94
End Date June 20/94
Test Type/Species Ampelisca (20 day)

Subsp #1

Sample I.D.	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.		pH	Dissolved Oxygen (mg/L)	Temp. (°C)	Cond. (µmhos/cm) □ Salinity (ppt) □
DAC-Hy-24T	A	61	5	0	5	0	MM		7.7	7.1	20	31
	B	47	5	0	5	0	MM		7.8	6.8	20	29
	C	03	5	0	5	0	MM		7.7	6.8	20	29
	D	64	5	0	5	0	MM		7.6	6.6	20	29
	E	50	5	0	5	0	MM		7.7	6.7	20	30
DAC-Hy-21T	A	51	5	0	5	0			8.1	7.0	20	30
	B	52	5	0	5	0			8.2	7.1	20	30
	C	53	5	0	5 ①	0			8.0	7.0	20	30
	D	54	5	0	5	0			7.9	6.5	20	29
	E	55	5	0	5 ①	0			8.1	7.0	20	30
DAC-Hy-13T	A	56	5	0	5	0			7.9	6.8	20	30
	B	57	5	0	5	0			7.9	7.0	20	30
	C	58	5	0	5 ①	0			7.9	7.1	20	31
	D	59	5	0	5 ①	0			7.9	7.0	20	33
	E	60	5	0	5 ①	0			7.9	7.1	20	32
							Technician's Initials					

DAC-Hy-21T C - N53 = Recovered in Pan E
E - N55 - Confirmed

Water Quality Instruments: pH II-A-16 #9 D.O. II-A-3 Cond./Salinity II-C-12

DAC-Hy-13T - C - N58 - Confirmed

DAC-Hy-21T A Missed with 6 animals initial of 5. JHS.

① a small portion of the [illegible]

Certified DLC

6/6

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

00600

Client NOAA
EVS Project Number 9/618-02-04
EVS W.O. No. 940225

Start Date (Day 0) May 31/94
End Date June 20/94
Test Type/Species Macoma - (20 day)

Solvent #1

Sample I.D.	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	pH	Dissolved Oxygen (mg/L)	Temp. (°C)	Cond. (µmhos/cm) □ Salinity (ppt) ⊟
DAC-H-Y-16T	A	67	5	0	5	0	RM	7.7	7.2	20	29
	B	62	5	0	5	0	RM	7.8	7.3	20	29
	C	63	5	0	5 ①	0	RM	7.7	7.2	20	30
	D	64	5	0	5	0	RM	7.7	7.1	20	29
	E	65	5	0	5 ①	0	RM	7.7	7.0	20	29
DAC-Hy-18T	A	66	4	0	4 ①	0		7.8	6.8	20	29
	B	67	5	0	5 ①	0		7.8	7.3	20	29
	C	68	5	0	5 ①	0		8.0	7.5	20	30
	D	69	5	0	5	0		7.9	5.2 ②	20	29
	E	70	3	0	3	2		7.2	2.0 ②	20	29
Technician's Initials								SB	PS/SB	SB	SB

DAC Hy-18T- A #66- Pecan in Pan - No Loss of Biomass
B #67- " " " " " " "
C #68- " " " " " " "

Water Quality Instruments: pH II-A-16 #9 D.O. II-A-3 ② Aeration adjusted Cond./Salinity II-C-12

EVS CONSULTANTS
ACUTE TOXICITY TEST DATA

SAMPLE ID: NOAA
DATE ~~COLLECTED~~ Received: May 24/94
TEST DATE/TIME: May 31/94 = 0 hrs.
NO. ORGANISMS/VOLUME: ~~5/test [illegible]~~ 5/L

PROJECT NAME: NOAA
EVS PROJECT NO.: 9/618-02-4
WORK ORDER NO.: 940225
TEST SPECIES: Needlefin
SOURCE & BATCH: Don Rich. May 24/94

Setup #1.

CONC'N mg/L Cd	PERCENT SURVIVAL (1 to 96 hours)							DISSOLVED OXYGEN (mg/L)					TEMPERATURE (°C)					pH					SALINITY (ppt)	
	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
Cd mg/L 32.0				0%	—	—	—	7.2	7.3	—	—	—	22	22	—	—	—	7.8	7.6	—	—	—	27	—
18.0				0%	—	—	—	7.2	7.2	—	—	—	22	22	—	—	—	7.8	7.7	—	—	—	27	—
10.0				30%	~~0%~~ 20	~~28~~ 20	10	7.2	7.2	7.0	6.9	7.2	22	22	21	—	21	7.8	7.7	7.9	7.8	7.9	27	—
5.6				100	100	100	100	7.1	7.2	7.0	7.2	7.2	22	22	21	21	21 ~~22~~	7.8	7.7	8.0	7.8	7.9	27	29
3.2				100	100	100	100	7.1	7.2	7.0	7.2	7.2	22	22	21	21	21	7.8	7.7	7.9	7.9	7.9	27	29
1.8				100	100	100	100	7.2	7.2	7.0	7.2	7.0	22	22	21	20.5	21	7.8	7.7	7.9	7.8	7.8	27	29
Control				100	100	100	100	7.2	7.2	7.1	7.1	7.2	22	22	21	20.5	21	7.8	7.7	7.8	7.7	7.9	27	29
Technician				[illegible]	[illegible]	[illegible]	[illegible]	RH	[illegible]	[illegible]	[illegible]	[illegible]	RH	[illegible]	[illegible]	[illegible]	[illegible]	RH	[illegible]	[illegible]	[illegible]	[illegible]	RH	[illegible]

SAMPLE DESCRIPTION: 4.86 g CdCl2 [illegible]
COMMENTS: there are 2 that are barely alive. - I thought they were dead yesterday but looked again [illegible] 3 [illegible] Feeble movements in 2 [illegible].

TEST SET UP BY: mel
DATA VERIFIED BY: [signature]
DATE VERIFIED: Aug 10, 1994

EVS ENVIRONMENT CONSULTANTS

00607

LC50:STEPHEN IBM/AT VERS 1.0

FILE: NOAA 9/618-02.4 940225

TEST: Reference Toxicant DATE: May 31, 1994
SPECIES: Neanthes arenaceodentata DURATION: 96 hr
CHEMICAL: Cadminum
CARRIER: Seawater CARRIER CONC: 28 ppt

Sample: Reference Toxicant

Conc	Number exposed	Number dead	Percent dead	Binomial prob(percent)
32.00	10	10	100.0	0.0977
18.00	10	10	100.0	0.0977
10.00	10	9	90.0	1.0742
5.60	10	0	0.0	0.0977
3.20	10	0	0.0	0.0977
1.80	10	0	0.0	0.0977

The binom test shows that 5.600 and 10.000 can be used as statistically sound at 95 conf since the actual conf level associated with these limits is 97.852

An approx LC50 is 7.955 mg/L

* warning:probit/mov av fail to give statsound results *
Less than 2 conc where %dead between 0-100

00608

certified DLC

EVS CONSULTANTS - *Neanthes* 20-d SEDIMENT TOXICITY TEST
DAILY WATER QUALITY MONITORING

Water Quality Instruments Used

D.O. Meter II-A-3
pH Meter II-A-16 #9
Salinity II-C-12 (refr)
Temperature Thermometer

Client: NOAA
EVS Project No.: 9/618-02-4
EVS W.O. No.: 940225
Day 0: May 31/94
Day 20: June 20/94
Test Species: Mediomastus
Source/Collection Date: Don Riche / May 29/94

Salty #1

SAMPLE I.D.		TEMPERATURE (°C)																				SALINITY (ppt)								DISSOLVED OXYGEN (mg/L)								pH							
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	0	3	6	9	12	15	18	20	0	3	6	9	12	15	18	20	0	3	6	9	12	15	18	20
Control #1	A	22	21	21	20	20.5	20.5	20.5	21	21	20.5	20.5	20.5	20	20	20	20.5	20.0	20.0	20	20	20	22	28	27	29	29	30	30	29	22	7.3	6.3	6.3	6.8	6.5	7.3	7.5	7.8	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8
	C	22	22	21	21	20.5	20.5	20.5	21	21	20.5	20.5	20.5	20	20	20	20.5	20.0	20.0	20	20	20	22	28	27	29	30	29	29	28	22	6.8	6.4	6.4	6.7	6.6	7.3	7.3	7.8	7.8	7.7	7.9	7.8	7.8	7.9	7.8	7.8
Control #2	B	22	22	21	20	20.5	21	20.5	21	21	20.5	20.5	20.5	20	20	20	20.5	20.0	20.0	20	20	20	22	29	28	29	29	29	29	27	22	7.1	7.1	6.6	6.8	6.8	7.3	7.4	7.8	7.8	7.7	7.8	7.9	7.9	7.9	7.9	7.8
	D	22	22	21	20	20.5	21	20.5	21	21	20.5	20.5	20.5	20	20	20	20.5	20.0	20.0	20	20	20	22	29	27	29	29	29	29	28	22	7.0	7.1	6.5	6.8	6.8	7.4	7.5	7.8	7.8	7.7	7.9	7.9	7.9	8.0	7.9	7.8
DAC-Hy-20T	A	22	22	21	21	20.5	21	20.5	21	21	20.5	20.5	20.0	20	20	20	20	20.0	20.0	20	20	20	22	27	27	29	29	29	29	31	22	7.0	7.2	6.4	6.6	6.6	7.2	6.6	7.8	8.0	8.1	7.9	7.9	7.9	7.7	7.6	7.6
	E	22	22	21	21	20.5	21	20.5	21	21	20.5	20.5	20.0	20	20	20	20	20.0	20.0	20	20	20	22	27	26	29	29	29	30	31	22	7.0	7.2	6.0	6.6	6.6	7.2	7.2	7.8	8.0	8.1	8.0	8.0	7.8	7.7	7.6	7.6
DAC-Hy-17T	B	22	22	21	20.5	20.5	21	20.5	21	21	20.5	20.5	20.0	20	20	20	20	20.0	20.0	20	20	20	22	21	26	30	29	29	30	30	22	7.1	7.4	6.5	6.7	6.7	7.4	7.0	7.8	7.8	7.9	8.0	8.0	8.0	7.8	7.8	7.8
	C	22	22	21	20.5	20.5	21	20.5	21	21	20.5	20.5	20.0	20	20	20	20	20.0	20.0	20	20	20	22	27	27	29	30	29	29	29	22	6.9	7.4	6.6	6.7	6.5	6.9	7.1	7.8	7.9	7.8	8.0	8.0	8.0	8.0	7.8	7.8
DAC-Hy-23T	C	22	22	21	20.5	20.5	20.5	20.5	21	21	20.5	20.5	20.0	20	20	20	21	20.0	20.0	20	20	20	22	26	26	29	29	29	29	30	22	7.0	7.2	6.6	6.7	6.7	7.2	6.7	7.8	7.8	7.9	7.8	7.8	7.9	7.6	7.6	7.6
	E	22	22	21	21	20.5	20.5	20.5	21	21	20.5	20.5	20.0	20	20	20	20	20.0	20.0	20	20	20	22	27	26	28	29	29	29	30	22	7.0	7.0	6.4	6.2	6.7	7.3	7.4	7.8	7.8	7.9	7.7	7.9	7.7	7.7	7.7	7.7
DAC																																													
Technician's Initials																																													

Comments/Adjustments Made: Day 3 ① Adjusted aeration (lowered) 23T

Use only black, ball-point pen. Cross out errors with a single line; initial and date corrections. Do not use "White-Out", correcting tape or eraser to make changes.

L:\Forms\Animals\neanthes.20d

Certified QC Aug 10, 1994

CONTROL #1 GOES WITH DAC-HY-14T, 15T, 17T, 19T, 20T, 21T, 22T, 23T, R&D CONTROL

CONTROL #2 GOES WITH DAC-HY-13T, 16T, 18T, 24T

Water Quality Instruments Used

D.O. Meter II-A-3
pH Meter II-A-16 #9
Salinity II-C-12 (SCI)
Temperature Thermometer

AMENDMENTS - Addition 20-d SEDIMENT TOXICITY TEST
DAILY WATER QUALITY MONITORING

Client: NOAA
EVS Project No.: 9/618-02-4
EVS W.O. No.: 940725
Day 0: May 31/94
Day 20: June 20/94
Test Species: M. nudlim
Source/Collection Date: Don Kiehe May 24/94

Salty #1

SAMPLE ID.	TEMPERATURE (°C)																				SALINITY (ppt)								DISSOLVED OXYGEN (mg/L)								pH							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	0	3	6	9	12	15	18	20	0	3	6	9	12	15	18	20	0	3	6	9	12	15	18	20
DAC-Hy-18T B	22	21	21	20.5	20.5	20.5	21	21	20.5	20.5	20.5	20	20	20	20	20	20	20	20	20	20	21	21	26	29	28	29	29	29	7.1	7.0	7.1	6.6	6.7	6.3	7.3	7.23	7.8	7.9	7.9	8.0	7.8	7.7	7.4	7.3
C	22	21	20.5	20.5	20.5	20.5	21	21	20.5	20.5	20.5	20	20	20	20	20	20	20	20	20	20	21	28	27	28	28	30	30	30	7.1	7.0	7.2	4.8	6.6	6.7	6.8	7.5	7.8	7.9	7.9	7.9	8.1	8.1	8.0	8.0
DAC-Hy-22T A	22	21	21	20.5	20.5	20.5	21	21	20.5	20.5	20.5	20	20	20	20	20	20	20	20	20	20	21	27	26	27	30	29	29	29	7.1	6.5	7.0	6.5	6.2	6.4	6.5	6.4	7.8	7.7	7.9	8.0	7.3	8.0	8.0	7.7
b	22	21	21	20.5	20.5	20.5	21	21	20.5	20.5	20.5	20	20	20	20	20	20	20	20	20	20	21	27	24	27	31	30	29	29	7.2	6.9	7.2	6.4	6.2	6.2	6.5	7.3	7.8	7.8	7.9	8.1	7.8	7.7	8.0	7.8
DAC-Hy-14T C	22	21	20.5	20.5	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20	20	20	20	20	20	20	21	27	26	28	31	27	29	31	7.0	6.9	7.3	6.6	6.7	6.8	6.8	7.2	7.8	7.8	8.0	8.0	7.7	8.0	7.9	7.8
D	22	21	21	20.5	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20	20	20	20	20	20	20	21	27	26	28	30	29	29	31	7.0	7.0	7.1	6.5	6.7	6.2	4.8	7.2	7.8	7.8	7.8	8.0	8.0	7.9	7.5	7.7
DAC-Hy-15T B	22	21	21	20.5	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20	20	20	20	20	20	20	21	27	26	28	29	28	29	31	6.9	7.2	7.0	6.7	5.8	6.7	6.2	6.5	7.8	7.9	7.5	8.1	7.7	7.9	7.8	7.6
D	22	21	21	20.5	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20	20	20	20	20	20	20	21	28	26	28	29	25	30	31	7.1	6.8	7.2	6.1	6.5	6.7	6.6	7.3	7.8	7.8	7.9	8.0	8.0	8.0	7.8	7.8
DAC-Hy-19T A	22	21	20.5	20.5	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20	20	20	20	20	20	20	21	27	29	30	29	30	30	30	7.0	7.0	7.2	6.7	6.2	6.7	6.6	7.0	7.8	7.9	8.0	8.1	8.0	8.0	8.0	7.8
C	22	21	20.5	20.5	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20	20	20	20	20	20	20	21	28	27	29	31	29	30	30	7.0	7.0	7.2	6.7	6.7	6.7	5.7	6.4	7.8	7.9	7.9	8.1	8.0	7.8	7.7	7.7
Technician's Initials																																													

Comments/Adjustments Made: ① Aeration off. Adjusted. ② ② Increased aeration rate ③ increased aeration rate
22T-Low DO. unknown cause -- will check. June 13/94. = DO 6.5

Certified Aug 10, 1994

Use only black, ball-point pen. Cross out errors with a single line; initial and date corrections. Do not use "White-Out", correcting tape or eraser to make changes.

EVS CONSULTANTS - *Neanthes* 20-d SEDIMENT TOXICITY TEST
DAILY WATER QUALITY MONITORING

Water Quality Instruments Used

D.O. Meter II-A-3
pH Meter II-A-16 #9
Salinity II-C-12 (refr)
Temperature thermometer

Client: NOAA
EVS Project No.: 9/618-02-4
EVS W.O. No.: 940225
Day 0: May 31/94
Day 20: Jun 20/94
Test Species: N. virens
Source/Collection Date: Don Rice May 24/94

Silty #1

SAMPLE I.D.	TEMPERATURE (°C)																					SALINITY (ppt)								DISSOLVED OXYGEN (mg/L)								pH							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	0	3	6	9	12	15	18	20	0	3	6	9	12	15	18	20	0	3	6	9	12	15	18	20
DAC-Hy-24 TA	21	22	21	21	21	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20.5	20	21	20	20	20	27	28	27	30	31	30	32	31	6.4	7.0	7.2	6.8	6.9	6.7	6.5	7.1	7.8	8.1	8.0	8.1	8.0	7.9	7.8	7.7
E	21	22	21	21	21	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20.5	20	21	20	20	20	27	28	24	28	29	29	31	30	7.1	6.8	7.2	6.4	6.2	6.7	6.4	6.7	7.8	8.0	7.9	8.0	7.8	8.1	8.0	7.7
DAC-Hy-21T C	21	22	21	20.5	21	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20.5	20	21	20	20	20	27	27	26	29	28	29	30	30	7.1	6.9	7.2	6.4	6.6	6.8	5.0	7.0	7.8	8.0	8.1	8.2	8.1	8.0	7.7	8.0
B	21	22	21	20.5	21	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20.5	20	21	20	20	20	27	27	26	28	29	29	31	30	7.0	7.5	6.5	5.9	5.5	6.7	5.6	7.1	7.8	8.0	8.0	7.8	8.1	7.7	8.2	
DAC-Hy-13T B	21	22	21	20.5	21	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20.5	20	21	20	20	20	27	27	27	30	32	32	33	30	7.0	6.9	7.3	6.8	6.0	6.8	6.7	7.0	7.8	7.9	7.9	8.1	7.8	8.0	8.1	7.9
C	21	22	21	20.5	21	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20.5	20	21	20	20	20	27	28	26	29	30	32	31	31	7.2	7.0	7.2	6.4	6.6	6.8	6.6	7.1	7.8	7.8	7.9	8.0	8.1	8.0	8.0	7.9
DAC-Hy-16T C	21	22	21	20.5	21	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20.5	20	21	20	20	20	27	27	26	28	30	29	30	30	7.2	6.9	7.0	6.7	6.5	6.7	6.4	7.2	7.8	7.9	7.9	7.9	7.8	7.8	7.9	7.7
D	21	22	21	20.5	21	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20.5	20	21	20	20	20	27	28	27	30	31	31	31	29	7.2	7.0	7.2	6.8	6.8	6.7	7.4	7.1	7.8	7.9	8.0	8.0	7.9	7.7	7.0	7.7
RADControl A	21	22	21	20.5	21	20.5	20.5	21	21	20.5	20.5	20	20	20	20	20.5	20	21	20	20	20	27	28	26	28	27	29	29	27	7.2	7.0	7.0	6.6	6.7	6.9	6.5	7.4	7.8	7.8	7.6	7.8	7.9	7.9	7.9	7.9
C	21	22	21	20.5	21	20.4	20.5	21	21	20.5	20.5	20	20	20	20	20.5	20	21	20	20	20	27	27	24	28	27	29	31	27	7.2	7.0	7.0	5.8	6.0	6.9	6.3	7.4	7.8	7.8	7.6	7.9	7.7	8.0	7.8	7.9
Technician's Initials																																													

Comments/Adjustments Made: ① aeration set adjusted (2) ② increased aeration (2)

Certified QC Aug 10, 1994

Use only black, ball-point pen. Cross out errors with a single line; initial and date corrections. Do not use "White-Out", correcting tape or eraser to make changes.

\\Forms\Acute\Neanthes.2bd

Nuanthes 9/618-02.4
W.O.# 940225

Setup # 1 - Day 0

RESULTS OF ANALYSIS - Water

File No. D9741

		DAC-HY-13N	DAC-HY-14N	DAC-HY-15N	DAC-HY-16N	DAC-HY-17N
Nutrients						
Ammonia Nitrogen	N	0.370	0.420	0.470	0.270	0.260
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	0.06

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00612

Neanthes 9/w18-02.4 W.O.# 940225 Setup #1 - Day 0

RESULTS OF ANALYSIS - Water

File No. D9741

		DAC-HY-18N	DAC-HY-19N	DAC-HY-20N	DAC-HY-21N	DAC-HY-22N
Nutrients						
Ammonia Nitrogen	N	0.460	0.550	0.430	0.670	0.570
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00613

Neanthes - 9/018-02.4
W.O. # 940225

Setup #1 - Day 0

RESULTS OF ANALYSIS - Water

File No. D9741

		DAC-HY-23N	DAC-HY-24N	Control 1N	Control 2N
Nutrients					
Ammonia Nitrogen	N	0.380	0.380	0.330	0.290
Inorganic Parameters					
Sulphide	S	<0.02	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00614

1988 Triumph Street, Vancouver, B.C., Canada V5L 1K5

analytical service laboratories ltd.

FAX: (604) 253-6700 TEL: (604) 253-4188

Nearshes
9/618-02.4
W.O.# 940225

Setup #1 - Day 20

CHEMICAL ANALYSIS REPORT

Date: June 29, 1994

ASL File No. E1362

Report On: 9/618-02.4 Water Analysis

Report To: **EVS Environment Consultants**
195 Pemberton Avenue
North Vancouver, BC
V7P 2R4

Attention: **Mr. Todd Shannon**

Received: June 21, 1994

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:

Heather A. Ross, B.Sc.
Project Chemist

Katherine Thomas, B.Sc.
Project Chemist

00615

Neanthes 91018-07 4
W.O.# 940225

Setup #1 - Day 20

RESULTS OF ANALYSIS - Water

File No. E1362

		DAC-HY 20T N	DAC-HY 17T N	DAC-HY 23T N	DAC-HY 22T N	Control Sediment #2 N
Nutrients						
Ammonia Nitrogen	N	0.15	4.16	0.13	0.30	7.19
Inorganic Parameters						
Sulphide	S	<0.02	0.06	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

00616

Neanthes 9/618-02 4
W.O. # 940225

Setup #1 - Day 20

RESULTS OF ANALYSIS - Water

File No. E1362

		Control Sediment #1 N	DAC-HY 14T N	DAC-HY 21T N	DAC-HY 16T N	DAC-HY 19T N
Nutrients						
Ammonia Nitrogen	N	6.68	0.55	0.19	0.17	0.14
Inorganic Parameters						
Sulphide	S	<0.02	<0.02	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre.
< = Less than the detection limit indicated.

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