ANCHOR ENVIRONMENTAL

ADDENDUM #3
WHATCOM WATERWAY AREA PROJECT
(PROJECT NO. 98-030-01)
MARINE SEDIMENT TOXICITY TESTING

LABORATORY REPORT

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9/852-01.1

February 1999

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ACKNOWLEDGEMENTS

Sediment toxicity testing was conducted by Patricia Haynes, Julianna Kalocai, George Yang, Stefan Santos, Betty Yung, Bushra Jamil, John Mohr, Blair McDonald, Candrina Bailey, Jacqueline Bell and Jennifer Stewart. The statistical analyses were conducted by Julianna Kalocai, Stefan Santos, Patricia Haynes and Blair McDonald. The report was prepared by Patricia Haynes and Stefan Santos. Quality assurance and quality control (QA/QC) review of all data was conducted by Gary Lawrence, Cathy McPherson and Julie Orban. The report was reviewed by Jennifer Stewart. Elissa Amar and Jackie Gelling were responsible for word processing. Analytical Service Laboratories (ASL) of Vancouver, BC were responsible for ammonia and sulfide analyses (with the exception of the purge and Day 0 ammonia analyses for the *E. estuarius* purge test which were performed in-house due to the tight turnaround time required).

1.0
INTRODUCTION

Fourteen (14) sediment samples and three (3) reference sediments collected between October 27 and 29, 1998 were received by the EVS Environment Consultants Laboratory between October 28 and 30, 1998 for toxicity testing using the following tests:

- 10-d *Eohaustorius estuarius* sediment toxicity test (non-purge)
- 10-d *Eohaustorius estuarius* sediment toxicity test (purge)
- 20-d *Neanthes arenaceodentata* sediment toxicity test
- 48-h *Mytilus galloprovincialis* sediment toxicity test

Each sample was shipped in nine or ten 1-L glass jars. Sediments were stored in the dark at 4°C, prior to testing. A summary of sample ID's and outline of tests is provided in Table 1-1.

This report describes the results of these tests. Chain-of-Custody forms submitted with the samples are provided in Appendix A. Test data and statistical printouts are provided in Appendices B, C, D and E, respectively.

Based on the bulk chemistry analysis, the client requested that sample AN-SC-84 be tested with the *Eohaustorius estuarius* non-purge test only; however, the sample was also tested with both *Neanthes arenaceodentata* and *Mytilus galloprovincialis*. The data and results for these tests using AN-SC-84 have also been included in this report.

The *E. estuarius* non-purge and purge tests were initiated on November 6 and 9, 1998, respectively, with field-collected immature adult amphipods. The exposure duration was 10 days, and the test endpoints were survival and behaviour (sediment avoidance and ability to rebury in clean sediment). The *N. arenaceodentata* tests were initiated on December 8, 1998 with juvenile polychaetes obtained from laboratory cultures and the exposure duration was 20 days. The test endpoints were survival and growth (change in dry weight). The *N. arenaceodentata* test failed to meet control criteria of ≥90% survival (PSEP, 1995). Based on the clients decision to accept the data, results of this testing have been included in this report. The *M. galloprovincialis* larvae tests were initiated November 25, 1998 with larvae that were within 2-h post-fertilization. The exposure duration was 48 h and the test endpoints were larval survival, normal development and survival/normal development.

A dissolved oxygen research and development test was set up alongside the non-purge *E. estuarius* test (Section 2.0). This test involved setting up one jar for reference sediments CR-10 and CR-22, samples AN-SC-78 and AN-SC-82 and the negative control in the same manner as the regular test for Day-1 (see Methods, Section 2.1). These jars did not received aeration and were not seeded. Water quality parameters (temperature, pH, salinity and

dissolved oxygen were recorded daily. Water quality measurements recorded during the 10-d exposure have been attached at the end of Appendix B.

1.1 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

This study was conducted under our comprehensive QA/QC Program to ensure full documentation and minimize possible errors in computation and reporting of results. The details of our QA/QC Program are documented in our Laboratory QA/QC Manual which describes all aspects of our program, including information on general laboratory procedures, sample handling, toxicity test procedures, data interpretation and management, and documentation of results. The following general QA/QC guidelines apply to all toxicity tests: use of negative controls, use of positive controls, replication, instrument calibration, water quality maintenance and record-keeping, and use of standard operating procedures (SOPs). To ensure the highest quality of data and reporting, all data and statistical analyses for each toxicity test are reviewed by a member of our QA/QC Committee prior to the report being released.

Table 1-1. Summary of sample ID's and tests performed.

	TOXICITY TESTS			
SAMPLE ID	*E. ESTUARIUS* (NON-PURGE)	*E. ESTUARIUS* (PURGE)	*N. ARENACEODENTATA*	*M. GALLOPROVINCIALIS*
CR-10	✔	✔	✔	✔
CR-22	✔	✔	✔	✔
CR-23W	✔	✔	✔	✔
AN-SS-36	✔	✔	✔	✔
AN-SS-37	✔		✔	✔
AN-SS-45	✔		✔	✔
AN-SS-47	✔		✔	✔
AN-SS-70	✔		✔	✔
AN-SS-71	✔		✔	✔
AN-SS-72	✔		✔	✔
AN-SS-73	✔		✔	✔
AN-SS-77	✔		✔	✔
AN-SS-78	✔	✔	✔	✔
AN-SS-80	✔		✔	✔
AN-SS-81	✔		✔	✔
AN-SS-82	✔		✔	✔
AN-SS-84	✔		✔*	✔*

* Sample was intended not to be tested for the noted species, however, was included in testing. Results are included at no cost to the client.

2.0
10-d *Eohaustorius estuarius* SEDIMENT TOXICITY TEST (non-purge)

2.1 METHODS

Ten-day toxicity tests using the estuarine amphipod, *Eohaustorius estuarius*, were conducted according to EVS Environment Consultants Ltd. Standard Operating Procedures (SOP) 1077-2 (EVS Environment Consultants, 1998), which is based on methods described in PSEP (1995). Amphipods were collected intertidally from Beaver Creek, Oregon, using a shovel. Amphipods were sieved from the sediments, counted and then transferred to small sandwich containers containing approximately a 1-cm layer of collection site sediment. Each container held approximately 100 amphipods. Sediment from the collection site was also retained for use as a clean control sediment for the toxicity tests. This material was sieved (500-μm screen), placed in a clean container and stored at 4°C in the dark prior to testing.

The amphipods were acclimated to laboratory conditions for two days prior to testing. During this time, amphipods received aeration but were not fed. The amphipods were kept in large plastic basins each holding about 12 sandwich containers. Each basin was filled with seawater (28 ± 1 ppt salinity) and maintained at 15 ± 1°C under continuous light. Seawater in the holding containers was replaced every two days. The seawater was obtained from Burrard Inlet, Vancouver, BC, at a depth of 12 m. This water was passed through a sand filter, a 0.5-μm filter and an ultraviolet light sterilizer, aerated vigorously and used within 2 d of collection. Water quality was measured before the water change and dead amphipods were removed.

Prior to test initiation the sediments were homogenized and a portion of sediment from each sample was centrifuged and sent to ASL for bulk interstitial ammonia and sulfide analysis. Tests were conducted in 1-L glass jars. Five replicates were prepared for each sample, and the negative control sediment. Three additional jars were prepared as sacrificial replicates for Days 0, 5 and 10 interstitial ammonia measurements, one of which was designated specifically for daily water quality measurements (temperature, pH, salinity and dissolved oxygen). Sediments were distributed to the test containers the day before test initiation (Day -1). Each test sediment was homogenized by thorough manual mixing. Large pieces of organic material (e.g., grasses, algae) and any live animals were removed at this time. A 175-mL volume (representing a 2-cm layer) of test sediment was added to each jar. Approximately 800 mL of seawater (28 ± 1 ppt salinity) was added to each jar. The jars were covered with clean plastic lids, fitted with aeration lines, and left to settle overnight. The following day (Day 0) the jars were seeded with 20 amphipods each. The amphipods were not fed during the tests. Following the same procedure, an additional dissolved oxygen (research and development) replicate was prepared for samples AN-SC-78 and AN-SC-82,

reference sediments CR-10 and CR-22 and the negative control. These replicates were not seeded and did not receive aeration. Water quality parameters were measured daily.

Tests were conducted in a constant environment chamber at 15 ± 1 °C under continuous light. Test jars were gently aerated. Water quality parameters (temperature, pH, dissolved oxygen and salinity) were measured daily in the water quality jar. Test containers were checked daily for emergent amphipods, indicating sediment avoidance or mortality. Amphipods which had left the sediment and become trapped by surface tension at the air/water interface were re-submerged with a glass rod. Composite subsamples of the overlying water were taken from each of the samples and the negative control on Days 0 and 10 for sulfide analysis. Interstitial water was collected on Days 0, 5 and 10 by centrifugation of the sediment from one of the sacrificial replicates from each of the samples and the negative control for ammonia analysis. As a result of high sulfide values in the bulk analysis, sample AN-SC-78 was also analyzed for interstitial sulfides on Day 0.

At the end of the 10-d exposure, the sediments were sieved through a 500-μm screen, and the number of live, dead and missing amphipods were counted in each replicate. Amphipods were presumed dead if there was no response to physical stimulation or examination revealed no evidence of pleopod movement. Missing amphipods were presumed to have died and decomposed prior to the termination of the test (Swartz et al., 1985). Surviving amphipods were transferred to plastic weighboats containing control sediment and seawater. The number of animals able to rebury within 1 h was recorded. For the test to be considered valid, mean survival in the control sediment had to be ≥90% (PSEP, 1995).

Mean responses (± SD) and statistical analysis for survival were calculated for each sediment using the TOXCALC Computer program (Tidepool Scientific Software, 1994). The survival data were tested for normality and homogeneity of variance. If the survival data did not pass the tests for normality and homogeneity of variance, then the data were transformed. If transformation did not allow the data to pass these tests, untransformed data were used. Homoscedastic *t*-tests or non-parametric heteroscedastic *t*-tests were then performed to determine if any of the test sediments were significantly different ($p \leq 0.05$) from the negative control with respect to survival. Using the same analyses, all samples were then compared with reference sediments CR-10, CR-22, and CR-23W. Amphipod mean avoidance was determined from daily counts of amphipods that had emerged from the sediments. After 10 d, the total number of amphipods emerged was divided by 50 (5 replicates x 10 d), to give mean avoidance (per jar per day). Percent reburial was calculated by dividing the total number of amphipods that did rebury within 1 h by the total number of surviving amphipods.

To assess the relative sensitivity of the test organisms, a concurrent 96-h water only reference toxicant test was conducted with cadmium (prepared from cadmium chloride, $CdCl_2 \cdot 2½H_2O$) with 900 mL of test solution containing 10 amphipods per concentration. A series of five concentrations (1.8, 3.2, 5.6, 10.0, 18.0 mg/L Cd), plus a negative control,

were prepared in 1-L glass jars from a 1,000 mg/L cadmium stock solution. Water quality measurements and mortalities were recorded daily. The 96-h LC50 value (expressed as mg/L Cd) was calculated using the TOXCALC program. This test was used to assess the relative health and sensitivity of the amphipods by comparing the results to a range (mean ± 2SD) obtained by this laboratory in previous testing.

2.2 RESULTS

Results of the 10-d *Eohaustorius* non-purge test are summarized in Table 2-1. Complete results including raw data and statistical printouts are provided in Appendix B.

Mean survival in the negative control was 98.0% and ranged between 91.0 and 97.0% in the reference sediments. Mean survival in the samples ranged from 87.0 to 98.0%. Homoscedastic *t*-tests indicated significant differences ($p \leq 0.05$) when samples were compared to the negative control and reference sediments, CR-22 and CR-23W. There were no significant differences ($p \leq 0.05$) when the samples were compared to reference sediment CR-10.

Mean avoidance (expressed as amphipods/jar/day) in the control sediment was 0.14 amphipods/jar/day and ranged between 0.02 and 0.08 amphipods/jar/day in the reference sediments. Mean avoidance in the test sediments ranged from 0.02 to 0.56 amphipods/jar/day. The percentage of surviving amphipods able to rebury in clean sediment and seawater within 1 h was 100% in the negative control and test sediments and ranged from 99 to 100% in the reference sediments.

2.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Mean survival responses in the negative control met the criterion for test acceptability as outlined in PSEP, 1995.

Water quality parameters measured during the 10-d exposure period were within the following ranges: temperature, 15.0°C; pH, 7.7 - 8.7; dissolved oxygen, 7.5 - 8.5 mg/L; salinity, 29 - 30 ppt; overlying sulfides, ≤0.02 - 0.03 mg/L S; and interstitial ammonia, 0.09 - 12.6 mg/L N. Interstitial bulk ammonia and sulfide concentrations were within the following ranges: 2.48 - 23.2 mg/L N and <0.05 - 41.7 mg/L S. Interstitial sulfides measured in sample AN-SC-78 on Day 0 were 7.0 mg/L S.

The LC50 for the cadmium reference toxicant (initiated concurrently on November 6, 1998) was determined using the TOXCALC computer program. The 96-h LC50 value for Cd was 10.8 mg/L Cd (95% confidence limits: 8.4 and 13.8 mg/L Cd) which was within the range

of 8.0 ± 6.9 mg/L Cd (mean ± 2SD) previously obtained by this laboratory. Water quality parameters measured during the 96-h exposure period were within the following ranges: temperature, 15.0 - 15.5 °C; pH, 7.4 - 8.1; dissolved oxygen, 8.0 - 8.4 mg/L; and salinity, 28 ppt.

Table 2-1. Summary of results of the 10-d *E. estuarius* sediment toxicity test (non-purge).

SAMPLE ID	% SURVIVAL[1] (MEAN ± SD)	AVOIDANCE[2] (MEAN ± SD)	% REBURIAL[3]
Negative control	98.0 ± 2.7	0.14 ± 0.13	100
CR-10	91.0 ± 4.2*○△	0.02 ± 0.04	99
CR-22	97.0 ± 4.5	0.02 ± 0.04	100
CR-23W	96,0 ± 2.2	0.08 ± 0.18	99
AN-SS-36	89.0 ± 8.9*	0.36 ± 0.24	100
AN-SS-37	93.0 ± 2.7*△	0.30 ± 0.24	100
AN-SS-45	89.0 ± 10.8	0.54 ± 0.62	100
AN-SS-47	87.0 ± 5.7*○△	0.14 ± 0.21	100
AN-SC-70	94.0 ± 4.2	0.04 ± 0.05	100
AN-SC-71	91.0 ± 4.2*○△	0.16 ± 0.21	100
AN-SC-72	93.0 ± 8.4	0.22 ± 0.08	100
AN-SC-73	92.0 ± 7.6	0.14 ± 0.17	100
AN-SC-77	94.0 ± 4.2	0.04 ± 0.05	100
AN-SC-78	97.0 ± 6.7	0.16 ± 0.21	100
AN-SC-80	98.0 ± 4.5	0.16 ± 0.21	100
AN-SC-81	87.0 ± 11.5*	0.56 ± 0.09	100
AN-SC-82	97.0 ± 2.7	0.12 ± 0.16	100
AN-SC-84	95.0 ± 5.0	0.02 ± 0.04	100

1 n = 5 replicates; 20 amphipods seeded per replicate.
2 Number of amphipods on the sediment surface per jar per day (out of a maximum of 20.0).
3 Percentage of surviving amphipods able to rebury in clean sediment and seawater within 1 h after a 10-d exposure.
* Indicates significant difference ($p \leq 0.05$) when compared to the negative control.
△ Indicates significant difference ($p \leq 0.05$) when compared to the reference sediment CR-23W.
○ Indicates significant difference ($p \leq 0.05$) when compared to the reference sediment CR-22.

3.0
10-d *Eohaustorius estuarius* SEDIMENT TOXICITY TEST (purge)

3.1 METHODS

Ten-day toxicity tests using the estuarine amphipod, *Eohaustorius estuarius*, were conducted according to EVS SOP 1077-2 (EVS, 1998), which is based on methods described in PSEP (1995). The experimental design was modified for this study. Prior to test initiation, porewater ammonia and sulfide analyses were performed on the bulk sediments to give an indication of whether purging might be required. Results of the bulk sediment analysis indicated that purging was a possibility for sample AN-SC-78 and reference sediments, CR-22 and CR-23W. Normally, sediments are distributed to the test containers, allowed to equilibrate overnight, and then the 10-d test begins on the following day (Day 0) when the amphipods are added to each test container. In this study a parallel purge test was set up alongside the non-purge test (Section 2.0) in the event that purging would be required. The purge test consisted of sample AN-SC-78, all three reference sediments (CR-10, CR-22 and CR-23W) and a negative control. Sediments were distributed and allowed to equilibrate overnight but, before the amphipods were added, porewater concentrations of ammonia were determined and compared to the target value of 15 mg/L N. If any of the samples exceeded the target value then purging was initiated (US EPA/US ACE, 1993). Purging consisted of performing two water changes per day on the test until the values were within range. Once the values were within range, amphipods were added to the test containers and the test was initiated (Day 0).

Amphipods were collected intertidally from Beaver Creek, Oregon, using a shovel. Amphipods were sieved from the sediments, counted and then transferred to small sandwich containers containing approximately a 1-cm layer of collection site sediment. Each container held approximately 100 amphipods. Sediment from the collection site was also retained for use as a clean control sediment for the toxicity tests. This material was wet sieved (500-μm screen), placed in a clean container and stored at 4°C in the dark prior to testing.

The amphipods were acclimated to laboratory conditions for five days prior to testing. During this time, amphipods received aeration but were not fed. The amphipods were kept in large plastic basins each holding about 12 sandwich containers. Each basin was filled with seawater (28 ± 1 ppt salinity) and maintained at 15 ± 1°C under continuous light. Seawater in the holding containers was replaced every two days. The seawater was obtained from Burrard Inlet, Vancouver, BC, at a depth of 12 m. This water was passed through a sand filter, a 0.5-μm filter and an ultraviolet light sterilizer, aerated vigorously and used within 2 d of collection. Water quality was measured before the water change and dead amphipods were removed.

Tests were conducted in 1-L glass jars. Five replicates were prepared for each sample and the negative control sediment for testing. Three additional jars were prepared as sacrificial replicates for Days 0, 5 and 10 interstitial ammonia measurements, one of which was designated specifically for daily water quality measurements (temperature, pH, salinity and dissolved oxygen). In addition, four purge replicates were prepared in order to monitor the porewater ammonia concentrations throughout the purge process. Sediments were distributed to the test containers four days before test initiation (Day -4). Each test sediment was homogenized by thorough manual mixing. Large pieces of organic material (e.g., grasses, algae) and any live animals were removed at this time. A 175-mL volume (representing a 2-cm layer) of test sediment was added to each jar. Approximately 800 mL of seawater (28 ± 1 ppt salinity) was added to each jar. The jars were covered with clean plastic lids, fitted with aeration lines, and left to settle overnight.

The following day porewater ammonia concentrations were measured in one of the sacrificial purge replicates. Interstitial water was collected through centrifugation of the sediment and porewater ammonia was measured using the Salicylate Method (Hach Company, 1992). Appropriate reagents were added and the absorbance was measured for each sample using a spectrophotometer. The absorbance reading was compared to a standard curve to determine the total ammonia concentration (mg/L N) in each sample. Porewater concentrations were found to be in exceedance at (22.5 mg/L N for both reference sediments CR-22 and CR-23W) or extremely close to (14.6 mg/L N in the AN-SC-78 duplicate) the target value (15 mg/L N), therefore purging was initiated. All of the test samples and negative control received two water renewals on this day and ammonia levels were checked again in the second sacrificial replicate. Porewater concentrations were still in exceedance (20.4 mg/L N for reference CR-22, 19.6 mg/L N for reference CR-23W and 16.6 mg/L N for sample AN-SC-78) of the target value and purging was continued over the weekend. On the following Monday, after performing one water renewal, ammonia values were again checked against the target value. At that time porewater ammonia concentrations were found to be within acceptable parameters and the test was initiated (Day 0). Each test chamber was seeded with 20 amphipods. The amphipods were not fed during the test.

Tests were conducted in a constant environment chamber at 15 ± 1 °C under continuous light. Test jars were gently aerated. Water quality parameters (temperature, pH, dissolved oxygen, salinity) were measured daily in the water quality jar. Test containers were checked daily for emergent amphipods, indicating sediment avoidance or mortality. Amphipods which had left the sediment and become trapped by surface tension at the air/water interface were re-submerged with a glass rod. Composite subsamples of the overlying water were taken from each sample and the negative control on Days 0 and 10 for sulfide analysis. Interstitial water was collected on Days 0, 5 and 10 by centrifugation of the sediment from the sacrificial replicates from each of the samples and the negative control for ammonia and sulfide analysis. As a result of high sulphide values in the bulk sediment analysis, interstitial water was collected from sample AN-SC-78 on Day 0 for sulfide analysis. Ammonia and sulfide

samples were sent to ASL for analysis, with the exception of the ammonia analyses for the purging period and Day 0 which were performed in-house due to the tight turnaround required.

At the end of the 10-d exposure, the sediments were sieved through a 500-μm screen, and the number of live, dead and missing amphipods were counted in each replicate. Amphipods were presumed dead if there was no response to physical stimulation or examination revealed no evidence of pleopod movement. Missing amphipods were presumed to have died and decomposed prior to the termination of the test (Swartz et al., 1985). Surviving amphipods were transferred to plastic weighboats containing control sediment and seawater. The number of animals able to rebury within 1 h was recorded. For the test to be considered valid, mean survival in the control sediment had to be ≥90% (PSEP, 1995).

Mean responses (± SD) and statistical analysis for survival were calculated for each sediment using the TOXCALC Computer program (Tidepool Scientific Software, 1994). The survival data were tested for normality and homogeneity of variance. If the survival data did not pass the tests for normality and homogeneity of variance, then the data were transformed. If transformation did not allow the data to pass these tests, untransformed data were used. Homoscedastic *t*-tests or non-parametric heteroscedastic *t*-tests were then performed to determine if any of the test sediments were significantly different ($p \leq 0.05$) from the negative control with respect to survival. If any of the test sediments were found to be significantly different when compared to the negative control, then the same statistical comparisons were made to each of the reference sediments (CR-10, CR-22 and CR-23W). Amphipod mean avoidance was determined from daily counts of amphipods that had emerged from the sediments. After 10 d, the total number of amphipods emerged was divided by 50 (5 replicates x 10 d), to give mean avoidance (per jar per day). Percent reburial was calculated by dividing the total number of amphipods that did rebury in clean control sediment and seawater within 1 h by the total number of surviving amphipods.

To assess the relative sensitivity of the test organisms, a concurrent 96-h water-only reference toxicant test was conducted with cadmium (prepared from cadmium chloride, $CdCl_2 \cdot 2½H_2O$) with 900 mL of test solution containing 10 amphipods per concentration. A series of five concentrations (1.8, 3.2, 5.6, 10.0, 18.0 mg/L Cd) plus a negative control, were prepared in 1-L glass jars from a 1,000 mg/L cadmium stock solution. Water quality measurements and mortalities were recorded daily. The 96-h LC50 value (expressed as mg/L Cd) was calculated using the TOXCALC program. This test was used to assess the relative health and sensitivity of the amphipods by comparing the results to a range (mean ± 2SD) obtained by this laboratory in previous testing.

3.2 RESULTS

Results of the 10-d *Eohaustorius* purge test are summarized in Table 3-1. Complete results including raw data and statistical printouts are provided in Appendix C.

Mean survival in the negative control was 98.0%, and ranged from 96.0 to 100% in the reference sediments. Mean survival in sample AN-SC-78 was 93.0%. Heteroscedastic *t*-tests indicated that there were no significant differences ($p \leq 0.05$) with respect to survival when compared to the negative control. Although no statistical comparisons were made, survival in the reference sediments is similar to that of the negative control. Mean avoidance (expressed as amphipods/jar/day) in the negative control sediment was 0.14 amphipods/jar/day, and ranged from 0 to 0.10 amphipods/ jar/day in the reference sediments. Mean avoidance in sample AN-SC-78 was 0.40 amphipods/jar/day. The percentage of surviving amphipods able to rebury in clean sediment and seawater within 1 h was 100% in all treatments.

3.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Mean survival responses in the negative control met the criterion for test acceptability as outlined in PSEP, 1995.

Due to purging requirements for this test is was necessary to exceed the amphipod holding time of 10 days by 1 day. It is unlikely that this exceedance had any affect on the test results as the control survival (98.0%) was the same for both the non-purge and the purge test and the animals came from the same population. The reference toxicant tests for both the non-purge and purge test showed comparable sensitivity relative to previous testing performed by this laboratory.

Water quality parameters measured during the 10-d exposure period were within the following ranges: temperature, 15.0°C; pH, 7.6 - 8.6; dissolved oxygen, 7.4 - 8.2 mg/L; salinity, 29 - 30 ppt; overlying sulfides, <0.02 mg/L S; and interstitial ammonia, <0.1 - 10.7 mg/L N. Interstitial bulk ammonia and sulfide concentrations were within the following ranges: 6.25 - 23.2 mg/L N; and <0.05 - 41.7 mg/L S. Interstitial ammonia concentrations measured during the purging process were between <0.1 and 22.5 mg/L N. Interstitial sulfide measured on Day 0 in sample AN-SC-78 was 0.6 mg/L S.

The LC50 for the cadmium reference toxicant (initiated concurrently on November 9, 1998) was determined using the TOXCALC computer program. The 96-h LC50 value for Cd was 8.1 mg/L Cd (95% confidence limits: 5.8 and 11.3 mg/L Cd) which was within the range of 8.3 ± 7.1 mg/L Cd (mean ± 2SD) obtained by this laboratory. Water quality parameters

measured during the 96-h exposure period were within the following ranges: temperature, 15.0 - 16.0°C; pH, 7.5 - 8.0; dissolved oxygen, 8.0 - 8.3 mg/L; and salinity, 29 ppt.

Table 3-1. Summary of results of the 10-d *E. estuarius* sediment toxicity test (purge).

SAMPLE ID	% SURVIVAL[1] (MEAN ± SD)	AVOIDANCE[2] (MEAN ± SD)	% REBURIAL[3]
Negative control	98.0 ± 4.5	0.14 ± 0.22	100
CR-10	96.0 ± 5.5	0.10 ± 0.71	100
CR-22	100	0.04 ± 0.05	100
CR-23W	100	0	100
AN-SC-78	93.0 ± 8.4	0.40 ± 0.31	100

1 n = 5 replicates; 20 amphipods seeded per replicate.
2 Number of amphipods on the sediment surface per jar per day (out of a maximum of 20.0).
3 Percentage of surviving amphipods able to rebury in clean sediment and seawater within 1 h after a 10-d exposure.

4.0
20-d *Neanthes arenaceodentata* SEDIMENT TOXICITY TEST

4.1 METHODS

The 20-d static-renewal juvenile polychaete (*Neanthes arenaceodentata*) sediment toxicity test was conducted according to EVS SOP 1078-1 (EVS, 1995a), which is based on methods described by PSEP (1995). Juvenile worms (2-3 weeks post-emergence) were obtained from a supplier in California. Worms were held in an aquarium, without sediment, at 20°C until used for testing. Gentle aeration was provided and the worms were fed ground TetraMarin® fish flakes during acclimation. Injured, unhealthy or dead worms were discarded prior to testing.

Seawater used for acclimation and toxicity testing was obtained from Burrard Inlet, Vancouver BC at a depth of 12 m and used within 2 d of collection. This water was passed through a sand filter, a 0.5-μm filter, and an ultraviolet sterilizer and aerated vigorously prior to use. Silica sediment was used as the control sediment.

Tests were conducted in 1-L glass jars. Five replicates were prepared for each sample and the negative control sediment. Three additional jars were prepared as sacrificial replicates for Days 0, 10, and 20 interstitial ammonia measurements, one of which was designated specifically for daily water quality measurements (temperature, pH, salinity and dissolved oxygen). Sediments were distributed to the test containers the day before test initiation (Day -1). Each test sediment was homogenized by thorough manual mixing. Large pieces of organic material (e.g., grasses, algae) and any live animals were removed at this time. A 175-mL volume (representing a 2-cm layer) of test sediment was added to each jar. Approximately 800 mL of seawater (28 ± 1 ppt salinity) was added to each jar. The jars were covered with clean plastic lids, fitted with aeration lines, and left to settle overnight. The following day (Day 0), each jar was seeded with five juvenile worms. The worms were removed from their holding containers, sorted by size and randomly distributed to small vials containing seawater. When there were five worms in each vial, counts were confirmed and the worms were randomly distributed among the test containers. Three additional replicates of five worms were also set aside for determination of initial (Day 0) dry weight.

Tests were conducted in a constant environment chamber at 20 ± 1°C under continuous light. Aeration was provided for the duration of the test. Every three days, approximately one-third of the water in each jar was removed and replaced with clean seawater, taking care not to disturb the sediments. Water quality parameters (pH, dissolved oxygen and salinity) were recorded in the water quality jar in each treatment just prior to each water renewal (i.e., every three days). The temperature was recorded daily. The worms were fed ground TetraMarin® fish flakes (8 mg per worm) every two days during testing. Interstitial water

4.2 RESULTS

Results of the 20-d *Neanthes* tests are summarized in Table 4-1. Complete results including raw data and statistical printouts are provided in Appendix C.

Mean survival in the negative control was 60.0% and ranged from 80.0 to 92.0 in the reference sediments. Mean survival in the samples ranged from 60.0 to 96.0%. The average individual dry weight (based on three replicates of five worms) at test initiation (Day 0) was 0.50 mg/worm. Average individual dry weight on Day 20 was 9.1 mg in the negative control and ranged from 9.1 to 12.2 mg in the reference sediments. Average individual dry weight ranged from 8.7 to 12.4 mg in the test sediments. Individual growth rate was 0.43 mg/worm/day in the negative control and ranged from 0.43 to 0.59 mg/worm/day in the reference sediments. Individual growth rate ranged from 0.41 to 0.59 mg/worm/day in the test sediments. Total dry weight was 31.9 mg in the negative control and ranged from 42.8 to 51.7 mg in the reference sediments. Total dry weight ranged from 31.2 to 52.1 mg in the test sediments.

Heteroscedastic *t*-tests indicated significant differences ($p \leq 0.05$) in survival when compared to reference sediment CR-10. No significant differences in individual dry weight, growth rate or total dry weight were observed in comparison to CR-10. Homoscedastic *t*-tests indicated significant differences in individual dry weight, growth rate, and total dry weight when samples were compared to reference sediment CR-22. No significant difference in survival was observed in comparison to CR-22. No significant differences with respect to survival, individual dry weight, growth rate or total dry weight were observed in comparison to CR-23W.

4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Mean survival in the negative control failed to meet the criteria of ≥90% for the test acceptability outlined in PSEP, 1995. Growth responses in the negative control and mean survival responses in the reference sediments met the criterion of ≥ 0.38 mg/worm/day and ≥80% survival respectively for test acceptability outlined in PSEP, 1995 and PSDDA, 1989.

Low control survival results may be attributed to anoxic conditions observed within the control sediment of two replicates. The colour of these replicates was dark grey as opposed to the pale cream colour of the other replicates which performed well. This theory is under investigation.

Water quality parameters measured during the 20-d exposure period were within the following ranges: temperature, 20.5 - 21.0°C; pH, 7.0 - 8.4; dissolved oxygen, 0.5 - 7.2

Table 4-1. Summary of results of the 20-d *N. arenaceodentata* sediment toxicity test.

Sample ID	Mean ± SD[1]			
	Survival (%)	Individual Dry Weight (mg/worm)	Individual Growth Rate (mg/worm/day)	Total Dry Weight (mg)
Negative control	60.0 ± 46.9	9.1 ± 4.3	0.43 ± 0.22	31.9 ± 28.5
CR-10	92.0 ± 11.0	9.1 ± 3.3	0.43 ± 0.16	42.8 ± 17.5
CR-22	88.0 ± 17.9	11.9 ± 1.0	0.57 ± 0.05	51.7 ± 8.3
CR-23W	80.0 ± 14.1	12.2 ± 4.2	0.59 ± 0.21	48.0 ± 16.6
AN-SS-36	96.0 ± 8.9	11.1 ± 2.9	0.53 ± 0.14	52.1 ± 8.2
AN-SS-37	72.0 ± 41.5	10.6 ± 1.6	0.51 ± 0.08	38.4 ± 23.2
AN-SS-45	80.0 ± 34.6	11.6 ± 5.6	0.55 ± 0.28	49.6 ± 28.5
AN-SS-47	60.0 ± 31.6□	9.5 ± 6.3	0.45 ± 0.31	32.6 ± 21.2○
AN-SC-70	88.0 ± 11.0	10.2 ± 3.7	0.48 ± 0.18	44.2 ± 14.1
AN-SC-71	88.0 ± 11.0	10.1 ± 1.4○	0.48 ± 0.07○	45.0 ± 11.9
AN-SC-72	92.0 ± 17.9	9.8 ± 3.8	0.47 ± 0.19	47.3 ± 22.2
AN-SC-73	88.0 ± 11.0	9.7 ± 4.5	0.46 ± 0.22	44.4 ± 25.2
AN-SC-77	80.0 ± 24.5	11.9 ± 1.6	0.57 ± 0.08	48.8 ± 19.7
AN-SC-78	60.0 ± 31.6□	12.4 ± 4.7	0.59 ± 0.24	33.4 ± 15.5○
AN-SC-80	88.0 ± 17.9	10.2 ± 2.1	0.48 ± 0.11	44.7 ± 11.9
AN-SC-81	72.0 ± 22.8	9.1 ± 3.2	0.43 ± 0.16	31.2 ± 12.3○
AN-SC-82	92.0 ± 11.0	10.3 ± 1.6	0.49 ± 0.08	48.0 ± 12.1
AN-SC-84	76.0 ± 16.7	8.7 ± 2.5○	0.41 ± 0.12○	33.9 ± 16.1○

[1] n=5 replicates; 5 worms seeded per replicate.
□ Indicates significant difference ($p \leq 0.05$) when compared to reference sediment CR-10.
○ Indicates significant difference ($p \leq 0.05$) when compared to reference sediment CR-22.
No significant differences when compared to reference sediment CR-23-W.

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: WW ADDENDUM #3 / EVS
EVS Project Number: 98-030-01 (ANCHOR #)
Contact Name: DAN HENNESSEY
Sampled By: K. MAGRUDER, S. WODZICKI, J. VIVEIROS

Ship to: EVS 195 PEMBERTON AVE., N. VANCOUVER, BC V7P
Attn: JENNIFER STEWART
Shipper: STEFAN WODZICKI
Form filled out by: K. MAGRUDER

Shipping Date: 10/29/98
Airbill Number: HAND COURIERED

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required) LARVAL	AMPHIPOD	Comments / Instructions [Jar tag number(s)]
10/29/98	1025	AN-SC-81	3 2oz/9	SED	1	2 6	5237, 5238, 5239, 5240, 5241, 5242, 5243, 5244, 5245
Total Number of Containers			9	Purchase Order / Statement of Work #			

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: STEFAN WODZICKI		Print name:	
Signature:		Signature:	
Company: ESI	Company: EVS	Company:	Company:
Date/Time: 10/24/98 16:46	Date/Time: 29Oct98 1646	Date/Time:	Date/Time:

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.

* Instructions for completion of Chain-of-Custody/Test Request Form on back.

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (206) 217-9343

To be completed by Laboratory upon sample receipt:

Date of receipt: 29Oct98	Laboratory W.O. #: 9800686-689
Condition upon receipt: 12°C	Time of receipt: 1646
Cooler temperature: 4.0°C	Received by: AJ

7 of 9

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: WW ADDENDUM #3/EVS
EVS Project Number: 98-030-01 (ANCHOR #)
Contact Name: DAN HENNESSEY
Sampled By: K.MABRUDER, S WODZICKI, J.VIEIROS

Ship to: EVS 195 PEMBERTON AVE., N. VANCOUVER, BC V7P 2R4
Attn: JENNIFER STEWART
Shipper: STEFAN WODZICKI
Form filled out by: K. MABRUDER

Shipping Date: 10/29/98
Airbill Number: HAND COURIERED

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required)							Comments / Instructions [Jar tag number(s)]
					LARVAL	POLYCHAETE	AMPHIPOD					
10/29/98	0923	AN-SC-82	3203/9	SED	1	2	6					5220, 5221, 5222, 5223, 5224, 5225, 5226, 5227, 5228.
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: STEFAN WODZICKI		Print name:	
Signature:		Signature:	
Company: ESI	Company: EVS	Company:	Company:
Date/Time: 10/29/98 16:46	Date/Time: 29 Oct 98 1646	Date/Time:	Date/Time:

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.
* Instructions for completion of Chain-of-Custody/Test Request Form on back.

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (206) 21[illegible]3

To be completed by Laboratory upon sample receipt:

Date of receipt: 29 Oct 98	Laboratory W.O. #: 9800686-689
Condition upon receipt: 12°C	Time of receipt: 1646
Cooler temperature: 4°C	Received by: AJW

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: WW ADDENDUM #3/EVS
EVS Project Number: 98-030-01 (ANCHOR #)
Contact Name: ~~KIRK~~ DAN HENNESSEY
Sampled By: K. MAGRUDER, T. VIVEIROS, S. WODZICKI

Ship to: EVS 195 PEMBERTON AVE. N. VANCOUVER, BC V7P 2
Attn: JENNIFER STEWART
Shipper: STEFAN WODZICKI
Form filled out by: K. MAGRUDER

Shipping Date: 10/29/98
Airbill Number: HAND COURIERED

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required) LARVAL	POLYCHAETE	AMPHIPOD					Comments / Instructions [Jar tag number(s)]
10/28/98	1542	AN-SC-80	32oz/9	SED	1	2	6					5203, 5204, 5205, 5206, 5207, 5208, 5209, 5210, 52
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: STEFAN WODZICKI		Print name:	
Signature:		Signature:	
Company: ESI	Company: EVS	Company:	Company:
Date/Time: 10/29/98 16:46	Date/Time: 29 Oct 98 1646	Date/Time:	Date/Time:

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.
* Instructions for completion of Chain-of-Custody/Test Request Form on back.

EVS ENVIRONMENT CONSULTANTS
• 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (6[illegible] 2-8
• 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (2[illegible] 17-9[illegible]

To be completed by Laboratory upon sample receipt:

Date of receipt: 29Oct98
Condition upon receipt: 12°C
Laboratory W.O. #: 9800686-689
Time of receipt: 1646

CHAIN-OF-CUSTODY/TEST REQUEST FORM

u16

Project/Client Name: WW ADDENDUM #3/EVS
EVS Project Number: 98-030-01 (ANCHOR #)
Contact Name: DAN HENNESSEY
Sampled By: K.MAGRUDER, S.WODZICKI, J.VIVEROS

Ship to: EVS 195 PEMBERTON AVE., N. VANCOUVER, BC V7P 2R4
Attn: JENNIFER STEWART
Shipping Date: 10/29/98
Shipper: STEFAN WODZICKI
Airbill Number: HAND COURIERED
Form filled out by: K. MAGRUDER

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required) LARVAL	POLYCHAETE	AMPHIPOD	Comments / Instructions [Jar tag number(s)]
10/28/98	0929	AN-SC-73	3203/9	SEDIMENT	1	2	6	5151, 5152, 5153, 5154, 5155, 5156, 5157, 5158, 5159
Total Number of Containers			9	Purchase Order / Statement of Work #				

1) Released by:
Print name: STEFAN WODZICKI
Signature:
Company: ESI
Date/Time: 10/29/98 16:46

1) Rec'd by: apw
Company: EVS
Date/Time: 29 Oct 98

2) Released by:
Print name:
Signature:
Company:
Date/Time:

1) Rec'd by:
Company:
Date/Time:

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.

* Instructions for completion of Chain-of-Custody/Test Request Form on back.

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-0237, Fax: (206) 21[illegible]13

To be completed by Laboratory upon sample receipt:

Date of receipt: 29Oct98	Laboratory W.O. #: 9800686-689
Condition upon receipt: 12°C	Time of receipt: 1646
Cooler temperature: 4°C	Received by: AJT

4 of 9

CHAIN-OF-CUSTODY/TEST REQUEST FORM

U15

Project/Client Name: WW ADDENDUM #3/EVS
EVS Project Number: 98-030-01 (ANCHOR#)
Contact Name: DAN HENNESSEY
Sampled By: K.MAGRUDER, J.VILFORDS, S.WODZICKI

Ship to: EVS 195 PEMBERTON AVE., N. VANCOUVER, BC V7P 2R4
Attn: JENNIFER STEWART
Shipping Date: 10/29/98
Shipper: STEFAN WODZICKI
Airbill Number: HAND COURIERED
Form filled out by: K. MAGRUDER

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required) LARVAL	REPRODUCTIVE	AMPHIPOD					Comments / Instructions [Jar tag number(s)]
10/28/98	1420	AN-SS-36	3208/9	SEDIMENT	1	2	6					5190, 5191, 5192, 5193, 5194, 5195, 5196, 5197, 5198
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: STEFAN WODZICKI		Print name:	
Signature:		Signature:	
Company: ESI	Company: EVS	Company:	Company:
Date/Time: 10/28/98 16:46	Date/Time: 29 OCT 98 1646	Date/Time:	Date/Time:

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.
* Instructions for completion of Chain-of-Custody/Test Request Form on back.

SAMPLES ARRIVED WITH ICE

To be completed by Laboratory upon sample receipt:

Date of receipt: 29 OCT 98	Laboratory W.O. #: 9809686-689
Condition upon receipt: 12°C	Time of receipt: 1646
Cooler temperature: 4°C	Received by: AJW

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (206) 217-9343

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CHAIN-OF-CUSTODY/TEST REQUEST FORM

J14

Project/Client Name: WW ADDENDUM #3 / EVS
EVS Project Number: 98-030-01 (ANCHOR #)
Contact Name: DAN HENNESSEY
Sampled By: K.MAERKLEY, S.WODZICKI, J.VIVEIROS

Ship to: EVS 195 PEMBERTON AVE, N. VANCOUVER, BC V7P 2R
Attn: JENNIFER STEWART
Shipper: STEFAN WODZICKI
Form filled out by: K. MAERKLEY

Shipping Date: 10/25/98
Airbill Number: HAND COURIERED

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required)							Comments / Instructions [Jar tag number(s)]
					LARVAL	POLYCHAETE	AMPHIPOD					
10/28/98	1150	AN-SC-98	3208/9	SED	1	2	6					5177, 5178, 5179, 5180, 5181, 5182, 5183, 5184, 5185
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: STEFAN WODZICKI		Print name:	
Signature:		Signature:	
Company: ESI	Company: EVS	Company:	Company:
Date/Time: 10/24/98 16:45	Date/Time: 29 Oct 98 1646	Date/Time:	Date/Time:

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.

SAMPLES ARRIVED WITH ICE

* Instructions for completion of Chain-of-Custody/Test Request Form on back.

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (206) [illegible]343

To be completed by Laboratory upon sample receipt:

Date of receipt: 29 Oct 98	Laboratory W.O. #: 9810686-689
Condition upon receipt: 12°C	Time of receipt: 1646
Cooler temperature: 4°C	Received by: AJ

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project Name: LDW ADDENDUM #3/EVS
EVS Project Number: 98-030-01 (ANCHOR #)
Contact Name: DAN HENNESSEY
Sampled By: K. MAGRUDER, S. WODZICKI, J. VIVEROS

Ship to: EVS 195 PEMBERTON AVE., N. VANCOUVER, BC V7P 2R4
Attn: JENNIFER STEWART
Shipper: STEFAN WODZICKI
Form filled out by: K. MAGRUDER

Shipping Date: 10/29/98
Airbill Number: HAND CARRIED

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required)							Comments / Instructions [Jar tag number(s)]
					LARVAL	POLYCHAETE	AMPHIPOD					
10/28/98	1032	AN-SC-77	300g/9	SEDIMENT	1	2	6					5164, 5165, 5166, 5167, 5168, 5169, 5170, 5171, 5172
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: STEFAN WODZICKI		Print name:	
Signature:		Signature:	
Company: ESI	Company: EVS	Company:	Company:
Date/Time: 10/29/98 16:45	Date/Time: 29 Oct 98 1646	Date/Time:	Date/Time:

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.

SAMPLES ARRIVED W/ICE

* Instructions for completion of Chain-of-Custody/Test Request Form on back.

To be completed by Laboratory upon sample receipt:

Date of receipt: 29Oct98	Laboratory W.O. #: 9810656 -689
Condition upon receipt: 12°C	Time of receipt: 1646
Cooler temperature: 4°C	Received by: AJW

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (206) 217-9343

1 of 9

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: WW ADDENDUM #3 / EVS
EVS Project Number: 98-030-01 (ANCHOR #)
Contact Name: DAN HENNESSEY
Sampled By: K. MAGRUDER, S. WODZICKI, J. VIVEIROS

Ship to: EVS 195 PEMBERTON AVE., N. VANCOUVER, BC V7P 2R4
Attn: JENNIFER STEWART
Shipper: STEFAN WODZICKI
Form filled out by: K. MAGRUDER

Shipping Date: 10/29/98
Airbill Number: HAND COURIERED

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required)							Comments / Instructions [Jar tag number(s)]
					LARVAL	POLYCHAETE	AMPHIPOD					TAG #
10/28/98	0841	AN-SC-72	3208/9	SEDIMENT	1	2	6					5138, 5139, 5140, 5141, 5142, 5143, 5144, 5145, 5146
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: STEFAN WODZICKI	Print name: AJW	Print name:	
Signature:	Company: EVS	Signature:	Company:
Company: ESI	Date/Time: 29 Oct 98 1646	Company:	Date/Time:
Date/Time: 10/29/98 16:45		Date/Time:	

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.
* Instructions for completion of Chain-of-Custody/Test Request Form on back.

SAMPLES ARRIVED W/ ICE

To be completed by Laboratory upon sample receipt:

Date of receipt: 29 Oct 98	Laboratory W.O. #: 9820686-689
Condition upon receipt: 12°C	Time of receipt: 1646
Cooler temperature: 4°C	Received by: AJ

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (206) -9343

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: WW ADDENDUM #3/EVS
EVS Project Number: 98-030-01 (ANCHOR#)
Contact Name: JULIE VIVEIROS
Sampled By: K. MAGRUDER, J. VIVEIROS, S. WADZICKI, K. LARSEN

Ship to: EVS 195 PEMBERTON AVE, N. VANCOUVER, BC V7P
Attn: JENNIFER STEWART
Shipping Date: 10/27/98
Shipper: BOULDER CARGO
Airbill Number: B21045
Form filled out by: K. MAGRUDER

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required)							Comments / Instructions [Jar tag number(s)]
					LARVAL	POLYCHAETE	AMPHIPOD					TAG #
10/27/98	1455	AN-SC-71	3208/9	SED	1	2	6					5126, 5128, 5127, 5128, 5129, 5130, 5131, 5132, 5133
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: K. MAGRUDER		Print name:	
Signature:	Company:	Signature:	Company:
Company: ANCHOR		Company:	
Date/Time: 10/27/98 16:10	Date/Time:	Date/Time:	Date/Time:

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.
* Instructions for completion of Chain-of-Custody/Test Request Form on back.

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (206) 217-9343

To be completed by Laboratory upon sample receipt:

Date of receipt: Oct 28/98	Laboratory W.O. #: 9800686 - 68
Condition upon receipt:	Time of receipt: 0950
Cooler temperature: 9 °C	Received by: RM

CHAIN-OF-CUSTODY/TEST REQUEST FORM

J00

Project/Client Name: WW ADDENDUM NO 3/EVS ~~ANCHOR~~ Ship to: EVS 195 PEMBERTON AVE, N.VANCOUVER, BC. V7P 2R4

EVS Project Number: 98-030-01 (ANCHOR#) Attn: JENNIFER STEWART Shipping Date: 10/27/98

Contact Name: ~~KAT~~ ~~KIM MAGRUDER~~, JULIE VIVEIROS Shipper: BORDER CARGO Airbill Number: B21045

Sampled By: K. MAGRUDER, JVIVEIROS, S. WODZICKI. K. LARM Form filled out by: K. MAGRUDER

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required)							Comments / Instructions [Jar tag number(s)]
					LARVAL	~~AMP~~ PCB/CHLORD	AMPHIPOD					
												TAG #
10/23/98	~~HOT~~	AN-SC-7D	3003/9	SED	1	2	6					5108, 5109, 5110, 5111, 5112, 5113, 5114, 5115, 5116
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: K. MAGRUDER		Print name:	
Signature:	Company:	Signature:	Company:
Company: ANCHOR		Company:	
Date/Time: 10/23/98 1610	Date/Time:	Date/Time:	Date/Time:

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.

* Instructions for completion of Chain-of-Custody/Test Request Form on back.

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (206) 9343

To be completed by Laboratory upon sample receipt:

Date of receipt: Oct 28/98	Laboratory W.O. #: 00686-689
Condition upon receipt:	Time of receipt: 0950
Cooler temperature: 9°C	Received by: R

EVS COOLER #8

8 of 10

CHAIN-OF-CUST DY/TEST REQUEST FORM

009

Project/Client Name: WW ADDENDUM #3 / ~~ANCHOR~~ EVS
EVS Project Number: 98-030-01 (ANCHOR #)
Contact Name: KIM MAGRUDER, JULIE VIVEIROS
Sampled By: K. MAGRUDER, J. VIVEIROS, S. WODZICKI, K. HARMS

Ship to: EVS 195 PEMBERTON AVE., N. VANCOUVER, BC V7P
Attn: JENNIFER STEWART
Shipper: BORDER CARGO
Form filled out by: K. MAGRUDER

Shipping Date: 10/27/98
Airbill Number: B21045

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required)							Comments / Instructions [Jar tag number(s)]
					LARVAL	POLYCHAETE	AMPHIPOD					
10/27/98	1222	AN-SS-47	3203/9	SED.	1	2	6					TAG # 5095, 5096, 5097, 5098, 5099, 5100, 5101, 5102, 5
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: K. MAGRUDER		Print name:	
Signature:		Signature:	
Company: ANCHOR	Company:	Company:	Company:
Date/Time: 10/27/98 1640	Date/Time:	Date/Time:	Date/Time:

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* Instructions for completion of Chain-of-Custody/Test Request Form on back.

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- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (2 17-9

To be completed by Laboratory upon sample receipt:

Date of receipt: 28 Oct 98
Condition upon receipt:
Laboratory W.O. #: 9800686-689
Time of receipt: 0950

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: WW ADDENDUM #3/EVS ANCHOR
EVS Project Number: 98-030-01 (ANCHOR#)
Contact Name: JULIE VIVEIROS
Sampled By: K.MAHRUDER, K.LARM, S.WODZICKI, J.VIVEIROS

Ship to: EVS 195 PEMBERTON AVE, N.VANCOUVER, BC V7P 2R4
Attn: JENNIFER STEWART
Shipper: BORDER CARGO
Form filled out by: KIM MAHRUDER

Shipping Date: 10/27/98
Airbill Number: B21045

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required)							Comments / Instructions [Jar tag number(s)]
					LARVAL	POLYCHAETE	AMPHIPOD					
10/27/98	1117	AN-SS-45	32oz/9	SED	1	2	6					TAG# 5082, 5083, 5084, 5085, 5086, 5087, 5088, 5089, 5090
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: Juliana Viveiros		Print name:	
Signature:	Company:	Signature:	Company:
Company: EVS		Company:	
Date/Time: 10-27-98 16:25	Date/Time:	Date/Time:	Date/Time:

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.

* Instructions for completion of Chain-of-Custody/Test Request Form on back.

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (206) [illegible]9343

To be completed by Laboratory upon sample receipt:

Date of receipt: OCT 28/98	Laboratory W.O. #: 9800686-689
Condition upon receipt:	Time of receipt: 0950
Cooler temperature: 9°C	Received by:

CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: WW ADDENDUM #3/EVS ANCHOR
EVS Project Number: 98-030-01 (ANCHOR #)
Contact Name: JULIE VIVEIROS
Sampled By: KIM MAGRUDER, JULIE VIVEIROS, STEFAN WODZICKI, KATHERINE LAMM

Ship to: EVS 195 PEMBERTON AVE, N.VANCOUVER, BC V7P 2R4
Attn: JENNIFER STEWART
Shipper: BORDER CARGO
Form filled out by: KIM MAGRUDER

Shipping Date: 10/27/98
Airbill Number: B21045

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required) LARVAL	POLYCHAETE	AMPHIPOD					Comments / Instructions [Jar tag number(s)]
												TAG#
10/27/98	0920	AN-SC-84	300g/9	SEDIMENTS	1	2	6					5069, 5070, 5071, 5072, 5073, 5074, 5075, 5076, 5081
		AN-SS-45 KM										
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: Juliana Viveiros		Print name:	
Signature: Juliana Viveiros		Signature:	
Company: EVS	Company:	Company:	Company:
Date/Time: 10-27-98 16:25	Date/Time:	Date/Time:	Date/Time:

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.
* Instructions for completion of Chain-of-Custody/Test Request Form on back.

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (206) 217-9343

To be completed by Laboratory upon sample receipt:

Date of receipt: 28 Oct 98	Laboratory W.O. #: 9800656-689
Condition upon receipt:	Time of receipt: 0930
Cooler temperature: 10°C	Received by: ML

1 of 1

CHAIN-OF-CUSTODY/TEST REQUEST FORM

u4i

Project/Client Name: Anchor Environmental
EVS Project Number:
Contact Name: Kim Magruder / Dan Hennessy (ESI)
Sampled By: Charlie Eaton

Ship to: EVS N-Vancouver Lab
Attn: Jennifer Stewart
Shipper: Border Cargo
Form filled out by: Dan Hennessy

Shipping Date: 10/30/98
Airbill Number: N/A

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required)							Comments / Instructions [Jar tag number(s)]
					10-d Amph.	20-d Neanthes	PSD					
10/29/98	1102	CR-10	32 64oz/10	Sediment	X	X	X					10 x 1 L.
10/29/98	1243	CR-22	32 64oz/9	Sediment	X	X	X					9 x 1 L
10/29/98	1426	CR23W	32 64oz/9* JMB	Sediment	X	X	X			9 x 1 L		*Two jars only labeled on lids with sample ID, sample ID left blank on labels
Total Number of Containers			3	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: Daniel P. Hennessy	Company:	Print name:	Company:
Signature:	Date/Time:	Signature:	Date/Time:
Company: ESI		Company:	
Date/Time: 10/30/98 0835		Date/Time:	

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.
* Instructions for completion of Chain-of-Custody/Test Request Form on back.

Samples arrived w/ ice

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-[illegible], Fax: (206) 217[illegible]

To be completed by Laboratory upon sample receipt:

Date of receipt: 30 oct 98	Laboratory W.O. #: 9800686-689
Condition upon receipt: Good	Time of receipt: 1701
Cooler temperature: 5°C	Received by: JMB

APPENDIX A

Chain of Custody Forms

Tidepool Scientific Software. 1994. TOXCALC: Comprehensive Toxicity Data Analysis and Database Software, Version 5.0. Tidepool Scientific Software, McKinleyville, CA. 80pp.

US EPA/US ACE. 1993. Technical panel recommendations concerning use of acute amphipod tests in evaluation of dredged material. Memorandum. U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. U.S. Environmental Protection Agency, Department of Water, Washington, DC.

6.0
REFERENCES

ASTM (American Society for Testing and Materials). 1997. Standard guide for conducting sediment toxicity tests with marine and estuarine polychaetous annelids. Method 1611-94. In: 1997 Annual Book of ASTM Standards, Water and Environmental Technology, Volume 11.05. American Society for Testing and Materials, Philadelphia, PA.

EVS (EVS Environment Consultants). 1998. *Eohaustorius estuarius* 10-d amphipod toxicity test. EVS SOP 1077-2. In: EVS Consultants Laboratory Standard Operating Procedures (SOPs) Manual. Volume III: Sediment. EVS Environment Consultants, North Vancouver, BC.

EVS. 1995a. *Neanthes* 20-d sediment toxicity test. EVS SOP 1078-1. In: EVS Consultants Laboratory Standard Operating Procedures (SOPs) Manual. Volume III: Sediment. EVS Environment Consultants, North Vancouver, BC.

EVS. 1995b. Bivalve larvae whole sediment toxicity test. EVS SOP 1057-2. In: EVS Consultants Laboratory Standard Operating Procedures (SOPs) Manual. Volume III: Sediment. EVS Environment Consultants, North Vancouver, BC.

Hach Company. 1992. Water Analyses Handbook: Second Edition. Hach Company, Loveland, CO. 831pp.

PSDDA (Puget Sound Dredged Disposal Analysis). 1989. Management plan report (MPR) - Phase II. U.S. Army Corps of Engineers, Seattle District; U.S. Environmental Protection Agency, Region X; Seattle, WA. Washington State Department of Natural Resources; and Washington State Department of Ecology. September 1989.

PSEP (Puget Sound Estuary Program). 1995. Recommended guidelines for conducting laboratory bioassays on Puget Sound sediments. Prepared for the U.S. Environmental Protection Agency, Region 10, Seattle, WA. July 1995. 85 pp.

Swartz, R.C., W.A. DeBen, J.K. Phillips, J.O. Lamberson and F.A. Cole. 1985. Phoxocephalid amphipod bioassay for marine sediment toxicity. R.D. Cardwell, R. Purdy and R.C. Bahner (eds). In: Aquatic Toxicology and Hazard Assessment: Proceedings of the Seventh Annual Symposium ASTM STP 854, American Society for Testing and Materials, Philadelphia, PA.

The 48-h EC50 value for the sodium dodecyl sulphate (SDS) reference toxicant (initiated concurrently on November 25, 1998) was 3.3 mg/L SDS (95% confidence limits: 3.2 and 3.4 mg/L SDS). This value was within the laboratory range of 3.7 ± 1.6 mg/L SDS (mean ± 2 SD). Water quality parameters measured in the reference toxicant test were within the following ranges: temperature, 15.0 - 16.0°C; pH, 7.5 - 8.1; dissolved oxygen, 2.0 - 8.1 mg/L; and salinity, 28 - 31 ppt.

Table 5-1. Summary of results of the 48-h *M. galloprovincialis* larval development sediment toxicity test.

SAMPLE ID	% NORMAL (MEAN ± SD)	% SURVIVAL (MEAN ± SD)	% SURVIVAL/NORMAL (MEAN ± SD)
Negative control	94.1 ± 1.1	96.8 ± 3.6	91.8 ± 5.0
CR-10	92.9 ± 4.0	75.5 ± 8.9*	70.0 ± 7.5*
CR-22	97.4 ± 2.0	70.4 ± 6.1*	68.6 ± 5.7*
CR-23W	95.9 ± 0.8	71.6 ± 3.6*	68.7 ± 3.6*
AN-SS-36	92.4 ± 4.2+	65.9 ± 4.9*□△	60.8 ±4.4*□+△
AN-SS-37	93.2± 1.4+△	68.1 ± 2.2*△	63.4 ± 3.0*○
AN-SS-45	78.9 ± 7.2*□+△	64.2 ± 8.5*□	51.1 ± 10.6*□+△
AN-SS-47	68.1 ± 9.7*□+△	56.6 ± 5.0*△+□	38.7 ± 7.8*□+△
AN-SC-70	97.7 ± 1.0	74.4 ± 4.8*	72.7 ± 4.8*
AN-SC-71	91.0 ± 2.2*+△	75.0 ± 3.5*	68.3 ± 4.0*
AN-SC-72	97.0 ± 0.8	71.0 ± 5.5*	68.8 ± 5.1*
AN-SC-73	96.0 ± 1.2	70.8 ± 3.0*	68.0 ± 3.6*
AN-SC-77	95.0 ± 0.9+	77.1 ± 3.2*	73.2 ± 2.9*
AN-SC-78	91.0 ± 2.6*+△	71.4 ± 5.8*	65.0 ± 6.1*
AN-SC-80	74.8 ± 6.8*□+△	72.8 ± 8.2*	54.7 ± 9.3*□+△
AN-SC-81	83.3 ± 1.5*□+△	70.5 ± 3.5*	58.7 ± 2.0*□+△
AN-SC-82	78.0 ± 11.3*□+△	76.5 ± 6.4*	59.8 ± 11.3*
AN-SC-84	97.1 ± 1.0	81.0 ± 2.5*	78.7 ± 2.0*

n = 5 replicates.
* Indicates significant difference ($p \leq 0.05$) when compared to the negative control.
□ Indicates significant difference ($p \leq 0.05$) when compared to the reference sediment CR-10.
○ Indicates significant difference ($p \leq 0.05$) when compared to the reference sediment CR-22.
△ Indicates significant difference ($p \leq 0.05$) when compared to the reference sediment CR-23W.

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CHAIN-OF-CUSTODY/TEST REQUEST FORM

Project/Client Name: WW ADDENDUM #3/EVS
EVS Project Number: 98-030-01 (ANCHOR #)
Contact Name: DAN HENNESSEY
Sampled By: K. MAGRUDER, S. WODZICKI, J. VIEIROS

Ship to: EVS 195 PEMBERTON AVE., N. VANCOUVER, BC V7P 2R
Attn: JENNIFER STEWART
Shipper: STEFAN WODZICKI
Form filled out by: K. MAGRUDER

Shipping Date: 10/29/98
Airbill Number: HAND COURIERED

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required)							Comments / Instructions [Jar tag number(s)]
					LARVAL	POLYCHAETE	AMPHIPOD					
10/29/98	1115	AN-SS-37	3208/9	SED	1	2	6					5250, 5251, 5253, 5254, 5255 5256, 5257, 5258
Total Number of Containers			9	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	1) Rec'd by:
Print name: STEFAN WODZICKI	Print name: AJW	Print name:	
Signature:	Company: EVS	Signature:	Company:
Company: ESI	Date/Time: 29 Oct 98 1646	Company:	Date/Time:
Date/Time: 10/24/98 16:46		Date/Time:	

* Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy.
* Instructions for completion of Chain-of-Custody/Test Request Form on back.

EVS ENVIRONMENT CONSULTANTS

- 195 Pemberton Avenue, North Vancouver, B.C., Canada, V7P 2R4, Tel: (604) 986-4331, Fax: (604) 662-8548
- 200 West Mercer Street, Suite 403, Seattle, WA 98119, Tel: (206) 217-9337, Fax: (206) 217-9343

To be completed by Laboratory upon sample receipt:

Date of receipt: 29 Oct 98	Laboratory W.O. #: 980686-689
Condition upon receipt: 12°C	Time of receipt: 1646
Cooler temperature: 4°C	Received by: AJW

are $p \leq 0.05$. For the test to be considered valid, mean control performance must be ≥70% mean survival/normal larvae (PSEP, 1995).

To assess the relative sensitivity of the test organisms a separate positive (toxic) control test was conducted, using sodium dodecyl sulphate (SDS) in a 48-h reference toxicant test. This was set up in the same manner as the test except that it was conducted without sediment. A series of five test concentrations (1.0, 1.8, 3.2, 5.6 and 10.0 mg/L SDS), with three replicates each, was prepared from a 1,000 mg/L SDS stock solution. This test was used to assess the relative health and sensitivity of the larvae by comparing the results to ranges (mean ± 2SD) obtained by this laboratory in previous testing.

5.2 RESULTS

The results of the bivalve larvae toxicity test are summarized in Table 5-1. Complete results including raw data and statistical printouts, are provided in Appendix E.

The initial density of embryos introduced into each test container was determined to be 285 embryos/10 mL. Mean percent survival/normal larvae in the seawater control was 91.8% and ranged between 68.6 and 70.0% in the reference sediments. Mean percent survival/normal larvae in the test sediments ranged from 38.7 and 78.7%. Mean percent normal larvae ranged from 92.9 to 97.4% in the reference sediments and was 94.1 % in the seawater control. In the test sediments, mean percent normal larvae ranged from 68.1 and 97.7%. Mean percent survival ranged from 70.4 to 75.5% in the reference sediments and was 96.8% in the seawater control. In the test sediments, mean percent survival ranged from 56.6 and 81.0%. Heteroscedastic t-tests indicated significant differences ($p \leq 0.05$) in normality when the samples were compared to the negative control and all three reference sediments. Homoscedastic t-tests indicated significant differences ($p \leq 0.05$) in survival and the survival/normal endpoint when the samples were compared to the negative control and all three reference sediments.

5.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Mean percent survival/normal larvae in the seawater control met the criterion for test acceptability (PSEP, 1995).

Water quality parameters measured during the test were within the following ranges: temperature, 15.0 - 17.0°C; pH, 7.7 - 8.1; dissolved oxygen, 4.7 - 8.0 mg/L; salinity, 29 - 31 ppt; overlying ammonia, <0.02 - 0.94 mg/L N; and overlying sulfides, <0.02 - <0.05 mg/L S.

After 48 h, the overlying water from each replicate was poured off, collected, and then mixed to re-suspend the larvae. A 10-mL subsample of larvae was quantitatively transferred to a test tube using an automatic pipette, and preserved in 50% buffered formalin. Another subsample was also collected as a back-up to confirm results if needed. The preserved samples were later examined in Sedgewick-Rafter counting chambers under 40X magnification. Samples collected from the "zero-time" controls on Day 0 were counted to confirm the number of embryos introduced. Salinity, dissolved oxygen, temperature and pH were measured in each container at the termination of the larval toxicity test.

Adverse effects on development were determined on the basis of normal shell development to the 48-h prodissoconch I stage. Normal and abnormal prodissoconch I larvae were recorded in each replicate to determine percent normality. Larvae which failed to transform to the fully shelled, straight hinged "D" shaped prodissoconch I stage were considered abnormal. Normal and abnormal prodissoconch I larvae were enumerated for each replicate, and mean percent normal larvae was calculated using the following equation:

$$Mean\ Normal\ Larvae\ (\%) = \frac{mean\ no.\ normal\ larvae}{mean\ no.\ of\ total\ larvae} \times 100$$

Mean survival was calculated using the following equation:

$$Mean\ Survival\ (\%) = \frac{mean\ no.\ of\ total\ larvae}{no.\ of\ embryos\ introduced} \times 100$$

Mean survival/normal larvae was calculated using the following equation:

$$Mean\ Survival/Normal\ Larvae\ (\%) = \frac{mean\ no.\ of\ normal\ larvae}{no.\ of\ embryos\ introduced} \times 100$$

The survival/normal larvae endpoint uses data from both endpoints to determine the percentage of larvae which survive ***and*** develop normally. Percent normal larvae, survival and survival/normal larvae data were analyzed using the TOXCALC computer program (Tidepool Scientific Software, 1994). The responses in the test sediments were compared to the negative control and reference sediments, CR-10, CR-22 and CR-23W. Survival, normal and survival/normal data were first transformed using an arcsine square root transformation and then tested for normality (Kolmogorov D-Test) and homogeneity of variance (Bartlett's test). Homoscedastic t-tests or non-parametric heteroscedastic t-tests were then performed to determine if any of the test sediments were significantly different ($p \leq 0.05$) from the negative control and reference sediments (CR-10, CR-22 and CR-23W). PSDDA (1989) requires statistical comparisons with an alpha level of 10% ($p \leq 0.10$). However, TOXCALC is incapable of making comparisons at $p \leq 0.10$; the statistical comparisons made in this report

Amphipod Survival and Avoidance Test-10 Day Survival

Start Date:	11/6/98	Test ID:	EVS8418	Sample ID:	VARIOUS
End Date:	11/16/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	EE-Eohaustorius estuarius
Comments:	Whatcom Waterway (Non-Purge);9/852-01.1; 9800686				

Conc-%	1	2	3	4	5
S-Control	1.0000	1.0000	0.9500	1.0000	0.9500
CR-23W	0.9500	0.9500	1.0000	0.9500	0.9500
CR-10	0.9500	0.9500	0.9000	0.8500	0.9000
CR-22	1.0000	0.9500	1.0000	1.0000	0.9000
AN-SS-36	0.8500	0.9500	0.7500	0.9500	0.9500
AN-SS-37	0.9000	0.9000	0.9500	0.9500	0.9500
AN-SS-45	0.7500	0.9500	0.8000	0.9500	1.0000
AN-SS-47	0.9000	0.8500	0.8500	0.8000	0.9500
AN-SC-70	1.0000	0.9000	0.9500	0.9500	0.9000
AN-SC-71	0.9500	0.9000	0.8500	0.9000	0.9500
AN-SC-72	0.8000	0.9000	1.0000	0.9500	1.0000
AN-SC-73	1.0000	0.8000	0.9500	0.9500	0.9000
AN-SC-77	0.9000	1.0000	0.9500	0.9500	0.9000
AN-SC-78	1.0000	1.0000	1.0000	1.0000	0.8500
AN-SC-80	1.0000	1.0000	0.9000	1.0000	1.0000
AN-SC-81	1.0000	0.8500	0.9500	0.7000	0.8500
AN-SC-82	0.9500	1.0000	0.9500	1.0000	0.9500
AN-SC-84	0.9000	1.0000	1.0000	0.9500	0.9000

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
S-Control	0.9800	0.0274	0.9800	0.9500	1.0000	2.795	5			
CR-23W	0.9600	0.0224	0.9600	0.9500	1.0000	2.329	5			
*CR-10	0.9100	0.0418	0.9100	0.8500	0.9500	4.597	5	2.357	1.860	0.0008
CR-22	0.9700	0.0447	0.9700	0.9000	1.0000	4.610	5	-0.447	1.860	0.0009
AN-SS-36	0.8900	0.0894	0.8900	0.7500	0.9500	10.050	5	1.698	1.860	0.0032
*AN-SS-37	0.9300	0.0274	0.9300	0.9000	0.9500	2.945	5	1.897	1.860	0.0005
N-SS-45	0.8900	0.1084	0.8900	0.7500	1.0000	12.179	5	1.414	1.860	0.0046
AN-SS-47	0.8700	0.0570	0.8700	0.8000	0.9500	6.553	5	3.286	1.860	0.0014
AN-SC-70	0.9400	0.0418	0.9400	0.9000	1.0000	4.450	5	0.943	1.860	0.0008
*AN-SC-71	0.9100	0.0418	0.9100	0.8500	0.9500	4.597	5	2.357	1.860	0.0008
AN-SC-72	0.9300	0.0837	0.9300	0.8000	1.0000	8.996	5	0.775	1.860	0.0028
AN-SC-73	0.9200	0.0758	0.9200	0.8000	1.0000	8.242	5	1.131	1.860	0.0023
AN-SC-77	0.9400	0.0418	0.9400	0.9000	1.0000	4.450	5	0.943	1.860	0.0008
AN-SC-78	0.9700	0.0671	0.9700	0.8500	1.0000	6.916	5	-0.316	1.860	0.0019
AN-SC-80	0.9800	0.0447	0.9800	0.9000	1.0000	4.563	5	-0.894	1.860	0.0009
AN-SC-81	0.8700	0.1151	0.8700	0.7000	1.0000	13.231	5	1.716	1.860	0.0051
AN-SC-82	0.9700	0.0274	0.9700	0.9500	1.0000	2.823	5	-0.632	1.860	0.0005
AN-SC-84	0.9500	0.0500	0.9500	0.9000	1.0000	5.263	5	0.408	1.860	0.0011

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.10481	1.035	-0.7069	0.73142
Bartlett's Test indicates equal variances (p = 0.06)	25.8676	31.9999		
The control means are not significantly different (p = 0.24)	1.26491	2.30601		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates significant differences

* Indicates significant difference when compared to Reference Sediment CR~~-32W~~ 23W Bem

Reviewed by: GSL

Amphipod Survival and Avoidance Test-10 Day Survival

Start Date:	11/6/98	Test ID:	EVS8418	Sample ID:	VARIOUS
End Date:	11/16/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	EE-Eohaustorius estuarius
Comments:	Whatcom Waterway (Non-Purge);9/852-01.1; 9800686				

Conc-%	1	2	3	4	5
S-Control	1.0000	1.0000	0.9500	1.0000	0.9500
CR-22	1.0000	0.9500	1.0000	1.0000	0.9000
CR-23W	0.9500	0.9500	1.0000	0.9500	0.9500
CR-10	0.9500	0.9500	0.9000	0.8500	0.9000
AN-SS-36	0.8500	0.9500	0.7500	0.9500	0.9500
AN-SS-37	0.9000	0.9000	0.9500	0.9500	0.9500
AN-SS-45	0.7500	0.9500	0.8000	0.9500	1.0000
AN-SS-47	0.9000	0.8500	0.8500	0.8000	0.9500
AN-SC-70	1.0000	0.9000	0.9500	0.9500	0.9000
AN-SC-71	0.9500	0.9000	0.8500	0.9000	0.9500
AN-SC-72	0.8000	0.9000	1.0000	0.9500	1.0000
AN-SC-73	1.0000	0.8000	0.9500	0.9500	0.9000
AN-SC-77	0.9000	1.0000	0.9500	0.9500	0.9000
AN-SC-78	1.0000	1.0000	1.0000	1.0000	0.8500
AN-SC-80	1.0000	1.0000	0.9000	1.0000	1.0000
AN-SC-81	1.0000	0.8500	0.9500	0.7000	0.8500
AN-SC-82	0.9500	1.0000	0.9500	1.0000	0.9500
AN-SC-84	0.9000	1.0000	1.0000	0.9500	0.9000

			Transform: Untransformed					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
S-Control	0.9800	0.0274	0.9800	0.9500	1.0000	2.795	5			
CR-22	0.9700	0.0447	0.9700	0.9000	1.0000	4.610	5			
CR-23W	0.9600	0.0224	0.9600	0.9500	1.0000	2.329	5	0.447	1.860	0.0009
*CR-10	0.9100	0.0418	0.9100	0.8500	0.9500	4.597	5	2.191	1.860	0.0014
AN-SS-36	0.8900	0.0894	0.8900	0.7500	0.9500	10.050	5	1.789	1.860	0.0037
AN-SS-37	0.9300	0.0274	0.9300	0.9000	0.9500	2.945	5	1.706	1.860	0.0010
AN-SS-45	0.8900	0.1084	0.8900	0.7500	1.0000	12.179	5	1.526	1.860	0.0051
*AN-SS-47	0.8700	0.0570	0.8700	0.8000	0.9500	6.553	5	3.086	1.860	0.0020
AN-SC-70	0.9400	0.0418	0.9400	0.9000	1.0000	4.450	5	1.095	1.860	0.0014
*AN-SC-71	0.9100	0.0418	0.9100	0.8500	0.9500	4.597	5	2.191	1.860	0.0014
AN-SC-72	0.9300	0.0837	0.9300	0.8000	1.0000	8.996	5	0.943	1.860	0.0033
AN-SC-73	0.9200	0.0758	0.9200	0.8000	1.0000	8.242	5	1.270	1.860	0.0029
AN-SC-77	0.9400	0.0418	0.9400	0.9000	1.0000	4.450	5	1.095	1.860	0.0014
AN-SC-78	0.9700	0.0671	0.9700	0.8500	1.0000	6.916	5	0.000	1.860	0.0024
AN-SC-80	0.9800	0.0447	0.9800	0.9000	1.0000	4.563	5	-0.354	1.860	0.0015
AN-SC-81	0.8700	0.1151	0.8700	0.7000	1.0000	13.231	5	1.811	1.860	0.0057
AN-SC-82	0.9700	0.0274	0.9700	0.9500	1.0000	2.823	5	0.000	1.860	0.0010
AN-SC-84	0.9500	0.0500	0.9500	0.9000	1.0000	5.263	5	0.667	1.860	0.0017

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.10481	1.035	-0.7069	0.73142
Bartlett's Test indicates equal variances (p = 0.06)	25.8676	31.9999		
The control means are not significantly different (p = 0.68)	0.4264	2.30601		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates significant differences

* Indicates significant difference when compared to ~~CR-10~~ CR-22

Reviewed by: GSL

Amphipod Survival and Avoidance Test-10 Day Survival

Start Date:	11/6/98	Test ID:	EVS8418	Sample ID:	VARIOUS
End Date:	11/16/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	EE-Eohaustorius estuarius
Comments:	Whatcom Waterway (Non-Purge);9/852-01.1; 9800686				

Conc-%	1	2	3	4	5
S-Control	1.0000	1.0000	0.9500	1.0000	0.9500
CR-10	0.9500	0.9500	0.9000	0.8500	0.9000
CR-23W	0.9500	0.9500	1.0000	0.9500	0.9500
CR-22	1.0000	0.9500	1.0000	1.0000	0.9000
AN-SS-36	0.8500	0.9500	0.7500	0.9500	0.9500
AN-SS-37	0.9000	0.9000	0.9500	0.9500	0.9500
AN-SS-45	0.7500	0.9500	0.8000	0.9500	1.0000
AN-SS-47	0.9000	0.8500	0.8500	0.8000	0.9500
AN-SC-70	1.0000	0.9000	0.9500	0.9500	0.9000
AN-SC-71	0.9500	0.9000	0.8500	0.9000	0.9500
AN-SC-72	0.8000	0.9000	1.0000	0.9500	1.0000
AN-SC-73	1.0000	0.8000	0.9500	0.9500	0.9000
AN-SC-77	0.9000	1.0000	0.9500	0.9500	0.9000
AN-SC-78	1.0000	1.0000	1.0000	1.0000	0.8500
AN-SC-80	1.0000	1.0000	0.9000	1.0000	1.0000
AN-SC-81	1.0000	0.8500	0.9500	0.7000	0.8500
AN-SC-82	0.9500	1.0000	0.9500	1.0000	0.9500
AN-SC-84	0.9000	1.0000	1.0000	0.9500	0.9000

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
S-Control	0.9800	0.0274	0.9800	0.9500	1.0000	2.795	5			
CR-10	0.9100	0.0418	0.9100	0.8500	0.9500	4.597	5			
CR-23W	0.9600	0.0224	0.9600	0.9500	1.0000	2.329	5	-2.357	1.860	0.0008
CR-22	0.9700	0.0447	0.9700	0.9000	1.0000	4.610	5	-2.191	1.860	0.0014
AN-SS-36	0.8900	0.0894	0.8900	0.7500	0.9500	10.050	5	0.453	1.860	0.0036
AN-SS-37	0.9300	0.0274	0.9300	0.9000	0.9500	2.945	5	-0.894	1.860	0.0009
AN-SS-45	0.8900	0.1084	0.8900	0.7500	1.0000	12.179	5	0.385	1.860	0.0050
AN-SS-47	0.8700	0.0570	0.8700	0.8000	0.9500	6.553	5	1.265	1.860	0.0019
AN-SC-70	0.9400	0.0418	0.9400	0.9000	1.0000	4.450	5	-1.134	1.860	0.0013
AN-SC-71	0.9100	0.0418	0.9100	0.8500	0.9500	4.597	5	0.000	1.860	0.0013
AN-SC-72	0.9300	0.0837	0.9300	0.8000	1.0000	8.996	5	-0.478	1.860	0.0033
AN-SC-73	0.9200	0.0758	0.9200	0.8000	1.0000	8.242	5	-0.258	1.860	0.0028
AN-SC-77	0.9400	0.0418	0.9400	0.9000	1.0000	4.450	5	-1.134	1.860	0.0013
AN-SC-78	0.9700	0.0671	0.9700	0.8500	1.0000	6.916	5	-1.697	1.860	0.0023
AN-SC-80	0.9800	0.0447	0.9800	0.9000	1.0000	4.563	5	-2.556	1.860	0.0014
AN-SC-81	0.8700	0.1151	0.8700	0.7000	1.0000	13.231	5	0.730	1.860	0.0056
AN-SC-82	0.9700	0.0274	0.9700	0.9500	1.0000	2.823	5	-2.683	1.860	0.0009
AN-SC-84	0.9500	0.0500	0.9500	0.9000	1.0000	5.263	5	-1.372	1.860	0.0016

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.10481	1.035	-0.7069	0.73142
Bartlett's Test indicates equal variances (p = 0.06)	25.8676	31.9999		
The control means are significantly different (p = 0.01)	3.1305	2.30601		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

No significant differences when compared to Reference Sediment CR-10.

Amphipod Survival and Avoidance Test-10 Day Survival

Start Date:	11/6/98	Test ID:	EVS8418	Sample ID:	VARIOUS
End Date:	11/16/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	EE-Eohaustorius estuarius
Comments:	Whatcom Waterway (Non-Purge);9/852-01.1; 9800686				

Conc-%	1	2	3	4	5
S-Control	1.0000	1.0000	0.9500	1.0000	0.9500
CR-23W	0.9500	0.9500	1.0000	0.9500	0.9500
CR-10	0.9500	0.9500	0.9000	0.8500	0.9000
CR-22	1.0000	0.9500	1.0000	1.0000	0.9000
AN-SS-36	0.8500	0.9500	0.7500	0.9500	0.9500
AN-SS-37	0.9000	0.9000	0.9500	0.9500	0.9500
AN-SS-45	0.7500	0.9500	0.8000	0.9500	1.0000
AN-SS-47	0.9000	0.8500	0.8500	0.8000	0.9500
AN-SC-70	1.0000	0.9000	0.9500	0.9500	0.9000
AN-SC-71	0.9500	0.9000	0.8500	0.9000	0.9500
AN-SC-72	0.8000	0.9000	1.0000	0.9500	1.0000
AN-SC-73	1.0000	0.8000	0.9500	0.9500	0.9000
AN-SC-77	0.9000	1.0000	0.9500	0.9500	0.9000
AN-SC-78	1.0000	1.0000	1.0000	1.0000	0.8500
AN-SC-80	1.0000	1.0000	0.9000	1.0000	1.0000
AN-SC-81	1.0000	0.8500	0.9500	0.7000	0.8500
AN-SC-82	0.9500	1.0000	0.9500	1.0000	0.9500
AN-SC-84	0.9000	1.0000	1.0000	0.9500	0.9000

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
S-Control	0.9800	0.0274	0.9800	0.9500	1.0000	2.795	5			
CR-23W	0.9600	0.0224	0.9600	0.9500	1.0000	2.329	5	1.265	1.860	0.0005
*CR-10	0.9100	0.0418	0.9100	0.8500	0.9500	4.597	5	3.130	1.860	0.0009
CR-22	0.9700	0.0447	0.9700	0.9000	1.0000	4.610	5	0.426	1.860	0.0010
*AN-SS-36	0.8900	0.0894	0.8900	0.7500	0.9500	10.050	5	2.151	1.860	0.0033
*AN-SS-37	0.9300	0.0274	0.9300	0.9000	0.9500	2.945	5	2.887	1.860	0.0006
AN-SS-45	0.8900	0.1084	0.8900	0.7500	1.0000	12.179	5	1.800	1.860	0.0046
*AN-SS-47	0.8700	0.0570	0.8700	0.8000	0.9500	6.553	5	3.889	1.860	0.0015
AN-SC-70	0.9400	0.0418	0.9400	0.9000	1.0000	4.450	5	1.789	1.860	0.0009
*AN-SC-71	0.9100	0.0418	0.9100	0.8500	0.9500	4.597	5	3.130	1.860	0.0009
AN-SC-72	0.9300	0.0837	0.9300	0.8000	1.0000	8.996	5	1.270	1.860	0.0029
AN-SC-73	0.9200	0.0758	0.9200	0.8000	1.0000	8.242	5	1.664	1.860	0.0024
AN-SC-77	0.9400	0.0418	0.9400	0.9000	1.0000	4.450	5	1.789	1.860	0.0009
AN-SC-78	0.9700	0.0671	0.9700	0.8500	1.0000	6.916	5	0.309	1.860	0.0020
AN-SC-80	0.9800	0.0447	0.9800	0.9000	1.0000	4.563	5	0.000	1.860	0.0010
*AN-SC-81	0.8700	0.1151	0.8700	0.7000	1.0000	13.231	5	2.079	1.860	0.0052
AN-SC-82	0.9700	0.0274	0.9700	0.9500	1.0000	2.823	5	0.577	1.860	0.0006
AN-SC-84	0.9500	0.0500	0.9500	0.9000	1.0000	5.263	5	1.177	1.860	0.0012

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.22853	1.035	-0.7169	0.86599
Bartlett's Test indicates equal variances (p = 0.03)	29.0151	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates significant differences

* Indicates significant difference when compared to the ~~control~~ S-Control

Test: AM-Amphipod Survival and Avoidance Test — Test ID: EVS8418
Species: EE-Eohaustorius estuarius — Protocol: PSEP 95
Sample ID: VARIOUS — Sample Type: SEDIMENT1-Marine
Start Date: 11/6/98 — End Date: 11/16/98 — Lab ID: BCEVS-EVS Environment Consultants

	53	3	AN-SC-72	20	20	3	0	
	54	4	AN-SC-72	20	19	2	0	
	55	5	AN-SC-72	20	20	3	0	
	56	1	AN-SC-73	20	20	0	0	
	57	2	AN-SC-73	20	16	2	0	
	58	3	AN-SC-73	20	19	4	0	
	59	4	AN-SC-73	20	19	1	0	
	60	5	AN-SC-73	20	18	0	0	
	61	1	AN-SC-77	20	18	0	0	
	62	2	AN-SC-77	20	20	1	0	
	63	3	AN-SC-77	20	19	0	0	
	64	4	AN-SC-77	20	19	1	0	
	65	5	AN-SC-77	20	18	0	0	
	66	1	AN-SC-78	20	20	2	0	
	67	2	AN-SC-78	20	20	5	0	
	68	3	AN-SC-78	20	20	0	0	
	69	4	AN-SC-78	20	20	0	0	
	70	5	AN-SC-78	20	17	1	0	
	71	1	AN-SC-80	20	20	1	0	
	72	2	AN-SC-80	20	20	5	0	
	73	3	AN-SC-80	20	18	0	0	
	74	4	AN-SC-80	20	20	2	0	
	75	5	AN-SC-80	20	20	0	0	
	76	1	AN-SC-81	20	20	6	0	
	77	2	AN-SC-81	20	17	4	0	
	78	3	AN-SC-81	20	19	6	0	
	79	4	AN-SC-81	20	14	6	0	
	80	5	AN-SC-81	20	17	6	0	
	81	1	AN-SC-82	20	19	0	0	
	82	2	AN-SC-82	20	20	1	0	
	83	3	AN-SC-82	20	19	0	0	
	84	4	AN-SC-82	20	20	4	0	
	85	5	AN-SC-82	20	19	1	0	
	86	1	AN-SC-84	20	18	0	0	
	87	2	AN-SC-84	20	20	0	0	
	88	3	AN-SC-84	20	20	0	0	
	89	4	AN-SC-84	20	19	1	0	
	90	5	AN-SC-84	20	18	0	0	

Comments: Whatcom Waterway (Non-Purge);9/852-01.1; 9800686

Test: AM-Amphipod Survival and Avoidance Test Test ID: EVS8418
Species: EE-Eohaustorius estuarius Protocol: PSEP 95
Sample ID: VARIOUS Sample Type: SEDIMENT1-Marine
Start Date: 11/6/98 End Date: 11/16/98 Lab ID: BCEVS-EVS Environment Consultants

Pos	ID	Rep	Group	Survival Day 0	Survival Day 10	Avoidance Days 0 - 10	No. Failing to Reburrow	Notes
	1	1	S-Control	20	20	0	0	
	2	2	S-Control	20	20	2	0	
	3	3	S-Control	20	19	0	0	
	4	4	S-Control	20	20	2	0	
	5	5	S-Control	20	19	3	0	
	6	1	CR-23W	20	19	4	0	
	7	2	CR-23W	20	19	0	0	
	8	3	CR-23W	20	20	0	1	
	9	4	CR-23W	20	19	0	0	
	10	5	CR-23W	20	19	0	0	
	11	1	CR-10	20	19	0	0	
	12	2	CR-10	20	19	0	0	
	13	3	CR-10	20	18	0	0	
	14	4	CR-10	20	17	1	0	
	15	5	CR-10	20	18	0	1	
	16	1	CR-22	20	20	0	0	
	17	2	CR-22	20	19	0	0	
	18	3	CR-22	20	20	0	0	
	19	4	CR-22	20	20	0	0	
	20	5	CR-22	20	18	1	0	
	21	1	AN-SS-36	20	17	2	0	
	22	2	AN-SS-36	20	19	3	0	
	23	3	AN-SS-36	20	15	1	0	
	24	4	AN-SS-36	20	19	7	0	
	25	5	AN-SS-36	20	19	5	0	
	26	1	AN-SS-37	20	18	3	0	
	27	2	AN-SS-37	20	18	1	0	
	28	3	AN-SS-37	20	19	1	0	
	29	4	AN-SS-37	20	19	3	0	
	30	5	AN-SS-37	20	19	7	0	
	31	1	AN-SS-45	20	15	0	0	
	32	2	AN-SS-45	20	19	3	0	
	33	3	AN-SS-45	20	16	5	0	
	34	4	AN-SS-45	20	19	3	0	
	35	5	AN-SS-45	20	20	16	0	
	36	1	AN-SS-47	20	18	1	0	
	37	2	AN-SS-47	20	17	0	0	
	38	3	AN-SS-47	20	17	5	0	
	39	4	AN-SS-47	20	16	0	0	
	40	5	AN-SS-47	20	19	1	0	
	41	1	AN-SC-70	20	20	0	0	
	42	2	AN-SC-70	20	18	0	0	
	43	3	AN-SC-70	20	19	1	0	
	44	4	AN-SC-70	20	19	0	0	
	45	5	AN-SC-70	20	18	1	0	
	46	1	AN-SC-71	20	19	1	0	
	47	2	AN-SC-71	20	18	2	0	
	48	3	AN-SC-71	20	17	0	0	
	49	4	AN-SC-71	20	18	5	0	
	50	5	AN-SC-71	20	19	0	0	
	51	1	AN-SC-72	20	16	1	0	
	52	2	AN-SC-72	20	18	2	0	

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

Client (Anchor Environmental / Whatcom Waterway)
EVS Project No. 91852-01.1
EVS Work Order No. 9800686

Test Initiation Date (Day 0) 06-NOV-98
Test Termination Date (Day 10) 16-NOV-98
Test Species E. estuarius
Source/Collection Date NHS/Oct. 29-Nov. 1, 1998

SAMPLE ID AN-SC-82

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	19	0	15	8.4	30	7.5
B	0	0	0	0	0	0	0	0	1	0	20	0	15	8.4	30	7.6
C	0	0	0	0	0	0	0	0	0	0	19	0	15	8.4	30	7.7
D	1	0	1	0	0	0	0	1	1	0	20	0	15	8.4	30	7.7
E	0	0	0	0	0	0	0	0	1	0	19	0	15	8.4	30	7.7
Tech'n	JM	CB	CB	CB	CB	CB	CB	CB	CB	CB	JM	JM	CB	CB	CB	CB

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

SAMPLE ID AN-SC-84

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	18	0	15	7.9	30	8.0
B	0	0	0	0	0	0	0	0	0	0	20	0	15	7.9	30	8.0
C	0	0	0	0	0	0	0	0	0	0	20	0	15	8.1	30	8.2
D	1	0	0	0	0	0	0	0	0	0	19	0	15	7.9	30	8.0
E	0	0	0	0	0	0	0	0	0	0	18	0	15	8.0	30	7.9
Tech'n	JM	CB	CB	CB	CB	CB	CB	CB	CB	CB	RP	RP	CB	CB	CB	CB

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

SAMPLE ID _____

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Tech'n																

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

WQ Instruments Used: Temp. Cal. Hg Therm pH II-A-26 Salinity II-C-22 DO II-A-19

Data Verified By Julie Urban Date Verified NOV/24/98

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

Client: Anchor Environmental (Whatcom Waterway)
EVS Project No.: 9852-01.1
EVS Work Order No.: 9800686

Test Initiation Date (Day 0): Nov 5/98
Test Termination Date (Day 10): Nov 15/98
Test Species: E. estuarius
Source/Collection Date: NAC/Oct. 29 - Nov. 1/98

SAMPLE ID: AN-SC-78

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	1	0	1	0	0	0	0	0	0	0	20	0	15.0	8.6	30	8.0
B	0	0	3	0	1	0	0	0	0	1	20	0	15.0	8.6 ①	30	8.0
C	0	0	0	0	0	0	0	0	0	0	20	0	15.0	8.6 ①	30	8.0
D	0	0	0	0	0	0	0	0	0	0	20	0	15.0	8.6 ①	30	8.0
E	0	0	0	0	0	0	0	0	0	1	17	0	15.0	8.6 ①	30	8.2
Tech'n	JEM					CWB							CWB		BGM	CWB

① double-checked

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

SAMPLE ID: AN-SC-80

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	1	0	0	0	0	0	0	0	0	0	20	0	15.0	8.5	30	8.2
B	1	1	0	0	2	0	0	0	0	1	20	0	15.0	8.4	30	8.1
C	0	0	0	0	0	0	0	0	0	0	18	0	15.0	8.4	30	8.1
D	0	0	2	0	0	0	0	0	0	0	20	0	15.0	8.5	30	8.1
E	0	0	0	0	0	0	0	0	0	0	20	0	15.0	8.4	30	8.0
Tech'n	JEM					CWB							CWB		BGM	CWB

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

SAMPLE ID: AN-SC-81

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	2	2	0	1	0	0	0	0	0	1	20	0	15.0	8.3	29	7.6
B	0	1	1	1	1	0	0	0	0	0	17	0	15.0	8.4	29	7.8
C	2	3	0	0	0	0	0	0	0	1	19	0	15.0	8.3	29	7.8
D	3	2	0	0	0	0	0	0	0	1	14 ①	0	15.0	8.3	29	8.0
E	3	3	0	0	0	0	0	0	0	0	17	0	15.0	8.5	29	7.6
Tech'n	JEM					CWB							CWB	CWB	CWB	CWB

① Checked by CWB

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

WQ Instruments Used: Temp. cal Hg thermom pH II-A-26 Salinity II-C-22 DO II-A-19

Data Verified By: Julie Ohan Date Verified: NOV/24/98

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

Client Anchor Environmental (Whatcom Waterway)
EVS Project No. 9852-01.1
EVS Work Order No. 98006086

Test Initiation Date (Day 0) Nov 5/98
Test Termination Date (Day 10) Nov 15/98
Test Species E. estuarius
Source/Collection Date WAS (Oct. 29 - Nov. 1/98

SAMPLE ID AN-SC-72

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	1	0	0	0	0	0	0	0	0	0	16	Ø	15.0	8.4	30	8.1
B	1/1	1	0	0	0	0	0	0	0	0	18	Ø	15.0	8.5	30	8.0
C	2	0	0	0	0	1	0	0	0	0	20	Ø	15.0	8.5	30	8.0
D	0	2	0	0	0	0	0	0	0	0	19	Ø	15.0	8.4	30	8.0
E	0	1	1	0	0	0	0	0	0	1	20	Ø	15.0	8.4	30	8.0
Tech'n	JM	CP	BGH/CAB	CAB/BGH	CP	CAB	CAB	SAS	SS	CAB	BGH	BGH	CAB	CAB/BGH	BGH	BGH/CAB

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

SAMPLE ID AN-SC-73

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	0	0	0	0	0	0	0	0	0	0	20	Ø	15.0	8.3	30	8.2
B	0	1	1	0	0	0	0	0	0	0	16	Ø	15.0	8.3	30	8.1
C	2	0	0	0	0	2	0	0	0	0	19	Ø	15.0	8.4	30	8.1
D	0	0	0	0	0	0	0	0	0	1	19	Ø	15.0	8.3	30	8.2
E	0	0	0	0	0	0	0	0	0	0	16	Ø	15.0	8.3	30	8.2
Tech'n	JM	CP	BGH/CAB	BGH/CAB	CP	CAB	CAB	SAS	SS	CAB	BGH	BGH	CAB	BGH/CAB	BGH	BGH/CAB

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

SAMPLE ID AN-SC-77

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	0	0	0	0	0	0	0	0	0	0	18	Ø	15.0	8.3	30	7.8
B	0	0	0	0	0	1	0	0	0	0	20	Ø	15.0	8.3	30	8.0
C	0	0	0	0	0	0	0	0	0	0	19	Ø	15.0	8.3	30	8.0
D	0	0	0	0	0	0	0	0	0	1	19	Ø	15.0	8.2	30	8.2
E	0	0	0	0	0	0	0	0	0	0	18	Ø	15.0	8.3	30	8.1
Tech'n	JM	CP	BGH/CAB	BGH/CAB	CP	CAB	CAB	SAS	SS	CAB	CP	CP	CAB	BGH/CAB	BGH	BGH/CAB

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

WQ Instruments Used: Temp. cal Hg thermom pH II-A-26 Salinity II-E-22 DO II-A-19

Data Verified By Julie Urban Date Verified NOV/24/98

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

Client Anchor Environmental (Whatcom Waterway)
EVS Project No. 9852-01.1
EVS Work Order No. 98000686

Test Initiation Date (Day 0) Nov 5/98
Test Termination Date (Day 10) Nov 15/98
Test Species E. estuarius
Source/Collection Date NAS/Oct. 29 - Nov 1/98

SAMPLE ID AN-SS-47

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	0	0	0	0	0	0	0	1	0	0	18	0	15.0	8.4	30	7.6
B	0	0	0	0	0	0	0	0	0	0	17	0	15.0	8.3	30	7.6
C	0	0	5	0	0	0	0	0	0	0	17	0	15.0	8.2	30	7.6
D	0	0	0	0	0	0	0	0	0	0	16	0	15.0	8.4	30	7.7
E	0	0	0	0	0	1	0	0	0	0	19	0	15.0	8.4	30	7.6
Tech'n	JM	GP	BSH CAB	BSH CAB	GP	CAB	CAB	BSH	BSH	CAB	RJM	RJM	CAB	CAB	CAB	CAB

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

SAMPLE ID AN-SC-70

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	0	0	0	0	0	0	0	0	0	0	20	0	15.0	7.9	29	8.0
B	0	0	0	0	0	0	0	0	0	0	18	0	15.0	7.9	29	8.2
C	1	0	0	0	0	0	0	0	0	0	19	0	15.0	7.9	29	8.2
D	0	0	0	0	0	0	0	0	0	0	19	0	15.0	7.9	29	8.2
E	0	0	0	0	0	1	0	0	0	0	18	0	15.0	7.9	29	8.2
Tech'n	JM	GP	BSH CAB	BSH CAB	GP	CAB	CAB	BSH	BSH	CAB	GP	GP	CAB	CAB	CAB	CAB

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

SAMPLE ID AN-SC-71

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	1	0	0	0	0	0	0	0	0	0	19	0	15.0	CAB 7.82	30	7.6
B	1	0	0	0	1	0	0	0	0	0	18	0	15.0	CAB 8.1	30	7.8
C	0	0	0	0	0	0	0	0	0	0	17	0	15.0	CAB 8.1	30	7.9
D	3	1	0	0	1	0	0	0	0	0	18	0	15.0	CAB 8.1	30	7.9
E	0	0	0	0	0	0	0	0	0	0	19	0	15.0	CAB 8.1	30	7.9
Tech'n	JM	GP	BSH CAB	BSH CAB	GP	CAB	CAB	BSH	BSH	CAB	RJM	RJM	CAB	CAB	CAB	CAB

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

WQ Instruments Used: Temp. Red thermom pH II-A-26 Salinity II-C-22 DO II-A-19

Data Verified By Julie Urban Date Verified NOV/24/98

EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY

Client Anchor Environmental (Whatcom Waterway)
EVS Project No. 9857-01.1
EVS Work Order No. 9800686

Test Initiation Date (Day 0) Nov 5 / 98
Test Termination Date (Day 10) Nov 15 / 98
Test Species E. estuarius
Source/Collection Date WAS/Oct. 29 - Nov 1, 1998

SAMPLE ID AN-SS-36

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	0	1	0	0	1	0	0	0	0	0	17	0	15.0	8.4	30	8.1
B	1	0	0	1	1	0	0	0	0	0	19	0	15.0	8.4	30	8.2
C	0	0	0	0	0	1	0	0	0	0	15	0	15.0	8.4	30	8.2
D	3	1	0	0	0	3	0	0	0	0	19	0	15.0	8.3	30	8.2
E	0	0	1	0	2	1	0	0	0	1	19	0	15.0	8.4	30	8.1
Tech'n	JFM	PP	BGH CMB	BGH CMB	PP	CMB	CMB	BS	BS	CMB	JFM	JFM	CMB	BGH CMB	BGH CMB	CMB BGH

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

SAMPLE ID AN-SS-37

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	1	2	0	0	0	0	0	0	0	0	18	0	15.0	8.5	30	8.0
B	1	0	0	0	0	0	0	0	0	0	18	0	15.0	8.5	30	8.0
C	1	0	0	0	0	0	0	0	0	0	19	0	15.0	8.5	30	7.9
D	0	1	0	1	0	0	0	0	0	1	19	0	15.0	8.6	30	7.9
E	2	1	0	0	0	1	0	0	1	2	19	0	15.0	8.5	30	8.0
Tech'n	JFM	PP	BGH CMB	BGH CMB	PP	CMB	CMB	BS	BS	BGH CMB	PP	PP	CMB	CMB BGH	BGH	CMB BGH

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

SAMPLE ID AN-SS-45

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Rep A	0	0	0	0	0	0	0	0	0	0	15	Ø	15.0	8.4	30	8.1
B	1	0	1	0	0	0	0	0	0	1	19 BGH	Ø	15.0	8.4	30	8.1
C	3	1	1	0	0	0	0	0	0	0	16	Ø	15.0	8.4	30	8.2
D	0	0	0	0	1	0	2	0	0	0	19	Ø	15.0	8.5	30	8.1
E	7	6	0	2	1	0	0	0	0	0	20	Ø	15.0	8.5	30	8.1
Tech'n	JFM	PP	BGH CMB	BGH CMB	PP	CMB	CMB	BS	BS	CMB	BGH	BGH	CMB	BGH	BGH	BGH CMB

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

WQ Instruments Used: Temp. cal Hg thermo pH II-A-26 Salinity II-C-22 DO II-A-19

Data Verified By Julie Arlan Date Verified NOV/24/98

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

Client Hart Crowser Environmental (Whatcom Waterway)
EVS Project No. 91852-01.1
EVS Work Order No. 9800686

Test Initiation Date (Day 0) 06-NOV-98
Test Termination Date (Day 10) 16-NOV-98
Test Species E. estuarius
Source/Collection Date NRS/Oct. 29-Nov. 1, 1998

SAMPLE ID CR-10

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	19	0	15	8.0	30	8.1
B	0	0	0	0	0	0	0	0	0	0	19	0	15	8.0	30	7.9
C	0	0	0	0	0	0	0	0	0	0	18	0	15	8.0	30	8.1
D	0	0	0	0	0	1	0	0	0	0	17	0	15	8.0	30	8.1
E	0	0	0	0	0	0	0	0	0	0	18	1	15	8.0	30	8.1
Tech'n	JHM	RP	MB	JHM	RP	CAB	CAB	PM	SH	PAH	PAH	PAH	PAH	PAH	PAH	PAH

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

SAMPLE ID CR-22

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	RP ~~19~~ 20	0	15	8.1	30	8.1
B	0	0	0	0	0	0	0	0	0	0	19	0	15	~~8.1~~ 8.0 RP	30	~~7.9~~ 8.1
C	0	0	0	0	0	0	0	0	0	0	20	0	15	8.1	30	8.1
D	0	0	0	0	0	0	0	0	0	0	RP ~~19~~ 20	0	15	8.0	RP ~~30~~ 31	RP ~~8.1~~ 7.9
E	0	0	0	0	0	1	0	0	0	0	RP ~~19~~ 18	0	15	8.1	30	8.1
Tech'n	JHM	RP	MB	JHM	RP	CAB	CAB	PM	SH	PAH	PAH	PAH	PAH	PAH	PAH	PAH

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

SAMPLE ID CR-23W

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	4	0	0	0	0	RP ~~20~~ 19	0	15	~~8.0~~ 8.1 RP	RP ~~29~~ 30	RP ~~8.2~~ 8.1
B	0	0	0	0	0	0	0	0	0	0	RP ~~20~~	0	15	8.0	RP ~~29~~ 30	RP ~~8.2~~ 7.9
C	0	0	0	0	0	0	0	0	0	0	20 ~~19~~ RP	1 ~~0~~ PAH	15	~~8.0~~ 8.1 RP	30	~~8.2~~ 8.1
D	0	0	0	0	0	0	0	0	0	0	19 ~~20~~ RP	0	15	~~8.1~~ RP	RP ~~29~~ 30	RP ~~8.2~~ 8.1
E	0	0	0	0	0	0	0	0	0	0	19	0	15	8.1 ~~8.0~~ RP	30	RP ~~8.2~~ 8.1
Tech'n	JHM	RP	MB	JHM	RP	CAB	CAB	PM	SH	PAH	PAH	PAH	PAH	PAH	PAH	PAH

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

WQ Instruments Used: Temp. Cal. Hg Therm pH II-A-26 Salinity II-C-22 DO II-A-19

Data Verified By G. Lauve Date Verified Dec 3, 1998

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

Client Anchor Environmental (Whatcom Waterway)
EVS Project No. 91852-01.1
EVS Work Order No. 9800686

Test Initiation Date (Day 0) 06-NOV-98
Test Termination Date (Day 10) 16-NOV-98
Test Species E. estuarius
Source/Collection Date NHS/Oct. 29-Nov. 1, 1998

SAMPLE ID Negative control

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	20	0	15	8.0	29	8.2
B	1 (1)	1	0	0	0	0	0	0	0	0	20	0	15	8.1	29	8.2
C	0	0	0	0	0	0	0	0	0	0	19	0	15	8.0	30	8.2
D	0	1	0	0	1	0	0	0	0	0	20	0	15	8.0	29	8.2
E	1 (1)	1	0	0	0	0	0	0	1	0	19	0	15	8.0	30	8.2
Tech'n	JRM										PAH	PAH	PAH	PAH	PAH	PAH

(1) appears dead

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

SAMPLE ID _____

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Tech'n																

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

SAMPLE ID _____

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Tech'n																

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

WQ Instruments Used: Temp. Cal. Hg Therm pH II-A-26 Salinity II-C-22 DO II-A-19

Data Verified By Julie Ochran Date Verified NOV/24/98

EVS CONSULTANTS

10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client Anchor Environmental (Whatcom Waterway)
EVS Project No. 91852-01.1
EVS Work Order No. 98006886

Test Initiation Date (Day 0) 06-NOV-98
Test Termination Date (Day 10) 16-NOV-98
Test Species E. estuarius
Source/Collection Date NAS 1 Oct. 29-Nov. 1, 1998

Sample ID	Salinity (ppt)											Dissolved Oxygen (mg/L)										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
AN-SC-81	30	30	30	30	30	30	30	30	30	30	30	8.3	8.5 CR	8.0	7.8	8.1	8.1	8.1	7.6	8.1	8.1	8.2
AN-SC-82	30	30	30	30	30	30	30	30	30	30	30	8.4	8.2	8.2	7.8	8.1	8.1	8.1	7.6	8.2	8.0	8.1
AN-SC-84	30	30	30	30	30	29	29	30	30	30	30	8.3	8.3	8.2	7.7	8.1	8.0	8.2	7.7	8.2	8.1	8.2
Technician's Initials	BGM CNB	JKM	RP	BGM CNB	BGM CNB	RP	BGM CNB	BGM	BGM	GS	BGM PAH	BGM CNB	JKM	RP	BGM CNB	BGM CNB	RP	BGM CNB	BGM CNB	BGM	GS	BGM JKM

WQ Instruments Used: Salinity II-C-22 DO II-A-19

Comments

Test Set Up By PAH | JKM | CNB | BGM Data Verified By G Clausen Date Verified Dec 3, 1998

EVS CONSULTANTS

10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client Anchor Environmental (Whatcom Waterway)
EVS Project No. 91852-01.1
EVS Work Order No. 98006886

Test Initiation Date (Day 0) 06-NOV-98
Test Termination Date (Day 10) 16-NOV-98
Test Species E. estuarius
Source/Collection Date NAS 1 Oct. 29 - Nov. 1, 1998

Sample ID	Salinity (ppt)											Dissolved Oxygen (mg/L)										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
AN-SS-36	30	30	30	30	30	30	30	30	30	30	30	8.4	8.1	8.1	7.7	8.1	8.0	8.1	7.7	7.9	8.0	8.1
AN-SS-37	30	30	30	30	30	30	30	30	30	30	30	8.4	8.1	8.1	7.6	8.1	8.1	8.0	7.6	7.9	7.9	8.1
AN-SS-45	30	30	30	30	30	30	30	30	30	30	30	8.4	8.2	8.2	7.8	8.1	8.1	8.2	7.6	8.2	8.1	8.2
AN-SS-47	30	30	30	30	30	30	30	30	30	30	30	8.3	8.2	8.1	7.8	8.1	8.1	8.2	7.7	8.1	8.0	8.2
AN-SC-70	30	30	30	30	30	30	30	30	30	30	30	8.3	8.2	8.1	7.7	8.2	8.0	8.2	7.6	8.1	8.0	8.2
AN-SC-71	30	30	30	30	30	30	30	30	30	30	30	8.3	7.8	8.0	7.8	8.1	8.1	8.1	7.7	8.2	8.0	7.2
AN-SC-72	30	30	30	30	30	30	30	29	30	30	30	8.3	8.1	8.0	7.7	8.2	8.0	7.8	7.6	7.7	7.6	7.9
AN-SC-73	30	30	30	30	30	30	30	30	30	30	30	8.3	8.2	8.2	7.8	8.1	8.0	8.2	7.7	8.2	8.0	8.2
AN-SC-77	30	30	30	30	30	30	30	30	30	30	30	8.3	8.2	8.1	7.7	8.1	8.1	8.2	7.7	8.1	8.1	8.2
AN-SC-78	30	30	30	30	30	30	30	30	30	30	30	8.3	8.2	8.1	7.6	8.1	8.1	8.1	7.6	8.1	7.9	8.0
AN-SC-80	30	30	30	30	30	30	30	30	30	30	30	8.3	8.2	8.1	7.8	8.1	8.0	8.2	7.7	8.1	8.0	8.2
Technician's Initials	BGM CAB	BGM JAM	PH	BGM CAB	BGM CAB	PH	BGM CAB	BGM	BJ	BM	BGM	BGM CAB	JAM	PH	BGM CAB	BGM CAB	PH	BGM CAB	BGM CAB	BJ	BM	BGM

WQ Instruments Used: Salinity II-C-22 DO II-A-19
Comments

Test Set Up By PAH/JKM/CNB/BGM Data Verified By G. Carver Date Verified Dec 3, 1998

EVS CONSULTANTS

10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client: Anchor Environmental (Whatcom Waterway)
EVS Project No.: 91852-01.1
EVS Work Order No.: 98006856

Test Initiation Date (Day 0): 06-NOV-98
Test Termination Date (Day 10): 16-NOV-98
Test Species: E. estuarius
Source/Collection Date: NAS 1 Oct. 29 - Nov. 1, 1998

Sample ID	Salinity (ppt)											Dissolved Oxygen (mg/L)										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
CR-10	30	30	30	30	30	30	30	30	30	30	30	8.4	8.2	8.0	7.7	8.1	8.0	8.2	7.6	8.2	8.1	8.1
CR-22	30	30	30	30	30	30	30	30	30	30	30	8.5	8.2	8.1	7.7	8.1	7.9	8.2	7.7	8.2	8.0	8.2
CR-230	30	30	30	30	30	30	30	30	30	30	30	8.3	8.2	8.1	7.8	8.1	8.0	8.2	7.7	8.1	8.1	8.1
Negative control	30	29	29	30	30	30	30	30	30	30	30	8.5	8.3	8.2	7.9	8.2	8.1	8.2	7.7	8.2	7.9	8.2
Technician's Initials	BMM CWB	JKM	QP	BMM CWB	BMM CWB	QP	BMM	CWB	BMJ	JKS	PAH	BMM CWB	JKM	QP	BMM CWB	BMM CWB	QP	BMM CWB	BMM CWB	BMJ	JKS	PAH

WQ Instruments Used: Salinity: II-C-22 DO: II-A-19

Comments:

Test Set Up By: PAH | JKM | CNB | BGM

Data Verified By: C. Ciaiver

Date Verified: Dec 3, 1998

EVS CONSULTANTS
10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client (Anchor Environmental / Whatcom Waterway)
EVS Project No. 91852-01.1
EVS Work Order No. 98006856

Test Initiation Date (Day 0) 06-NOV-98
Test Termination Date (Day 10) 16-NOV-98
Test Species E. estuarius
Source/Collection Date NAS / Oct. 29 - Nov. 1, 1998

Sample ID	Temperature (°C)											pH										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
AN-SC-81	15	15	15	15	15	15	15	15	15	15	15	7.8	7.8	7.9	8.0	8.2	8.2	8.4	8.6	8.5	8.3	8.6
AN-SC-82	15	15	15	15	15	15	15	15	15	15	15	7.7	7.9	8.0	7.9	8.1	8.1	8.2	8.5	8.1	8.2	8.5
AN-SC-84	15	15	15	15	15	15	15	15	15	15	15	7.9	8.0	8.0	8.1	8.3	8.2	8.1	8.2	8.0	8.0	8.1
Technician's Initials	BGM CNB	JKM	PAH	BGM CNB	BGM CNB	PAH	BGM CNB	CNB	BGM	JKM	PAH	BGM CNB	JKM	PAH	BGM CNB	BGM CNB	PAH	BGM CNB	CNB	BGM	PAH	BGM JKM

WQ Instruments Used: Temp. Cal. Hg therm. pH II-A-26
Comments Values double checked.

Test Set Up By PAH / JKM / CNB / BGM Data Verified By G. Carver Date Verified Dec 3, 1998

EVS CONSULTANTS

10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client Anchor Environmental (Whatcom Waterway)

EVS Project No. 91852-01.1

EVS Work Order No. 98006856

Test Initiation Date (Day 0) 06-NOV-98

Test Termination Date (Day 10) 16-NOV-98

Test Species E. estuarius

Source/Collection Date NAS / Oct. 29 - Nov. 1, 1998

Sample ID	Temperature (°C)											pH										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
AN-SS-36	15	15	15	15	15	15	15	15	15	15	15	7.8	7.9	8.0	8.0	8.1	8.1	8.2	8.3	8.3	8.2	8.4
AN-SS-37	15	15	15	15	15	15	15	15	15	15	15	7.7	7.9	8.0	8.0	8.3	8.2	8.4 ①	8.4 ①	8.4	8.2	8.5
AN-SS-45	15	15	15	15	15	15	15	15	15	15	15	7.8	8.0	8.1	8.1	8.4	8.1	8.6 ①	8.7 ①	8.4	8.1	8.6 ①
AN-SS-47	15	15	15	15	15	15	15	15	15	15	15	7.7	8.0	8.0	8.0	8.2	8.1	8.3	8.4	8.3	8.2	8.4
AN-SC-70	15	15	15	15	15	15	15	15	15	15	15	7.8	8.0	8.0	8.0	8.2	8.1	8.1	8.1	7.9	8.1	8.0
AN-SC-71	15	15	15	15	15	15	15	15	15	15	15	7.8	7.9	8.0	8.0	8.3	8.2	8.1	8.2	8.0	8.0	8.3
AN-SC-72	15	15	15	15	15	15	15	15	15	15	15	7.7	7.9	8.0	8.0	8.1	8.1	8.1	8.2	8.2	8.1	8.4
AN-SC-73	15	15	15	15	15	15	15	15	15	15	15	7.8	8.0	8.1	8.0	8.2	8.2	8.1	8.2	8.1	8.0	8.3
AN-SC-77	15	15	15	15	15	15	15	15	15	15	15	7.7	8.0	8.0	8.0	8.2	8.2	8.0	8.1	8.1	8.2	8.2
AN-SC-78	15	15	15	15	15	15	15	15	15	15	15	7.8	8.1	8.1	8.2	8.4	8.2	8.3	8.5	8.0	8.1	8.6 ①
AN-SC-80	15	15	15	15	15	15	15	15	15	15	15	7.8	8.0	8.0	8.0	8.2	8.1	8.3	8.4	8.3	8.3	8.4
Technician's Initials	Bam CAB	JAM	[illegible]	Bam CAB	Bam CAB	[illegible]	Bam CAB	CAB	BJ	DS	PDH	Bam CAB	JAM	[illegible]	Bam CAB	Bam CAB	[illegible]	Bam CAB	Bam CAB	BJ	DS	[illegible]

WQ Instruments Used: Temp. Cal. Hg therm. pH II-A-26

Comments ① Double checked value

Test Set Up By PAH / JAM / CAB / BGM Data Verified By Julie Dalton Date Verified NOV/24/98

EVS CONSULTANTS
10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client Anchor Environmental (Whatcom)
EVS Project No. 91852-01.1
EVS Work Order No. 98006086

Test Initiation Date (Day 0) 06-NOV-98
Test Termination Date (Day 10) 16-NOV-98
Test Species E. estuarius
Source/Collection Date NAS / Oct. 29 - Nov. 1, 1998

Sample ID	Temperature (°C)											pH										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
CR-10	15	15	15	15	15	15	15	15	15	15	15	7.8	7.9	8.0	8.0	8.2	8.2	8.1	8.1	7.9	8.0	8.1
CR-22	15	15	15	15	15	15	15	15	15	15	15	7.8	8.1	8.1	8.1	8.3	8.1	8.2	8.3	8.1	8.0	8.2
CR-23W	15	15	15	15	15	15	15	15	15	15	15	7.8	8.0	8.0	8.1	8.2	8.2	8.1	8.2	8.0	8.0	8.1
Negative Control	15	15	15	15	15	15	15	15	15	15	15	7.9	8.1	8.1	8.1	8.3	8.2	8.1	8.2	8.0	8.0	8.0
Technician's Initials	BKM CMB	JRM	RP	BKM CMB	BKM CMB	RP	BKM	CMB CMB	BM	BD	DOH	BKM CMB	JRM	RP	BKM CMB	BKM CMB	RP	BKM CMB	BKM CMB	BM	BD	DOH

WQ Instruments Used: Temp. Cal. Hg therm. pH II-A-26
Comments

Test Set Up By PAH IJRM/CNB IBGM Data Verified By Julie Ortar Date Verified NOV 24/98

EVS CONSULTANTS
SEDIMENT DESCRIPTION AND CHARACTERIZATION

Client Anchor Environmental (Whatcom)
EVS Project No. 9852-01.1
EVS Work Order No. 9800686; 9800687

Test Species E. estuarius
Test Type/Duration 10 d marine sediment
Day 0 Various

Sample ID	Colour	Grain Size	Smell	Shells/ Debris	Other Observations	Tech. Initial
AN-SC-80 (Bgm)	Black	Silt	none	none		CW
AN-SC-81	Black	Silt	none	2 rocks		BCM
AN-SC-82	Black	Silt/Sand	none	twigs		PAH
AN-SC-84	Black/Green	Silt	slight org	none		PAH

Be descriptive when you characterize the sediments. Colour and grain size information must be complete. If the sediment has an odour, describe the type of smell. Note any shells or debris that are present. Be sure to record anything else in the Observations section.

Data Verified By G. Lauren Date Verified Dec 3, 1998

EV. ONSULTANTS
SEDIMENT DESCRIPTION AND CHARACTERIZATION

Client Burn ~~Urban Corp~~ Anchor Environmental (Whatcom Waterway; [redacted])

EVS Project No. 9/852-01.1

EVS Work Order No. 9800666; 9800687

Test Species E. estuarius

Test Type/Duration 10 d marine sediment

Day 0 various

Sample ID	Colour	Grain Size	Smell	Shells/ Debris	Other Observations	Tech. Initial
CR10	brown	sand/silt	slight hydrocarbons	none		Bum
CR22	brown	Sand	—	none		Jm
CR23W	black/brown	sand/silt	slight hydrocarbons	none		Bum

Be descriptive when you characterize the sediments. Colour and grain size information must be complete. If the sediment has an odour, describe the type of smell. Note any shells or debris that are present. Be sure to record anything else in the Observations section.

Data Verified By C Lawrence

Date Verified Dec 3, 1998

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EVS CONSULTANTS
SEDIMENT DESCRIPTION AND CHARACTERIZATION

Client ~~Whatcom~~ Anchor Environmental (Whatcom, Waterway; [redacted] Trail)

EVS Project No. 9/852-01.1

EVS Work Order No. 9800686; 9800684-687

Test Species E. estuarius

Test Type/Duration 10 d marine Sediment

Day 0 06 Nov 98; 09 Nov 98

Sample ID	Colour	Grain Size	Smell	Shells/ Debris	Other Observations	Tech. Initial
AN SS-36	Black/Grey	Sand/Silt	Hydrocarbon smell	Small Rocks		JKM
AN-SS-37	Black Brown	Silt	none	Large Rocks		CAB
AN-SS-45	Black	Silt	slight Sulphide	small twigs		CAB
AN-SS-47	black	sand/gravel	none	none		BAM
AN-SC-70	dark brown	Silt	none	(some alive small animals		ALG
AN-SC-71	Brown/Black	Silt	None	None		CAB
AN-SC-72	Dark Brown	Silt	none	none		CAB
AN-SC-73	black	silt/sand	none	none		BLM
AN-SC-77	Black/Grey	Silt	—	—		JKM
AN-SC-78	Black	silt	Sulphide	some twigs		CAB

Be descriptive when you characterize the sediments. Colour and grain size information must be complete. If the sediment has an odour, describe the type of smell. Note any shells or debris that are present. Be sure to record anything else in the Observations section.

Data Verified By S. Lauren

Date Verified Dec 3, 1998

EVS CONSULTANTS
MARINE AMPHIPOD TOXICITY TEST DATA SUMMARY

Client Anchor Environmental / Whatcom Waterway
EVS Project No. 9/852-01.1
EVS Work Order No. 9800686

EVS Analysts RAH, CNB, LM, JFM, ALG, CSY, BSY
Test Type 10 d marine sediment
Test Initiation Date (Day 0) 06 Nov 98

SAMPLE
Identification Liquor
Amount Received 9-10 x 1 L
Date Collected 27 Oct - 29 Oct 98
Date Received 28 - 30 Oct 98

TEST SPECIES INFORMATION
Organism E. estuarius
Source/Collection Date NAS/29 Oct - 01 Nov 98
Amphipod Size (Day 0) 3-5 mm
Reference Toxicant Cadmium
Current Reference Toxicant Result 10.8 mg/L Cd
(96-h LC50 and 95% CL) 95% CL: 8.4 and 13.8 mg/L
Reference Toxicant Warning Limits (mean ± 2SD)
8.0 ± 6.9

TEST CONDITIONS
Temperature Range (°C) 15
pH Range 7.7 - 8.7
Dissolved Oxygen Range (mg/L) 7.5 - 9.4
Salinity Range (ppt) 29 - 30
Photoperiod (L:D h) 24:00
Ammonia Type and Ranges (mg/L N)
☐ Inter: Day 0 1.95 - 12.6 Day 5 1.91 - 7.68 Day 10 0.59 - 5.52
☐ Over: Day 0 — Day 5 — Day 10 —
Sulphide Type and Ranges (mg/L S)
☐ Inter: Day 0 — Day 5 — Day 10 —
☐ Over: Day 0 <0.02 - 0.03 Day 5 — Day 10 <0.02

DILUTION AND CONTROL MEDIUM
Water Type UV sterilized, filtered seawater
Temperature (°C) 15
pH 7.9
Dissolved Oxygen (mg/L) 8.5
Salinity (ppt) 30
Other

Sample ID	Survival (%) Mean ± SD	Avoidance (Amphipods/jar/day) Mean ± SD	Reburial (%)
AN-SC-80	98.0 ± 4.5	0.16 ± 0.21	100
AN-SC-81 x	87.0 ± 11.5	0.56 ± 0.09	100
AN-SC-82	97.0 ± 2.7	0.12 ± 0.16	100
AN-SC-84	95.0 ± 5.0	0.02 ± 0.04	100
Control	98.0 ± 2.7	0.14 ± 0.13	100
CR-10 ° Δ	91.0 ± 4.2	0.02 ± 0.04	99
CR-22	97.0 ± 4.4	0.02 ± 0.04	100
CR-23W	96.0 ± 2.2	0.06 ± 0.16	99

x significant difference when compared to S-control, ° significant difference when compared to reference sediment CR-22
Δ significant difference when compared to reference sediment CR-23W

Data Verified By G. Lauren Date Verified Dec 5, 1998

Note: Significant differences apply to survival.

EVS CONSULTANTS
MARINE AMPHIPOD TOXICITY TEST DATA SUMMARY

Client Anchor Environmental (Whatcom Waterway) EVS Analysts BWY PAH, CUB, BKM, JFM, ALG, GSY, SUP
EVS Project No. 9652-01.1 Test Type 10 d marine sediment
EVS Work Order No. 9800686 Test Initiation Date (Day 0) 06 Nov 98

SAMPLE
Identification Various
Amount Received 9-10 x 1L
Date Collected 27 26 Oct – 29 Oct 98
Date Received 28 28 - 30 Oct 98.

TEST CONDITIONS
Temperature Range (°C) 15
pH Range 7.7 - 8.7
Dissolved Oxygen Range (mg/L) 7.5 - 8.4 ppt 8.5
Salinity Range (ppt) 29 - 30
Photoperiod (L:D h) 24:0
Ammonia Type and Ranges (mg/L N) Bkm Bkm Bkm
☐ Inter: Day 0 6.85 - 12.6 Day 5 0.16 - 11.5 Day 10 0.09 - 10.6
☐ Over: Day 0 — Day 5 — Day 10 —
Sulphide Type and Ranges (mg/L S)
☐ Inter: Day 0 ① — Day 5 — Day 10 —
☐ Over: Day 0 <0.02-0.03 Day 5 — Day 10 <0.02
BULK (IN) N: 248 - 23.2 mg/L ; S: <0.05 - 41.7 mg/L

TEST SPECIES INFORMATION
Organism E. estuarius
Source/Collection Date NAS / 29 Oct - 01 Nov 98
Amphipod Size (Day 0) 3-5 mm
Reference Toxicant Cadmium
Current Reference Toxicant Result 10.8 mg/L Cd
(96-h LC50 and 95% CL) 95% CL: 8.4 and 13.8 mg/L
Reference Toxicant Warning Limits (mean ± 2SD)
8.0 ± 6.9

DILUTION AND CONTROL MEDIUM
Water Type UV sterilized, filtered seawater
Temperature (°C) 15
pH 7.9
Dissolved Oxygen (mg/L) 8.5
Salinity (ppt) 30
Other
① AN-SC-78 : 7.0 mg/L S

Sample ID	Survival (%) Mean ± SD	Avoidance (Amphipods/jar/day) Mean ± SD	Reburial (%)
S Bkm Control AN-SS-36 X	89.0 ± Bkm 8.9	Bkm 0.36 ± 0.24	100
Bkm CR AN-SS-37 XΔ	93.0 ± 2.7	0.30 ± 0.24	100
AN-SS-45	89.0 ± 10.8	0.54 ± 0.62	100
AN-SS-47 XOΔ	87.0 ± 5.7	0.14 ± 0.21	100
AN-SC-70	94.0 ± 4.2	0.04 ± 0.05	100
AN-SC-71 XOΔ	91.0 ± 4.2	0.16 ± 0.21	100
AN-SC-72	93.0 ± 8.4	0.22 ± 0.08	100
AN-SC-73	92.0 ± 7.6	0.14 ± 0.17	100
AN-SC-77	94.0 ± 4.2	0.04 ± 0.05	100
AN-SC-78	97.0 ± 6.7	0.16 ± 0.21	100

X significant difference when compared to S-control O significant difference when compared to reference sediment CR-in survival Δ significant difference when compared to reference sediment CR23W

Data Verified By G. Blaurock Date Verified Dec 8, 1998

Note: significant differences apply to survival.

APPENDIX B

Raw Data for the 10-d *Eohaustorius estuarius* Sediment Toxicity Test (non-purge)

Amphipod Survival and Avoidance Test-Avoidance

Start Date:	11/6/98	Test ID:	EVS8418	Sample ID:	VARIOUS
End Date:	11/16/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	EE-Eohaustorius estuarius

Comments: Whatcom Waterway (Non-Purge);9/852-01.1; 9800686

Conc-%	1	2	3	4	5
S-Control	0.0000	0.2000	0.0000	0.2000	0.3000
CR-22	0.0000	0.0000	0.0000	0.0000	0.1000
CR-23W	0.4000	0.0000	0.0000	0.0000	0.0000
CR-10	0.0000	0.0000	0.0000	0.1000	0.0000
AN-SS-36	0.2000	0.3000	0.1000	0.7000	0.5000
AN-SS-37	0.3000	0.1000	0.1000	0.3000	0.7000
AN-SS-45	0.0000	0.3000	0.5000	0.3000	1.6000
AN-SS-47	0.1000	0.0000	0.5000	0.0000	0.1000
AN-SC-70	0.0000	0.0000	0.1000	0.0000	0.1000
AN-SC-71	0.1000	0.2000	0.0000	0.5000	0.0000
AN-SC-72	0.1000	0.2000	0.3000	0.2000	0.3000
AN-SC-73	0.0000	0.2000	0.4000	0.1000	0.0000
AN-SC-77	0.0000	0.1000	0.0000	0.1000	0.0000
AN-SC-78	0.2000	0.5000	0.0000	0.0000	0.1000
AN-SC-80	0.1000	0.5000	0.0000	0.2000	0.0000
AN-SC-81	0.6000	0.4000	0.6000	0.6000	0.6000
AN-SC-82	0.0000	0.1000	0.0000	0.4000	0.1000
AN-SC-84	0.0000	0.0000	0.0000	0.1000	0.0000

			Transform: Untransformed				
Conc-%	Mean	SD	Mean	Min	Max	CV%	N
S-Control	0.1400	0.1342	0.1400	0.0000	0.3000	95.831	5
CR-22	0.0200	0.0447	0.0200	0.0000	0.1000	223.607	5
CR-23W	0.0800	0.1789	0.0800	0.0000	0.4000	223.607	5
CR-10	0.0200	0.0447	0.0200	0.0000	0.1000	223.607	5
AN-SS-36	0.3600	0.2408	0.3600	0.1000	0.7000	66.898	5
AN-SS-37	0.3000	0.2449	0.3000	0.1000	0.7000	81.650	5
AN-SS-45	0.5400	0.6189	0.5400	0.0000	1.6000	114.606	5
AN-SS-47	0.1400	0.2074	0.1400	0.0000	0.5000	148.117	5
AN-SC-70	0.0400	0.0548	0.0400	0.0000	0.1000	136.931	5
AN-SC-71	0.1600	0.2074	0.1600	0.0000	0.5000	129.603	5
AN-SC-72	0.2200	0.0837	0.2200	0.1000	0.3000	38.030	5
AN-SC-73	0.1400	0.1673	0.1400	0.0000	0.4000	119.523	5
AN-SC-77	0.0400	0.0548	0.0400	0.0000	0.1000	136.931	5
AN-SC-78	0.1600	0.2074	0.1600	0.0000	0.5000	129.603	5
AN-SC-80	0.1600	0.2074	0.1600	0.0000	0.5000	129.603	5
AN-SC-81	0.5600	0.0894	0.5600	0.4000	0.6000	15.972	5
AN-SC-82	0.1200	0.1643	0.1200	0.0000	0.4000	136.931	5
AN-SC-84	0.0200	0.0447	0.0200	0.0000	0.1000	223.607	5

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.94863	1.035	2.1136	10.5664
Bartlett's Test indicates unequal variances (p = 1.01E-07)	66.0856	33.4087		

Amphipod Survival and Avoidance Test-Reburial

Start Date:	11/6/98	Test ID:	EVS8418	Sample ID:	VARIOUS
End Date:	11/16/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	EE-Eohaustorius estuarius
Comments:	Whatcom Waterway (Non-Purge);9/852-01.1; 9800686				

Conc-%	1	2	3	4	5
S-Control	100.00	100.00	100.00	100.00	100.00
CR-22	100.00	100.00	100.00	100.00	100.00
CR-23W	100.00	100.00	95.00	100.00	100.00
CR-10	100.00	100.00	100.00	100.00	94.44
AN-SS-36	100.00	100.00	100.00	100.00	100.00
AN-SS-37	100.00	100.00	100.00	100.00	100.00
AN-SS-45	100.00	100.00	100.00	100.00	100.00
AN-SS-47	100.00	100.00	100.00	100.00	100.00
AN-SC-70	100.00	100.00	100.00	100.00	100.00
AN-SC-71	100.00	100.00	100.00	100.00	100.00
AN-SC-72	100.00	100.00	100.00	100.00	100.00
AN-SC-73	100.00	100.00	100.00	100.00	100.00
AN-SC-77	100.00	100.00	100.00	100.00	100.00
AN-SC-78	100.00	100.00	100.00	100.00	100.00
AN-SC-80	100.00	100.00	100.00	100.00	100.00
AN-SC-81	100.00	100.00	100.00	100.00	100.00
AN-SC-82	100.00	100.00	100.00	100.00	100.00
AN-SC-84	100.00	100.00	100.00	100.00	100.00

			Transform: Untransformed				
Conc-%	Mean	SD	Mean	Min	Max	CV%	N
S-Control	100.00	0.00	100.00	100.00	100.00	0.000	5
CR-22	100.00	0.00	100.00	100.00	100.00	0.000	5
CR-23W	99.00	2.24	99.00	95.00	100.00	2.259	5
CR-10	98.89	2.48	98.89	94.44	100.00	2.512	5
AN-SS-36	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SS-37	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SS-45	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SS-47	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SC-70	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SC-71	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SC-72	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SC-73	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SC-77	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SC-78	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SC-80	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SC-81	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SC-82	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SC-84	100.00	0.00	100.00	100.00	100.00	0.000	5

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	4.57063	1.035	-4.5956	28.1796
Equality of variance cannot be confirmed				

EVS CONSULTANTS

MARINE SPECIES REFERENCE TOXICANT TEST DATA

Client Anchor Environmental (Chesapeake Waterways)
EVS Project No. 91852-01.1
EVS Work Order No. 98006686
Test Initiation Date Nov 8/98 BH

Reference Toxicant Cadmium
EVS Stock ID/Preparation Date 98-C-005 / Oct. 02 198
Test Species E. estuarius
Source/Collection Date NAS / Oct. 29 - Nov. 1, 1998 ~~Oct 02 198~~ BH
No. Organisms/Test Volume 10 / 900 ml

Concentration (mg/L Cd)	Number of Survivors (24 to 96 hours)				Dissolved Oxygen (mg/L)					Temperature (°C)					pH					Salinity (ppt)	
	24	48	72	96	0	24	48	72 (5)	96	0	24	48	72	96	0	24	48	72	96	0	96
18.0	10	10 (1)	5 (4)	1	8.4	8.2	8.1	8.1	8.0	15.5	15	15	15	15	7.4	8.0	8.0	8.0	8.0	28	28
10.0	10	10	10 (3)	6	8.4	8.2	8.1	8.1	8.0	15.5	15	15	15	15	7.4	8.0	8.0	8.0	8.0	28	28
5.6	10	10	10	9	8.4	8.2	8.2	8.1	8.1	15.5	15	15	15	15	7.4	7.9	8.0	8.0	8.0	28	28
3.2	10	10	10	10	8.4	8.2	8.1	8.1	8.1	15.5	15	15	15	15	7.4	8.0	8.0	8.0	8.1	28	28
1.8	10	10	10	10	8.4	8.2	8.1	8.1	8.1	15.5	15	15	15	15	7.4	8.0	8.0	8.0	8.0	28	28
Control	10	10	10	10	8.4	8.2	8.1	8.1	8.1	15.5	15	15	15	15	7.4	8.0	8.0	8.0	8.0	28	28
Technician	JKM	BGM	BGM CAB	BGM	BGM	JKM	BGM	BGM CAB	BGM	BGM	JKM	BGM	BGM CAB	BGM	BGM	JKM	BGM	BGM CAB	BGM	BGM	BGM

WQ Instruments Used: Temperature cal Hg thermometer. pH II-A-26 DO II-A-19. Salinity II-C-22
Comments (1) two animals weak (2) aeration line reset -- wasn't fully emerged. (3) three animals weak. (4) all 5 animals(alive) are weak. (5) Recalibrated meter.
WQ Ranges: T(C): 15 - 15.5 ; pH: 7.4 - 8.1 ; D.O.(mg/L): 8.0 - 8.4 ; Sal(ppt): 28
Test Set Up By PAH / BGM Data Verified By [signature] Date Verified Dec 3, 1998

Amphipod Acute Reftox-96 Hr Survival

Start Date:	06/11/98	Test ID:	RTEECD26	Sample ID:	REF-Ref Toxicant
End Date:	10/11/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	CD-Cadmium
Sample Date:		Protocol:	PSEP 95	Test Species:	EE-Eohaustorius estuarius
Comments:	Whatcom Waterway (Non-Purge)				

Conc-mg/L	1
D-Control	1.0000
1.8	1.0000
3.2	1.0000
5.6	0.9000
10	0.6000
18	0.1000

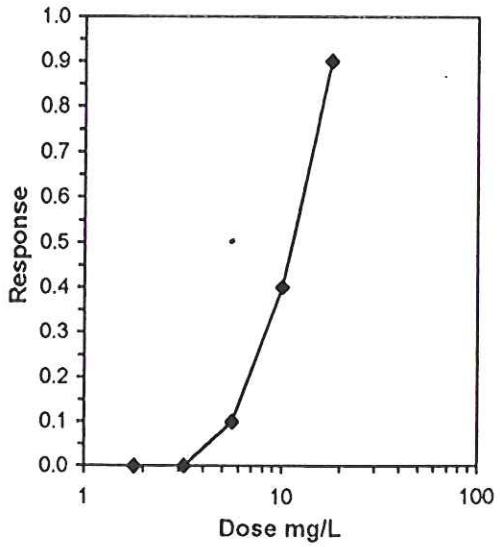
			Transform: Untransformed					Number	Total
Conc-mg/L	Mean	SD	Mean	Min	Max	CV%	N	Resp	Number
D-Control	1.0000	0.0000	1.0000	1.0000	1.0000	0.000	1	0	10
1.8	1.0000	0.0000	1.0000	1.0000	1.0000	0.000	1	0	10
3.2	1.0000	0.0000	1.0000	1.0000	1.0000	0.000	1	0	10
5.6	0.9000	0.0000	0.9000	0.9000	0.9000	0.000	1	1	10
10	0.6000	0.0000	0.6000	0.6000	0.6000	0.000	1	4	10
18	0.1000	0.0000	0.1000	0.1000	0.1000	0.000	1	9	10

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%	10.778	8.425	13.790
20.0%	10.967	7.962	15.107
Auto-10.0%	10.778	8.425	13.790

mg/L Cd



ToxCalc v5.0

Reviewed by: GSL

REMARKS File No. K1118

The detection limit for Sulphide has been increased for the samples in the following data tables due to the turbidity of the samples.

RESULTS OF ANALYSIS - Water

File No. K1118

		CR-10	CR-22	CR-23W
		98 11 03	98 11 03	98 11 03
Nutrients				
Ammonia Nitrogen	N	6.25	23.2	22.8
Inorganic Parameters				
Sulphide	S	<0.05	<0.05	<0.05

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Bulk, interstitial water.

REMARKS

File No. K1046

The detection limit for Sulphide has been increased due to the high concentration of Sulphide in the samples.

RESULTS OF ANALYSIS - Water

File No. K1046

	Ammonia Nitrogen N	Sulphide S
AN-SS-36 1998 Oct 30	2.48	0.5
AN-SS-37 1998 Oct 30	4.58	0.8
AN-SS-45 1998 Oct 29	4.82	0.7
AN-SS-47 1998 Oct 29	4.77	0.5
AN-SC-70 1998 Oct 29	2.37	0.2
AN-SC-71 1998 Oct 29	5.07	0.3
AN-SC-72 1998 Oct 30	10.6	0.4
AN-SC-73 1998 Oct 30	8.71	0.4
AN-SC-77 1998 Oct 30	3.87	0.6
AN-SC-78 1998 Oct 30	21.4	41.7
AN-SC-80 1998 Oct 30	6.58	0.8
AN-SC-81 1998 Oct 30	3.29	1.1
AN-SC-82 1998 Oct 30	3.88	0.7
AN-SC-84 1998 Oct 29	3.34	0.2

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Bulk, interstitial water.

REMARKS

File No. K1268

The detection limit for Sulphide has been increased for the sample "AN-SC-78 interstitial" due to the high concentration of Sulphide.

RESULTS OF ANALYSIS - Water

File No. K1268

	Ammonia[1] Nitrogen N	Sulphide[2] S
Control 1998 Nov 6	0.18	<0.02
CR-10 1998 Nov 6	5.32	<0.02
CR-22 1998 Nov 6	10.2	<0.02
CR-23W 1998 Nov 6	8.09	<0.02
AN-SC-70 1998 Nov 6	3.21	0.02
AN-SC-71 1998 Nov 6	4.47	<0.02
AN-SC-73 1998 Nov 6	5.48	<0.02
AN-SC-77 1998 Nov 6	2.52	<0.02
AN-SC-78 1998 Nov 6	12.6	<0.02
AN-SC-78 inter- stitial[3] 1998 Nov 6	-	7
AN-SC-80 1998 Nov 6	5.32	<0.02
AN-SC-81 1998 Nov 6	2.73	<0.02
AN-SC-82 1998 Nov 6	1.95	<0.02
AN-SC-84 1998 Nov 6	5.88	<0.02
AN-SS-36 1998 Nov 6	2.87	<0.02
AN-SS-37 1998 Nov 6	3.79	<0.02
AN-SS-45 1998 Nov 6	4.68	<0.02
AN-SS-47 1998 Nov 6	3.83	<0.02

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
[1]These results are identified as E.estuarius, interstitial Ammonia.
[2]These results are identified as E.estuarius, overlying Sulphide except where noted.
[3]This sample was identified as E.estuarius, interstitial Sulphide.

Day 0

RESULTS OF ANALYSIS - Water

File No. K1380

	Ammonia Nitrogen N
Control 1998 Nov 11	0.16
CR-10 1998 Nov 11	3.06
CR-22 1998 Nov 11	11.5
CR-23W 1998 Nov 11	10.9
AN-SC-70 1998 Nov 11	2.35
AN-SC-71 1998 Nov 11	2.99
AN-SC-72 1998 Nov 11	3.08
AN-SC-73 1998 Nov 11	2.55
AN-SC-77 1998 Nov 11	1.91
AN-SC-78 1998 Nov 11	7.68
AN-SC-80 1998 Nov 11	3.38
AN-SC-81 1998 Nov 11	1.92
AN-SC-82 1998 Nov 11	3.88
AN-SC-84 1998 Nov 11	4.80
AN-SS-36 1998 Nov 11	4.55
AN-SS-37 1998 Nov 11	2.75
AN-SS-45 1998 Nov 11	5.54
AN-SS-47 1998 Nov 11	5.65

Results are expressed as milligrams per litre except where noted.
These samples are identified as Day 5, E.estuarius, interstitial water.

RESULTS OF ANALYSIS - Water

File No. K1459

	Ammonia Nitrogen N
Control 1998 Nov 16	0.09
CR-10 1998 Nov 16	1.38
CR-22 1998 Nov 16	10.6
CR-23W 1998 Nov 16	6.06
AN-SC-70 1998 Nov 16	1.47
AN-SC-71 1998 Nov 16	1.30
AN-SC-72 1998 Nov 16	1.63
AN-SC-73 1998 Nov 16	0.59
AN-SC-77 1998 Nov 16	0.93
AN-SC-78 1998 Nov 16	5.52
AN-SC-80 1998 Nov 16	1.14
AN-SC-81 1998 Nov 16	1.29
AN-SC-82 1998 Nov 16	1.66
AN-SS-36 1998 Nov 16	1.29
AN-SS-37 1998 Nov 16	2.58
AN-SS-45 1998 Nov 16	4.55
AN-SS-47 1998 Nov 16	2.17

Results are expressed as milligrams per litre except where noted.
These samples are identified as Day 10, E.estuarius, interstitial water.

Appendix 1 - QUALITY CONTROL - Replicates

File No. K1459

Water	AN-SC-84	AN-SC-84
	98 11 16	QC # 140153
Nutrients		
Ammonia Nitrogen N	0.09	0.09

Results are expressed as milligrams per litre except where noted.
These samples are identified as Day 10, E.estuarius, interstitial water.

RESULTS OF ANALYSIS - Water

File No. K1460

	Sulphide S
Control 1998 Nov 16	<0.02
CR-10 1998 Nov 16	<0.02
CR-22 1998 Nov 16	<0.02
CR-23-W 1998 Nov 16	<0.02
AN-SC-70 1998 Nov 16	<0.02
AN-SC-71 1998 Nov 16	<0.02
AN-SC-72 1998 Nov 16	<0.02
AN-SC-73 1998 Nov 16	<0.02
AN-SC-77 1998 Nov 16	<0.02
AN-SC-78 1998 Nov 16	<0.02
AN-SC-80 1998 Nov 16	<0.02
AN-SC-81 1998 Nov 16	<0.02
AN-SC-82 1998 Nov 16	<0.02
AN-SC-84 1998 Nov 16	<0.02
AN-SS-36 1998 Nov 16	<0.02
AN-SS-37 1998 Nov 16	<0.02
AN-SS-45 1998 Nov 16	<0.02
AN-SS-47 1998 Nov 16	<0.02

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Day 10, E.estuarius, overlying water.

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.

End of Report

Dissolved ~~Oxy~~ oxygen R+D experiment

EVS CONSULTANTS

10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client ~~Whatcom DO R3.7~~ Archer (Whatcom Waterway ~~[redacted]~~ DO R3.7)

EVS Project No. 9/652-a.1

EVS Work Order No. 9800687

Test Initiation Date (Day 0) 9-Nov-98

Test Termination Date (Day 10) 19 Nov 98

Test Species E. estuarius

Source/Collection Date NAS / 30 Oct - 1 Nov '98

Sample ID	Temperature (°C)											pH										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
CR-10	15.0	15	15	15	15	15	15.0	15.0	15.0	15.0	15.0	7.4	7.7	7.6	7.7	7.6	7.6	7.9	7.9	7.6	7.8	7.8
AN-SC-78	15.0	15	15	15	15	15	15.0	15.0	15.0	15.0	15.0	7.4	7.6	7.4	7.6	7.6	7.6	7.8	7.9	7.6	7.8	7.7
CR-22	15.0	15	15	15	15	15	15.0	15.0	15.0	15.0	15.0	7.3	7.6	7.6	7.6	~~7.5~~ 7.6	7.6	7.8	7.9	7.6	7.7	7.7
Control	15.0	15	15	15	15	15	15.0	15.0	15.0	15.0	15.0	7.4	7.7	7.6	7.8	7.8	7.7	7.8	8.0	7.7	7.7	7.8
~~AN-SC-705~~	15.0	15	15	15	15	15	15.0	15.0	15.0	15.0	15.0	7.3	7.6	7.7	7.6	7.5	7.6	7.8	7.9	7.6	7.6	7.7
AN-SC-02	15.0	15	15	15	15	15	15.0	15.0	15.0	15.0	15.0	7.4	7.6	7.6	7.6	7.6	7.6	7.8	7.9	7.6	7.6	7.7
Technician's Initials	BKM	JEM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	BKM	JEM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

WQ Instruments Used: Temp. Hg thermometer pH II-A-26

Comments Jars set up strictly to monitor WQ measurements - not needed! No aeration

Test Set Up By BKM Data Verified By G. Lauren Date Verified Jan 8, 1999

Dissolved Oxygen R+D experiment

EVS CONSULTANTS

10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client: ~~Anchor (Whatcom DO R3D)~~ Anchor (Whatcom Waterway, [redacted] Dissolved Oxygen R3D)

EVS Project No. 9852-01.1

EVS Work Order No. 98000687

Test Initiation Date (Day 0) 09-Nov-98

Test Termination Date (Day 10) 19 Nov 98

Test Species E. estuarius

Source/Collection Date NAS / 30 Oct - 1 Nov 98

Sample ID	Salinity (ppt)											Dissolved Oxygen (mg/L)										
	0	1	2	3	4	5	6	7	8	9	10	0 (1)	1	2	3	4	5	6	7	8	9	10
CR 10	28	29	29	29	29	29	28	29	29	29	29	7.8	6.8	6.6	6.2	6.2	6.1	6.8	6.2	6.4	6.3	7.0
AN-SC-78	28	30	30	29	29	29	30	29	29	29	29	7.4	5.5	5.6	4.3	5.0	4.9	4.8	6.2	6.4	6.0	5.0
CR-22	28	30	30	29	29	29	28	29	29	29	29	5.4	5.5	5.6	5.5	5.8	5.7	6.4	6.0	6.2	6.0	6.2
control	28	28	29	28	29	29	28	29	29	29	29	8.2	7.5	7.4	6.6	8.0	7.8	7.4	7.2	7.2	7.1	7.4
~~PN-SS-305~~	28	29	29	29	29	29	28	29	29	29	29	5.2	6.0	6.0	5.7	6.6	6.4	6.6	6.0	6.0	6.2	6.5
AN-SC-82	28	29	29	29	29	29	30	29	29	29	29	6.6	5.9	5.8	5.5	6.5	6.0	6.2	5.8	6.3	6.2	6.2
Technician's Initials	BGM	JAM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	BGM	JAM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

WQ Instruments Used: Salinity II-C-22 DO YSI 52 meter II-A-19

Comments (1) double checked values Jars set strictly for WQ measurements - not added! No aeration!

Test Set Up By BGM

Data Verified By C. Lawrence

Date Verified Jan 8, 1999

APPENDIX C

Raw Data for the 10-d *Eohaustorius estuarius* Sediment Toxicity Test (purge)

EVS CONSULTANTS
MARINE AMPHIPOD TOXICITY TEST DATA SUMMARY

Client: Archer (Whatcom Waterway - Purge)
EVS Project No.: 9852-01.1
EVS Work Order No.: 9800687

EVS Analysts: TAH, Zam (NH3, GSY, SUS, BSY, MEL, Rain)
Test Type: 10 d marine sediment
Test Initiation Date (Day 0): 04 Nov 98

SAMPLE
Identification: various
Amount Received: 9-10 x 1L
Date Collected: 27 26-29 Oct 98
Date Received: AM 26-30 Oct 98

TEST CONDITIONS
Temperature Range (°C): 15
pH Range: 7.6-8.6
Dissolved Oxygen Range (mg/L): 7.4-8.2
Salinity Range (ppt): 29-30
Photoperiod (L:D h): 24:0
Ammonia Type and Ranges (mg/L N)
* ☐ Inter: Day 0 0.6 <0.1-10.7 Day 5 0.19-7.34 Day 10 0.18-5.37
☐ Over: Day 0 AM — Day 5 — Day 10 —
Sulphide Type and Ranges (mg/L S)
Inter: Day 0 ① — Day 5 — Day 10 —
☐ Over: Day 0 <0.02 Day 5 — Day 10 <0.02
① AN-SC-78 : 0.6 mg/L S

TEST SPECIES INFORMATION
Organism: E. estuarius
Source/Collection Date: NAS / 29 Oct - 1 Nov 98
Amphipod Size (Day 0): 3-5 mm
Reference Toxicant: cadmium
Current Reference Toxicant Result: BM 8.3 8.1 mg/L Cd
(96-h LC50 and 95% CL): 95% CL: 5.8 and 11.3 mg/L Cd
Reference Toxicant Warning Limits (mean ± 2SD): 8.3 ± 7.1

DILUTION AND CONTROL MEDIUM
Water Type: UV sterilized, filtered seawater
Temperature (°C): 15
pH: 7.7
Dissolved Oxygen (mg/L): 8.2
Salinity (ppt): 29
Other:
* Prepurge NH3 (NOV16): <0.1 - 22.5 mg/L N
Post purge NH3 (NOV16): <0.1 - 80.4 mg/L N

Sample ID	Survival (%) Mean ± SD	Avoidance (Amphipods/jar/day) Mean ± SD	Reburial (%)
S-Control	98.0 ± 4.4	0.14 ± 0.22	100
CR-10	96.0 ± 5.5	0.10 ± 0.17	100
CR-22	100 ± 0.0	0.04 ± 0.05 AM	100
CR-23W	100 ± 0.0	0 ± 0	100
AN-SC-78	93.0 ± 8.4	0.40 ± 0.31 AM	100

Over : Bulk N : 6.25 - 23.2 mg/L N ; Bulk S : <0.05 - 41.7 mg/L S (Interstial)

Data Verified By: G. Lanza
Date Verified: Dec 3, 1998

EVS CONSULTANTS

10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client Anchor Environmental (Purge) (Whatcom Waterway)
EVS Project No. 9852-01.1
EVS Work Order No. 9800667

Test Initiation Date (Day 0) 19-Nov-98
Test Termination Date (Day 10) 29 Nov 98
Test Species E. estuarius
Source/Collection Date NAS / 30 Oct-1 Nov 98

Sample ID	Temperature (°C)											pH										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
CR-10	15	15	15	15	15.0	15.0	15.0	15.0	15.0	15.0	15.0	7.7	8.2	8.0	7.9	8.1	7.9	7.8	8.1	8.1	8.1	8.1
CR-22	15	15	15	15	15.0	15.0	15.0	15.0	15.0	15.0	15.0	7.6	8.2	8.0	8.0	8.2	8.0	8.0	8.1	8.1	8.1	8.1
CR-23W	15	15	15	15	15.0	15.0	15.0	15.0	15.0	15.0	15.0	7.7	8.2	8.1	8.0	8.2	8.0	8.1	8.0	[illegible]	8.1	8.2
Control	15	15	15	15	15.0	15.0	15.0	15.0	15.0	15.0	15.0	7.7	8.3	8.0	8.0	8.2	8.0	8.0	8.0	8.1	8.1	8.1
ANSC-78	15	15	15	15	15.0	15.0	15.0	15.0	15.0	15.0	15.0	7.7	8.2	8.0	8.1	8.4	8.5	8.3	8.6[1]	8.5	8.6[2]	8.5
Technician's Initials	PAH	BLM	CH	BLM	CAB	PAH	BLM	CAB/BLM	CAB	CAB	BLM	PAH	BLM	CH	BLM	CAB	CAB/BLM	CH	CAB/BLM	CAB	CAB/BLM	BLM

WQ Instruments Used: Temp. Cal. Hg Therm pH II - 4-26
Comments ① double checked ② CAB AS-AW-SC-78 Rep E pH=8.6.

Test Set Up By PAH
Data Verified By G. Lauren
Date Verified Dec 3, 1998

EVS CONSULTANTS

10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client Anchor (Whatcom Waterway - Purge)
EVS Project No. 9852-01.1
EVS Work Order No. 9800654

Test Initiation Date (Day 0) 09-Nov-98
Test Termination Date (Day 10) 19 Nov 98
Test Species E. estuarius
Source/Collection Date NAS / 30 Oct - 1 Nov 98

Sample ID	Salinity (ppt)											Dissolved Oxygen (mg/L)										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
CR-10	29	30	30	30	29	29	29	29	29	29	29	8.1	8.2	8.1	7.6	7.3	8.0	8.0	8.0	8.0	7.6	8.2
CR-22	29	30	30	30	29	29	29	29	29	29	29	8.1	8.2	8.0	8.1	7.6	8.3	7.9	8.2	7.4	8.0	8.1
CR-23W	29	30	30	30	29	29	29	29	29	29	29	8.1	8.2	8.1	8.1	7.6	8.3	8.1	8.0	6.8	8.0	8.2
Control	29	30	30	30	29	29	29	29	29	29	29	8.2	8.2	8.0	8.1	7.6	8.4	8.2	8.2	7.8	8.4	8.2
WW-SC-78	29	30	30	30	29	29	29	29	29	29	29	8.1	8.2	8.0	8.1	7.6	8.2	8.2	7.9	7.8	8.0	8.2
Technician's Initials	BH	BH/DB	BP	BWM	BH/DB	BWM	BS	CAB/BWM	CAB/BWM	BWM	BWM	BH	BH/DB	BP	BWM	CAB/BWM	BWM	BS	BWM/CAB	CAB	CAB	BWM

WQ Instruments Used: Salinity III-C-22 DO III-A-3
Comments

Test Set Up By PAH
Data Verified By
Date Verified Dec 3, 1998

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

Client Anchor (Whatcom Waterway - Purge)
EVS Project No. 9852-01.1
EVS Work Order No. 9800684

Test Initiation Date (Day 0) 09 Nov 98
Test Termination Date (Day 10) 19 Nov 98
Test Species E. estuarius
Source/Collection Date NAS / 30 Oct - 1 Nov 98

SAMPLE ID Control

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	Ø	0	Ø①	0	0	0	20	Ø	15.0	8.1	29	8.0
B	0	2	0	0	Ø	0	0	0	0	0	20	Ø	15.0	8.1	29	8.2
C	0	0	0	0	Ø	0	0	0	0	0	20	Ø	15.0	8.1	29	8.2
D	0	0	0	0	Ø	0	0	0	0	0	20	Ø	15.0	8.1	29	8.2
E	0	0	1	1	Ø	1	0	1①	1	0	18	Ø	15.0	8.1	29	8.2
Tech'n	BJM	BJM	CAB	CAB	BJM	BJM	CAB	BJM	BJM	BJM	BJM	BJM	BJM	BJM	CAB BJM	CAB BJM

① Appears dead.
(# dead:# missing) - A(Ø:Ø) B(Ø:Ø) C(Ø:Ø) D(Ø:Ø) E(Ø:2)

SAMPLE ID CR-10

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	1	Ø	0	0	0	0	0	18	Ø	15.0	8.2	29	8.1
B	0	0	0	0	Ø	0	0	0	0	0	~~18~~ 20	Ø	15.0	8.2	29	8.1
C	0	0	0	0	Ø	0	0	0①	0	2	20	Ø	15.0	8.3	29	8.1
D	0	0	0	0	1	1	0	1	1	0	20	Ø	15.0	8.3	29	8.1
E	0	0	0	0	Ø	0	0	0	0	0	18	Ø	15.0	8.2	29	8.2
Tech'n	BJM	BJM	CAB	CAB	BJM	BJM	CAB	BJM	BJM	BJM	BJM	BJM	BJM	CAB BJM	CAB BJM	CAB BJM

① Polychaete present
(# dead:# missing) - A(Ø:2 BJM) B(Ø:Ø) C(Ø:Ø) D(Ø:Ø) E(1:1)

SAMPLE ID CR-22

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	1	0	0	Ø	0	0	0	0	0	20	Ø	15.0	8.2	29	8.1
B	0	0	0	0	Ø	0	0	0	0	0	20	Ø	15.0	8.2	29	8.1
C	0	0	0	0	Ø	0	0	0	1	0	20	Ø	15.0	8.2	29	8.2
D	0	0	0	0	Ø	0	0	0	0	0	20	Ø	15.0	8.2	29	8.1
E	0	0	0	0	Ø	0	0	0	0	0	20	Ø	15.0	8.2	29	8.2
Tech'n	BJM	BJM	CAB	CAB	BJM	BJM	CAB	BJM	BJM	BJM	BJM	BJM	BJM	CAB BJM	CAB BJM	CAB BJM

(# dead:# missing) - A(Ø:Ø) B(Ø:Ø) C(Ø:Ø) D(Ø:Ø) E(Ø:Ø) BJM 10:0

• WQ Instruments Used: Temp. Hg Thermo pH II-A-32 Salinity II-C-22 DO ~~DO~~ 4

Data Verified By G. Lanson Date Verified Dec 3, 1998

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

Client Archer (Whatcom Waterway - Purge) (Port Whatcom (Purge))
EVS Project No. 9/652-01.1
EVS Work Order No. 9800687

Test Initiation Date (Day 0) 29-Nov-98
Test Termination Date (Day 10) 19 Nov 98
Test Species E. estuarius
Source/Collection Date 30 Oct - 1 Nov 98

SAMPLE ID CR-23W

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	ϕ	0	0	0	0	0	20	ϕ	15.0	8.1	29	8.1
B	0	0	0	0	ϕ	0	0	0	0	0	20	ϕ	15.0	8.1	29	8.0
C	0	0	0	0	ϕ	0	0	0	0	0	20	ϕ	15.0	8.2	29	8.1
D	0	0	0	0	ϕ	0	0	0	0	0	20	ϕ	15.0	8.2	29	8.2
E	0	0	0	0	ϕ	0	0	0	0	0	20	ϕ	15.0	8.2	29	8.0
Tech'n	CB	CB	CB	CB	BM	CB	CB	JM	JM	BM	BGM	BGM	BGM	BGM CB3	CB3 BGM	CB BGM

~~*Rep E had 6 out of sediment on day 3. CB~~ CB

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

SAMPLE ID AN-SC-7F

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	3	0	ϕ	0	0	2	2	0	16	ϕ	15.0	8.6①	29	8.1
B	0	0	3	0	ϕ	0	0	0	1	0	20 BGM	ϕ	15.0	8.6①	29	8.1
C	1	0	0	3	#1	0	0	2	0	0	18	ϕ	15.0	8.5①	29	8.1
D	0	0	0	0	#2	0	0	0	0	0	14	ϕ	15.0	8.6①	29	8.0
E	0	0	0	0	ϕ	0	0	0	0	0	20	ϕ	15.0	8.6①	29	8.0
Tech'n	CB	CB	CB	CB	BM	CB	CB	JM	JM	BM	BGM	BGM	BGM	CB BGM	CB BGM	CB BGM

* Rep F had 6 emerged on Day 3 CB

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

① double checked

SAMPLE ID

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										Number Alive at Day 10	Number Not Reburying at Day 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10			Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
Tech'n																

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

WQ Instruments Used: Temp. Hythermo pH II-A-30 Salinity II-C-22 DO II-A-4

Data Verified By G. Lauren Date Verified Dec 3, 1998

Test: AM-Amphipod Survival and Avoidance Test | Test ID: EVS8395
Species: EE-Eohaustorius estuarius | Protocol: PSEP 95
Sample ID: VARIOUS | Sample Type: SEDIMENT1-Marine
Start Date: 11/9/98 End Date: 11/19/98 | Lab ID: BCEVS-EVS Environment Consultants

Pos	ID	Rep	Group	Survival Day 0	Survival Day 10	Avoidance Days 0 - 10	No. Failing to Reburrow	Notes
	1	1	S-Control	20	20	0	0	
	2	2	S-Control	20	20	2	0	
	3	3	S-Control	20	20	0	0	
	4	4	S-Control	20	20	0	0	
	5	5	S-Control	20	18	5	0	
	6	1	CR-22	20	20	1	0	
	7	2	CR-22	20	20	0	0	
	8	3	CR-22	20	20	1	0	
	9	4	CR-22	20	20	0	0	
	10	5	CR-22	20	20	0	0	
	11	1	CR-10	20	18	1	0	
	12	2	CR-10	20	20	0	0	
	13	3	CR-10	20	20	0	0	
	14	4	CR-10	20	20	4	0	
	15	5	CR-10	20	18	0	0	
	16	1	CR-23W	20	20	0	0	
	17	2	CR-23W	20	20	0	0	
	18	3	CR-23W	20	20	0	0	
	19	4	CR-23W	20	20	0	0	
	20	5	CR-23W	20	20	0	0	
	21	1	AN-SC-78	20	16	7	0	
	22	2	AN-SC-78	20	20	4	0	
	23	3	AN-SC-78	20	18	7	0	
	24	4	AN-SC-78	20	19	2	0	
	25	5	AN-SC-78	20	20	0	0	

Comments: Anchor (Whatcom Waterway - Purge); 9/852-01.1, 9800687, E. estuarius

Amphipod Survival and Avoidance Test-10 Day Survival

Start Date:	09/11/98	Test ID:	EVS8395	Sample ID:	various
End Date:	19/11/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	EE-Eohaustorius estuarius
Comments:	Anchor (Whatcom Waterway - Purge); 9/852-01.1, 9800687, E. estuarius				

Conc-	1	2	3	4	5
S-Control	1.0000	1.0000	1.0000	1.0000	0.9000
CR-10	0.9000	1.0000	1.0000	1.0000	0.9000
CR-22	1.0000	1.0000	1.0000	1.0000	1.0000
CR-23W	1.0000	1.0000	1.0000	1.0000	1.0000
AN-SC-78	0.8000	1.0000	0.9000	0.9500	1.0000

			Transform: Arcsin Square Root					1-Tailed		
Conc-	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
S-Control	0.9800	0.0447	1.4168	1.2490	1.4588	6.620	5			
CR-10	0.9600	0.0548	1.3749	1.2490	1.4588	8.355	5	0.632	2.132	0.0094
CR-22	1.0000	0.0000	1.4588	1.4588	1.4588	0.000	5	-1.000	2.132	0.0038
CR-23W	1.0000	0.0000	1.4588	1.4588	1.4588	0.000	5	-1.000	2.132	0.0038
AN-SC-78	0.9300	0.0837	1.3238	1.1071	1.4588	11.294	5	1.178	2.132	0.0133

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	0.89144	0.888	-0.8768	0.85018
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)

Heteroscedastic t Test indicates no significant differences

significant differences when compared to the S. control

Amphipod Survival and Avoidance Test-Avoidance

Start Date:	09/11/98	Test ID:	EVS8395	Sample ID:	various
End Date:	19/11/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	EE-Eohaustorius estuarius
Comments:	Anchor (Whatcom Waterway - Purge); 9/852-01.1, 9800687, E. estuarius				

Conc-	1	2	3	4	5
S-Control	0.0000	0.2000	0.0000	0.0000	0.5000
CR-10	0.1000	0.0000	0.0000	0.4000	0.0000
CR-22	0.1000	0.0000	0.1000	0.0000	0.0000
CR-23W	0.0000	0.0000	0.0000	0.0000	0.0000
AN-SC-78	0.7000	0.4000	0.7000	0.2000	0.0000

			Transform: Untransformed				
Conc-	Mean	SD	Mean	Min	Max	CV%	N
S-Control	0.1400	0.2191	0.1400	0.0000	0.5000	156.492	5
CR-10	0.1000	0.1732	0.1000	0.0000	0.4000	173.205	5
CR-22	0.0400	0.0548	0.0400	0.0000	0.1000	136.931	5
CR-23W	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5
AN-SC-78	0.4000	0.3082	0.4000	0.0000	0.7000	77.055	5

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.9033	0.888	0.40459	0.92663
Equality of variance cannot be confirmed				

Amphipod Survival and Avoidance Test-Reburial

Start Date:	09/11/98	Test ID:	EVS8395	Sample ID:	various
End Date:	19/11/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	EE-Eohaustorius estuarius
Comments:	Anchor (Whatcom Waterway - Purge); 9/852-01.1, 9800687, E. estuarius				

Conc-	1	2	3	4	5
S-Control	100.00	100.00	100.00	100.00	100.00
CR-10	100.00	100.00	100.00	100.00	100.00
CR-22	100.00	100.00	100.00	100.00	100.00
CR-23W	100.00	100.00	100.00	100.00	100.00
AN-SC-78	100.00	100.00	100.00	100.00	100.00

			Transform: Untransformed				
Conc-	Mean	SD	Mean	Min	Max	CV%	N
S-Control	100.00	0.00	100.00	100.00	100.00	0.000	5
CR-10	100.00	0.00	100.00	100.00	100.00	0.000	5
CR-22	100.00	0.00	100.00	100.00	100.00	0.000	5
CR-23W	100.00	0.00	100.00	100.00	100.00	0.000	5
AN-SC-78	100.00	0.00	100.00	100.00	100.00	0.000	5

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	1	0.888		
Equality of variance cannot be confirmed				

EVS CONSULTANTS

Client Anchor (What com Waterway - Puget) MARINE SPECIES REFERENCE TOXICANT TEST DATA

EVS Project No. 9/852-01.1

EVS Work Order No. 96000687

Test Initiation Date 27-Nov-98

Reference Toxicant cadmium

EVS Stock ID/Preparation Date 98-C-003/4 June 98

Test Species E. estuarius

Source/Collection Date NAS | 29 Oct - 1 Nov 98

No. Organisms/Test Volume 10/900mL

Concentration mg/L Cd	Number of Survivors (24 to 96 hours)				Dissolved Oxygen (mg/L)					Temperature (°C)					pH					Salinity (ppt)	
	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
control	10	10	10	10	8.0	8.2	8.1	8.2	8.1	16	15.0	15.0	15.0	15.0	7.5	7.7	7.6	8.0	7.9	29	29
1.8	10	10	10	10	8.0	8.2	8.2	8.2	8.1	16	15.0	15.0	15.0	15.0	7.5	7.7	7.6	8.0	7.9	29	29
3.2	10	10	10	9	8.0	8.3	8.2	8.2	8.1	16	15.0	15.0	15.0	15.0	7.5	7.7	7.7	8.0	7.9	29	29
5.6	9	9	7	6	8.0	8.3	8.2	8.2	8.1	16	15.0	15.0	15.0	15.0	7.5	7.7	7.7	8.0	7.9	29	29
10	10	10	5	5	8.0	8.2	8.2	8.2	8.1	16	15.0	15.0	15.0	15.0	7.5	7.6	7.7	8.0	7.9	29	29
18	10	9	3	1	8.0	8.3	8.2	8.2	8.1	16	15.0	15.0	15.0	15.0	7.5	7.7	7.7	8.0	7.9	29	29
Technician	CNB		CNB	PAH		CNB		CNB			CNB		CNB			CNB		CNB			

WQ Instruments Used: Temperature Hythermometer pH II-A-26 DO II-A-3 Salinity II-C-22

Comments Summary of WQ Ranges: T(°C): 15 - 16; pH: 7.5 - 8.0; Sal (ppt): 29; D.O. (mg/L): 8.0 - 8.3

Test Set Up By PAH/CNB Data Verified By C. Lauren Date Verified Dec 3, 1998

Amphipod Acute Reftox-96 Hr Survival

Start Date:	11/9/98	Test ID:	RTEECD30	Sample ID:	REF-Ref Toxicant
End Date:	11/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	CD-Cadmium
Sample Date:		Protocol:	PSEP 95	Test Species:	EE-Eohaustorius estuarius

Comments: E. estuarius, reftox for Anchor (Whatcom Waterway - Purge)

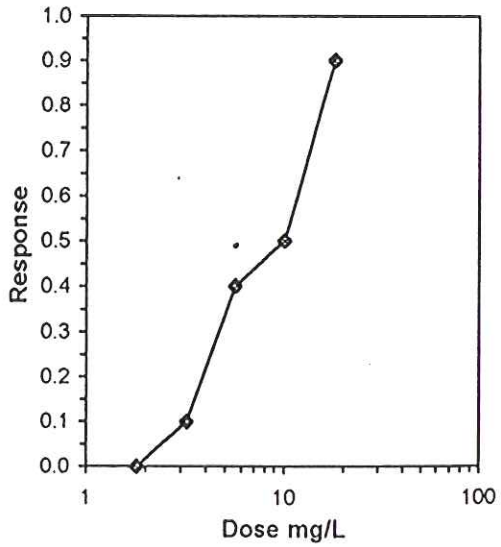
nc-mg/L	1
D-Control	1.0000
1.8	1.0000
3.2	0.9000
5.6	0.6000
10	0.5000
18	0.1000

			Transform: Untransformed					Number	Total
Conc-mg/L	Mean	SD	Mean	Min	Max	CV%	N	Resp	Number
D-Control	1.0000	0.0000	1.0000	1.0000	1.0000	0.000	1	0	10
1.8	1.0000	0.0000	1.0000	1.0000	1.0000	0.000	1	0	10
3.2	0.9000	0.0000	0.9000	0.9000	0.9000	0.000	1	1	10
5.6	0.6000	0.0000	0.6000	0.6000	0.6000	0.000	1	4	10
10	0.5000	0.0000	0.5000	0.5000	0.5000	0.000	1	5	10
18	0.1000	0.0000	0.1000	0.1000	0.1000	0.000	1	9	10

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%	8.0925	5.7977	11.2955
20.0%	8.2402	5.4530	12.4521
Auto-10.0%	8.0925	5.7977	11.2955



ToxCalc v5.0

Reviewed by: GSL

REMARKS File No. K1118

The detection limit for Sulphide has been increased for the samples in the following data tables due to the turbidity of the samples.

RESULTS OF ANALYSIS - Water File No. K1118

		CR-10	CR-22	CR-23W
		98 11 03	98 11 03	98 11 03
Nutrients				
Ammonia Nitrogen	N	6.25	23.2	22.8
Inorganic Parameters				
Sulphide	S	<0.05	<0.05	<0.05

Use values for both purge + non-purge tests.

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Bulk, interstitial water.

REMARKS

File No. K1046

The detection limit for Sulphide has been increased due to the high concentration of Sulphide in the samples.

RESULTS OF ANALYSIS - Water

File No. K1046

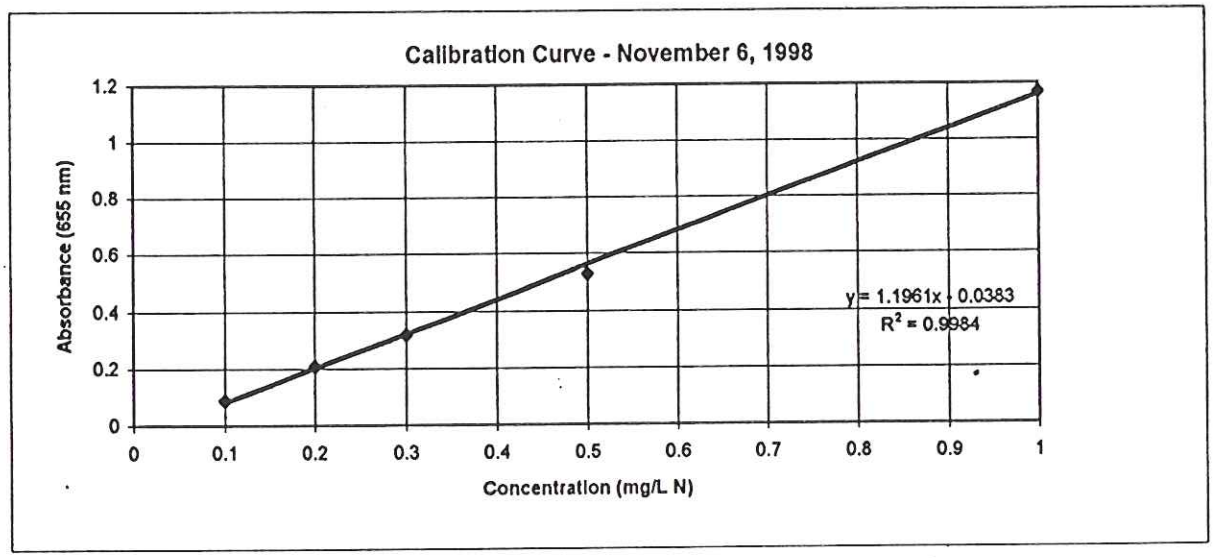
		Ammonia Nitrogen N	Sulphide S
AN-SS-36 1998 Oct 30		2.48	0.5
AN-SS-37 1998 Oct 30		4.58	0.8
AN-SS-45 1998 Oct 29		4.82	0.7
AN-SS-47 1998 Oct 29		4.77	0.5
AN-SC-70 1998 Oct 29		2.37	0.2
AN-SC-71 1998 Oct 29		5.07	0.3
AN-SC-72 1998 Oct 30		10.6	0.4
AN-SC-73 1998 Oct 30		8.71	0.4
AN-SC-77 1998 Oct 30		3.87	0.6
AN-SC-78 1998 Oct 30	Purge Sample	21.4	41.7
AN-SC-80 1998 Oct 30	Disregard other values for Purge Test	6.58	0.8
AN-SC-81 1998 Oct 30		3.29	1.1
AN-SC-82 1998 Oct 30		3.88	0.7
AN-SC-84 1998 Oct 29		3.34	0.2

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Bulk, interstitial water.

Total Ammonia Measurements (reported as ammonia nitrogen, mg/L N)

Client:	Whatcom (Anchor)	Test Type:	10-d Marine Sediment Toxicity Test
Project No.:	9/852-01.1	Test Species:	*Eohaustorius estuarius*
Work Order No.:	9800686 1 pm	Date Initiated:	09-Nov-98
Date Sampled:	06-Nov-98 Prepurge	Date Terminated:	19-Nov-98
Date Measured:	06-Nov-98		

Standard Concentrations (mg/L N)	Absorbance of Standards	Sample ID Interstitial Water	Absorbance of Samples	Dilution Factor	Ammonia Concentrations (mg/L N)
0.1	0.09	Control	0.06	2.8	<0.1
0.2	0.21	CR-22	0.50	50.0	22.5
0.3	0.32	CR-22 rep	0.48	50.0	21.7
0.5	0.53	CR-23W	0.50	50.0	22.5
1.0	1.17	CR-23W rep	0.46	50.0	20.8
		CR-10	0.48	50.0	21.7
		CR-10 rep	0.47	50.0	21.2
		AN-SC-78	0.28	50.0	13.3
		AN-SC-78 rep	0.31	50.0	14.6

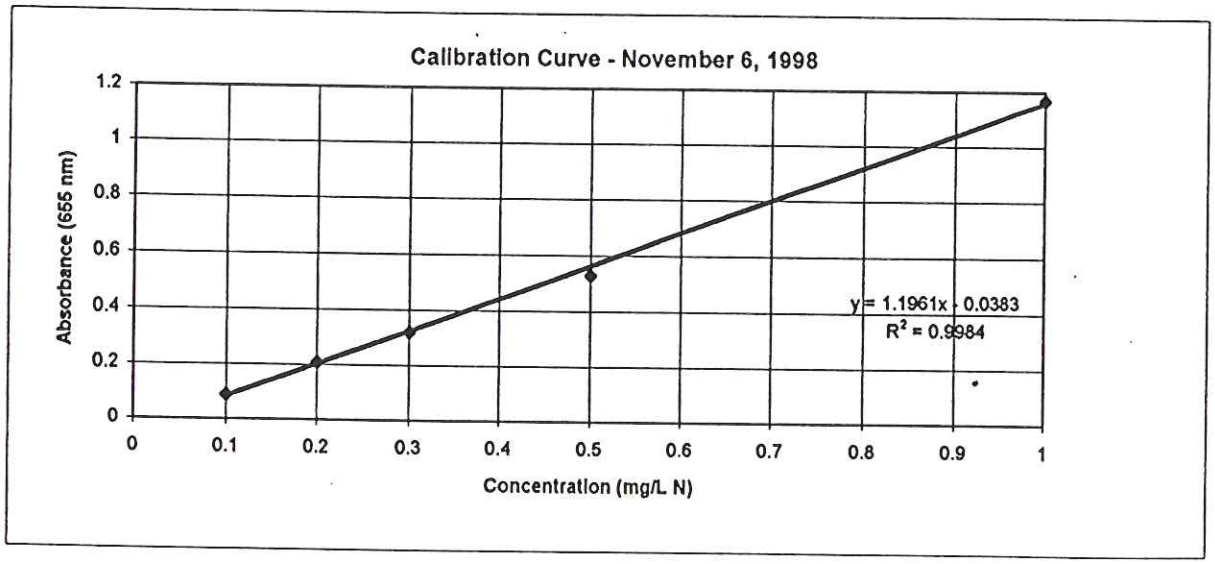


G. Lauren
Jan 8, 1999

Total Ammonia Measurements (reported as ammonia nitrogen, mg/L N)

Client:	Whatcom (Anchor)	Test Type:	10-d Marine Sediment Toxicity Test
Project No.:	9/852-01.1	Test Species:	*Eohaustorius estuarius*
Work Order No.:	9800688 7 epu	Date Initiated:	09-Nov-98
Date Sampled:	06-Nov-98 Postpurge 1	Date Terminated:	19-Nov-98
Date Measured:	06-Nov-98		

Standard Concentrations (mg/L N)	Absorbance of Standards	Sample ID Interstitial Water	Absorbance of Samples	Dilution Factor	Ammonia Concentrations (mg/L N)
0.1	0.09	Control	0.04	3.6	<0.1
0.2	0.21	CR-22	0.45	50.0	20.4
0.3	0.32	CR-22 rep	0.44	50.0	20.0
0.5	0.53	CR-23W	0.43	50.0	19.6
1.0	1.17	CR-23W rep	0.43	50.0	19.6
		CR-10	0.19	50.0	9.5
		CR-10 rep	0.22	50.0	10.8
		AN-SC-78	0.36	50.0	16.6
		AN-SC-78 rep	0.36	50.0	16.6

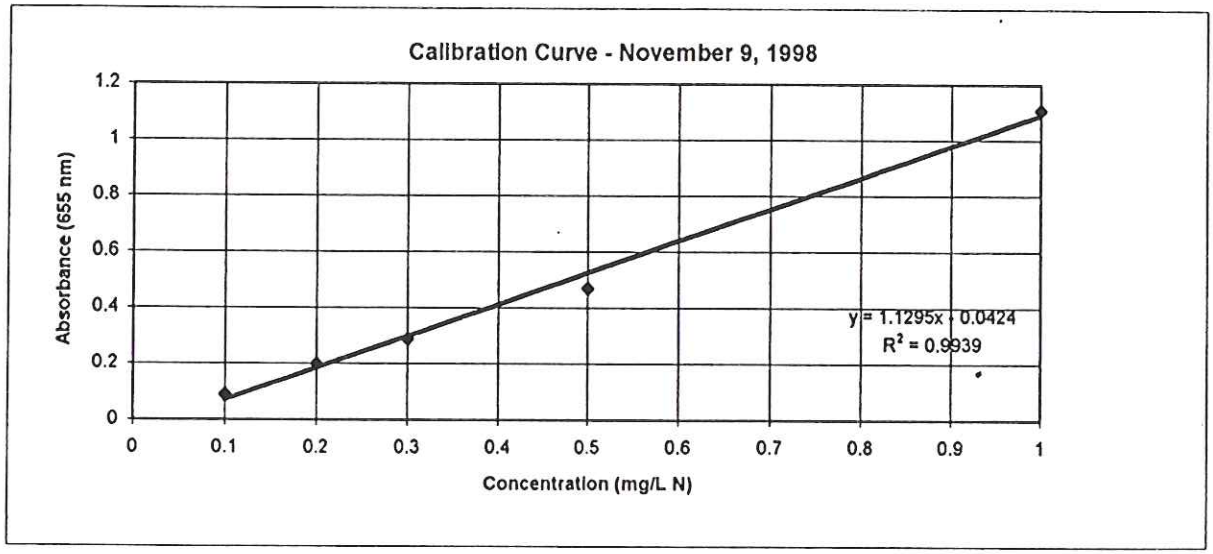


G. Lawrence
Jan 8, 1999

Total Ammonia Measurements (reported as ammonia nitrogen, mg/L N)

Client:	Whatcom (Anchor-)	Test Type:	10-d Marine Sediment Toxicity Test
Project No.:	9/852-01.1	Test Species:	*Eohaustorius estuarius*
Work Order No.:	9800688 Pan	Date Initiated:	09-Nov-98
Date Sampled:	09-Nov-98 Purge Test	Date Terminated:	19-Nov-98
Date Measured:	09-Nov-98 Day 0		

Standard Concentrations (mg/L N)	Absorbance of Standards	Sample ID Interstitial Water	Absorbance of Samples	Dilution Factor	Ammonia Concentrations (mg/L N)
0.1	0.09	Control	0.05	1.9	<0.1
0.2	0.20	CR-22	0.13	50.0	7.6
0.3	0.29	CR-22 rep	0.11	50.0	6.7
0.5	0.47	CR-23W	0.20	50.0	10.7
1.0	1.11	CR-23W rep	0.18	50.0	9.8
		CR-10	0.09	50.0	5.9
		CR-10 rep	0.09	50.0	5.9
		AN-SC-78	0.20	50.0	10.7
		AN-SC-78 rep	0.19	50.0	10.3



S. Lauren
Jan 8, 1999

RESULTS OF ANALYSIS - Water

File No. K1824

	Control	CR-22	CR-10	CR-23W	AN-SC-78
	98 11 09	98 11 09	98 11 09	98 11 09	98 11 09
Inorganic Parameters					
Sulphide S	<0.02	<0.02	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Day 0, Purge test, overlying water.

RESULTS OF ANALYSIS - Water

File No. K1338

		AN-SC-78
		98 11 09
Inorganic Parameters		
Sulphide	S	0.6

Results are expressed as milligrams per litre except where noted.
This samples is identified as Day 0, E.estuarius, interstitial water.

RESULTS OF ANALYSIS - Water

File No. K1493

		CR-10	CR-22	CR-23	AN-SC-78	Ctrl
		98 11 14	98 11 14	98 11 14	98 11 14	98 11 14
Nutrients						
Ammonia Nitrogen	N	1.93	5.71	7.34	4.51	0.19

Results are expressed as milligrams per litre except where noted.
These samples are identified as Day 5, E.estuarius, interstitial water.

RESULTS OF ANALYSIS - Water

File No. K1582

		Control	CR-10	CR-22	CR-23W	AN-SC-78
		98 11 19	98 11 19	98 11 19	98 11 19	98 11 19
Nutrients						
Ammonia Nitrogen	N	0.18	1.05	0.54	5.37	3.14

Results are expressed as milligrams per litre except where noted.
These samples are identified as Day 10, E.estuarius, interstitial water.

Appendix 1 - QUALITY CONTROL - Replicates

File No. K1582

Water		CR-10	CR-10
		98 11 19	QC # 140605
Nutrients			
Ammonia Nitrogen	N	1.05	1.06

Results are expressed as milligrams per litre except where noted.
These samples are identified as Day 10, E.estuarius, interstitial water.

RESULTS OF ANALYSIS - Water

File No. K1627

	CR-22	CR-23W	Control	AN-SC-78	CR-10
	98 11 19	98 11 19	98 11 19	98 11 19	98 11 19
Inorganic Parameters					
Sulphide S	<0.02	<0.02	<0.02	<0.02	<0.02

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Day 10, E.estuarius, overlying purged water.

METHODOLOGY

File No. K1627

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.

End of Report

APPENDIX D

Raw Data for the 20-d *Neanthes arenaceodentata* Sediment Toxicity Test

EVS CONSULTANTS
MARINE POLYCHAETE SEDIMENT TOXICITY TEST DATA SUMMARY

Client: Whatcom Waterway
EVS Project No.: 9/852-01.1
EVS Work Order No.: 9800688

EVS Analysts: JGK, GSY, BSJ, LJS, SVS, JKH, BBM, PAH
Test Type/Duration: 20-d Survival and Growth
Test Initiation Date (Day 0): Dec. 8, 1998

SAMPLE
Identification: Various
Amount Received: 9 x 1L; 10 x 1L
Date Collected: Oct. 27, 28 & 29, 1998
Date Received: Oct. 28, 29 & 30, 1998

TEST CONDITIONS (for all samples)
Temperature Range (°C): 20.5 - 21.0
pH Range: 7.0 - 8.4
Dissolved Oxygen Range (mg/L): 0.5 - 7.2
Salinity Range (ppt): 28 - 30
Photoperiod (L:D h): Constant ambient light
Ammonia Type and Ranges (mg/L N):
☐ Inter: Day 0 0.17 - 25.6 Day 10 2.58 - 12.9 Day 20 0.99 - 9.68
☐ Over: Day 0 n/a Day 10 n/a Day 20 n/a
Sulphide Type and Ranges (mg/L S):
☐ Inter: Day 0 n/a Day 10 n/a Day 20 n/a
☐ Over: Day 0 <0.02 - 0.03 Day 10 n/a Day 20 <0.02 - 0.6

TEST SPECIES INFORMATION
Organism: Heanthes arenaceodentata
Source/Date Received: Donald Reish / Dec. 2, 1998
Day 0 Dry Weight (mg/worm): 0.50
Reference Toxicant: Cadmium
Current Reference Toxicant Result
(96-h LC50 and 95% CL): 4.2 mg/L Cd (95% CL: 3.2 to 5.6 mg/L Cd)
Reference Toxicant Warning Limits (mean ± 2SD)
9.6 ± 4.7 mg/L Cd

DILUTION AND CONTROL MEDIUM (for all samples)
Water Type: UV Sterilized Filtered Sea Water
Temperature (°C): 20.0 - 21.0
pH: 7.7 - 8.1
Dissolved Oxygen (mg/L): 7.2 - 7.5
Salinity (ppt): 27 - 30
Other: -

Sample ID	Mean ± SD			
	Survival (%)	Individual Dry Weight (mg/worm)	Individual Growth Rate (mg/worm/day)	Total Dry Weight (mg)
Control Sediment	60.0 ± 46.9	9.1 ± 4.3	0.43 ± 0.22	31.9 ± 28.5
CR-10	92.0 ± 11.0	9.1 ± 3.3	0.43 ± 0.16	42.8 ± 17.5
CR-22	88.0 ± 17.9	11.9 ± 1.0	0.57 ± 0.05	51.7 ± 8.3
CR-23-W	80.0 ± 14.1	12.2 ± 4.2	0.59 ± 0.21	48.0 ± 16.6
AN-SS-36	96.0 ± 8.9	11.1 ± 2.9	0.53 ± 0.14	52.1 ± 8.2
AN-SS-37	72.0 ± 41.5	10.6 ± 1.6	0.51 ± 0.08	38.4 ± 23.2
AN-SS-45	80.0 ± 34.6	11.6 ± 5.6	0.55 ± 0.28	49.6 ± 28.5
AN-SS-47 *☐	60.0 ± 31.6*	9.5 ± 6.3	0.45 ± 0.31	32.6 ± 21.2☐
AN-SC-70	88.0 ± 11.0	10.2 ± 3.7	0.48 ± 0.18	44.2 ± 14.1

*) Asterisk indicates significant difference in comparing samples to reference sediment CR-10 w/respect to survival

Data Verified By: S. Lawn
Date Verified: Jan 27, 1999

) T : indicates significant difference in comparing samples to reference sediment CR-22 w/respect to Indiv. Dry W. and Growth Ra

) Square indicates significant difference in comparing samples to reference sediment CR-22 w/respect to Total Dry Weight.

MARINE POLYCHAETE SEDIMENT TOXICITY TEST

Client Whatcom Waterway
EVS Project No. 9852-01
EVS Work Order No. 9800688

EVS Analysts JGK, GSY, BSJ, LJS, SVS, JKM, BSM, PAH
Test Type/Duration 20-d Survival and Growth
Test Initiation Date (Day 0) Dec. 8, 1998

SAMPLE
Identification Various
Amount Received 9 x 1 L; 10 x 1 L
Date Collected Oct. 27, 28 & 29, 1998
Date Received Oct. 28, 29 & 30, 1998

TEST SPECIES INFORMATION
Organism Heanthes arenaceodentata
Source/Date Received Donald Reish / Dec. 2, 199
Day 0 Dry Weight (mg/worm) 0.50
Reference Toxicant Cadmium
Current Reference Toxicant Result
(96-h LC50 and 95% CL) 4.2 mg/L Cd
95% CL: 3.2 to 5.6 mg/L Cd
Reference Toxicant Warning Limits (mean ± 2SD)
9.6 ± 4.7 mg/L Cd.

TEST CONDITIONS (for all samples)
Temperature Range (°C) 20.5 - 21.0
pH Range 7.0 - 8.4
Dissolved Oxygen Range (mg/L) 0.5 - 7.2
Salinity Range (ppt) 28 - 30
Photoperiod (L:D h) Constant ambient light
Ammonia Type and Ranges (mg/L N)
☐ Inter: Day 0 0.17 - 25.6 Day 10 2.58 - 4.0 Day 20 0.99 - 9.68
☐ Over: Day 0 n/a Day 10 n/a Day 20 n/a
Sulphide Type and Ranges (mg/L S)
☐ Inter: Day 0 n/a Day 10 n/a Day 20 n/a
☐ Over: Day 0 <0.02 - 0.03 Day 10 n/a Day 20 <0.02 - 0.6

DILUTION AND CONTROL MEDIUM (for all samples)
Water Type UV Sterilized Filtered Sea Water
Temperature (°C) 20.0 - 21.0
pH 7.7 - 8.1
Dissolved Oxygen (mg/L) 7.2 - 7.5
Salinity (ppt) 27 - 30
Other -

Sample ID	Mean ± SD			
	Survival (%)	Individual Dry Weight (mg/worm)	Individual Growth Rate (mg/worm/day)	Total Dry Weight (mg)
AN-SC-71 △	88.0 ± 11.0	10.1 ± 1.4 △	0.48 ± 0.07 △	45.0 ± 11.9
AN-SC-72	92.0 ± 17.9	9.8 ± 3.8	0.47 ± 0.19	47.3 ± 22.2
AN-SC-73	88.0 ± 11.0	9.7 ± 4.5	0.46 ± 0.22	44.4 ± 25.5
AN-SC-77	80.0 ± 24.5	11.9 ± 1.6	0.57 ± 0.08	48.8 ± 19.7
AN-SC-78 * □	60.0 ± 31.6 *	12.4 ± 4.7	0.59 ± 0.24	33.4 ± 15.5 □
AN-SC-80	88.0 ± 17.9	10.2 ± 2.1	0.48 ± 0.11	44.7 ± 11.9
AN-SC-81 □	72.0 ± 22.8	9.1 ± 3.2	0.43 ± 0.16	31.2 ± 12.3 □
AN-SC-82	92.0 ± 11.0	10.3 ± 1.6	0.49 ± 0.08	48.0 ± 12.1
AN-SC-84 △□	76.0 ± 16.7	8.7 ± 2.5 △	0.41 ± 0.12 △	33.9 ± 16.1 □

(*) Asterisk indicates significant difference in comparing samples to reference sediment CR-10 w/respect to survival

Data Verified By G. Lauren
Date Verified Jan 27, 1999

(△) Triangle indicates significant difference in comparing samples to reference sediment CR-22 w/respect to Indiv. Dry W. and Growth

(□) Square indicates significant difference in comparing samples to reference sediment CR-22 w/respect to Total Dry Weight

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

Client: Whatcom Waterway
EVS Project No.: 9852-01.1
EVS Work Order No.: 9800688

Test Species: Neanthes arenaceodentata
Source/Date Received: Donald Reish / Dec. 2, 1998
Test Initiation Date (Day 0): Dec. 8, 1998
Test Termination Date (Day 20): Dec 28, 1998

Sample ID	Temperature (°C)																				
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
AN-SC-78	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
AN-SC-80	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	20.5
AN-SC-77	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	20.5
AN-SC-82	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	20.5
AN-SS-37	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
AN-SC-84	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
AN-SS-45	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	20.5
AN-SC-71	20.5	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
AN-SC-70	20.5	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	20.5
AN-SS-36	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
AN-SS-47	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	20.5
Technician's Initials	JGK	GSY	JGK	JGK	GSY	GSY	JGK	JGK	JGK	JGK	JGK	JGK	JGK	JGK	JGK	JGK	JGK	SSK	JGK	GSY	JGK

Sample ID	pH							
	0	3	6	9	12	15	18	20
AN-SC-78	8.0	7.9	8.2	7.9	8.0	7.8	7.9	8.0
AN-SC-80	7.9	7.8	8.1	7.9	8.0	7.9	8.0	7.9
AN-SC-77	8.0	7.8	8.0	7.8	7.6	7.4	8.0	7.9
AN-SC-82	8.0	7.9	8.3	7.8	7.9	7.4	7.9	7.8
AN-SS-37	7.9	8.2	8.4	8.2	8.2	8.1	8.2	8.1
AN-SC-84	8.0	7.7	7.9	7.8	7.8	7.2 (1) 7.2 (2)		7.9
AN-SS-45	7.9	8.0	8.3	8.1	8.2	8.1	8.2	8.2
AN-SC-71	8.0	7.8	8.1	7.8	7.8	7.6	7.9	7.9
AN-SC-70	8.0	7.9	8.0	7.8	7.9	7.9	7.9	7.9
AN-SS-36	8.0	7.8	8.2	7.8	7.8	7.8	7.8	7.5
AN-SS-47	7.9	7.9	8.1	7.9	8.0	7.9	7.8	7.8
Technician's Initials	JGK	JGK	JGK	JGK	JGK	GSY	RAS	RAS

WQ Instruments Used: Temp. Calibrated Hg Thermometer pH YI-A-30
Comments: ① double checked ② confirmed (rec-7.8)

Test Set Up By: JGK, GSY
Data Verified By: G. Lauren
Date Verified: Jan 22, 1999

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

Client: Whatcom Waterway
EVS Project No.: 9/852-01.1
EVS Work Order No.: 9800688

Test Species: Neanthes arenaceodentata
Source/Date Received: Donald Reish / Dec. 2, 1998
Test Initiation Date (Day 0): Dec. 8, 1998
Test Termination Date (Day 20): Dec. 28, 1998

Sample ID	Temperature (°C)																					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
AN-SC-73	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	8.0	7.8	8.0	7.9	7.8	7.7	7.8	7.7
AN-SC-81	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	8.0	7.6	7.9	7.7	7.9	7.8	7.9	7.4
AN-SC-72	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	8.0	7.7	7.9	7.7	7.7	7.6	7.5	7.5
Technician's Initials	JGL		JGL	JGL			JGL	JGL	JGL	JGL	JGL	JGL	JGL	JGL	RSM	RSM	RSM	SM	RSM			JGL	JGL	JGL	JGL	JGL	RSM	RSM	RSM

WQ Instruments Used: Temp. Calibrated Hg Thermometer pH YI-A-30
Comments

Test Set Up By: JGL, GSL
Data Verified By: Francesca Landig
Date Verified: FEB 16, 1999

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

Client: Various
EVS Project No.: 9/852-01.1
EVS Work Order No.: 9800688

Test Species: Neanthes arenaceodentata
Source/Date Received: Donald Resh / Dec. 2, 1998
Test Initiation Date (Day 0): Dec. 8, 1998
Test Termination Date (Day 20): Dec. 28, 1998

Sample ID	Temperature (°C)																					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
Control	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	8.0	7.9	7.7	7.6	7.8	7.3 (1)	7.8	7.9
Technician's Initials	JGH	SP	JGH	JGH	SP	SP	JGH	JGH	JGH	JGH	JGH	JGH	JGH	JGH	RSM	RSM	RSM	SS	SS	SP	RST	JGH	JGH	JGH	JGH	JGH	SP	RST	SS

WQ Instruments Used: Temp. Calibrated Hg thermometer pH YI-A-30
Comments: (1) recalibrated, double checked

Test Set Up By: JGH, GSY
Data Verified By: [signature]
Date Verified: Jan 22, 1999

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

Client Various
EVS Project No. 9852-01.1
EVS Work Order No. 9806688

Test Species Neanthes arenaceodentata
Source/Date Received Donald Reish / Dec. 2, 1998
Test Initiation Date (Day 0) Dec. 8, 1998
Test Termination Date (Day 20) Dec. 28, 1998

Sample ID	Temperature (°C)																					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
CR-23W	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	8.0	7.8	7.9	7.8	7.9	7.0	7.6	7.6
CR-22	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	8.1	7.7	8.0	7.8	7.9	7.7	7.9	7.9
CR-10	21.0	20.5	20.5	21.0	20.5	20.5	21.0	21.0	21.0	21.0	21.0	20.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	7.9	7.4	8.0	7.9	8.0	7.6	8.0	8.0
Technician's Initials	JGH		JGH	JGH			JGH	JGH	JGH	JGH	JGH	JGH	JGH	JGH	JGH	JGH	JGH	GSY	RJH		RMT	JGH	JGH	JGH	JGH	JGH	RJH	ROR	RMT

WQ Instruments Used: Temp. Calibrated Hg Thermometer pH I-1-30
Comments ① recalibrated, double checked

Test Set Up By JGH, GSY Data Verified By G. Lauren Date Verified Jan 22, 1999

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

Client: Whatcom Waterway
EVS Project No.: 9/852-01.1
EVS Work Order No.: 9800688

Test Species: Hrathes arenaceodentata
Source/Date Received: Donald Reish / Dec. 2, 1998
Test Initiation Date (Day 0): Dec. 8, 1998.
Test Termination Date (Day 20): Dec. 28, 1998.

Sample ID	Salinity (ppt)								Dissolved Oxygen (mg/L)							
	0	3	6	9	12	15	18	20	0	3	6	9	12	15	18	20
AN-SC-78	29	29	29	29	29	29	29	29	7.1	6.7	6.7	6.7	6-7	6.6	6.6	4.5
AN-SC-80	29	29	29	29	29	29	29	29	7.0	5.6	6.5	6-6	6-6	6.5	6.7	4.8
AN-SC-77	29	29	29	29	29	29	29	29	6.9	6.0	6-6	6-6	6.5	3.1 (1)	6.9	4.9
AN-SC-82	29	29	29	29	29	29	29	29	7.1	6.7	6.7	6.5	6.4	6.2	.6.3	4.7
AN-SS-37	29	29	29	29	29	29	29	29	5.1	6.9	5.7	7.0	7.0	6.6	7.3	5.0
AN-SC-84	29	29	29	29	29	29	29	29	7.1	5.8	6.6	6.6	6.9	2.0 (1)	@ 0.9	4.8
AN-SS-45	29	29	29	29	29	29	29	29	7.1	7.0	6.9	6.8	6.1	6.0	6.7	4.8
AN-SC-71	29	30	29	29	29	29	29	29	7.1	6.9	6.5	6.4	6.6	5.7 (1)	6.9	4.8
AN-SC-70	29	29	29	29	29	29	29	29	6.8	7.0	6.8	6.7	6.6	6.6	7.1	5.1
AN-SS-36	29	30	29	29	29	29	29	29	6.9	6.7	6.4	6.2	6.4	6.2	@ 5.7	4.2
AN-SS-47	29	30	29	29	29	29	29	29	6.9	5.5	6.3	6.2	6.2	6.2	@ 5.5	3.9
Technician's Initials	JGL	JGL	JGL	JGL	JGL	BAN	BAH	BST	JGL	JGL	JGL	JGL	JGL	BAN	BAH	BST

WQ Instruments Used: Salinity II-C-22 DO II-A-20
Comments: (1) aeration checked for blockages; aeration reset (2) Rep C - 6.9 aeration readjusted

Test Set Up By: JGL, GRY
Data Verified By: Francois Landry
Date Verified: Feb 16, 1999

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

Client: Whatcom waterway
EVS Project No.: 9852-01.1
EVS Work Order No.: 9800688

Test Species: Neanthes arenaceodentata
Source/Date Received: Donald Reish / Dec. 2, 1998
Test Initiation Date (Day 0): Dec. 8, 1998
Test Termination Date (Day 20): Dec. 28, 1998

Sample ID	Salinity (ppt)								Dissolved Oxygen (mg/L)							
	0	3	6	9	12	15	18	20	0	3	6	9	12	15	18	20
AN-SC-73	29	30	29	29	29	29	29	29	6.9	5.6	6.3	6.4	5.8	6.0	5.9	4.1
AN-SC-81	29	30	29	29	29	29	29	30	6.9	4.5①	6.0	6.2	6.4	6.2	6.1	3.6
AN-SC-72	29	30	29	29	29	29	29	30	7.1	4.2②	5.6	6.1	5.6	4.6①	③4.1	3.9
Technician's Initials	JEM	JEM	JGL	JGL	JGL	PGM	PDH	BSS	JEM	JEM	JGL	JGL	JGL	PGM	PDH	BSS

WQ Instruments Used: Salinity II-C-22 DO II-A-20

Comments: ① AN-SC-81, Rep B = 4.4 mg/L, Incorrect aeration on WQ sheet; ② AN-SC-72, Rep D = 6.7 mg/L, Incorrect aeration on WQ sheet ③ aeration adjusted ③ Rep C = 7.1 Adjusted & Aerated

Test Set Up By: JGL, GSY

Data Verified By: Francis Landy

Date Verified: Feb 16, 1999

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

Client: Various
EVS Project No.: 9852-01.1
EVS Work Order No.: 9800688

Test Species: Neanthes arenaceodentata
Source/Date Received: Donald Reish / Dec. 2, 1998
Test Initiation Date (Day 0): Dec. 8, 1998
Test Termination Date (Day 20): Dec. 28, 1998

Sample ID	Salinity (ppt)								Dissolved Oxygen (mg/L)							
	0	3	6	9	12	15	18	20	0	3	6	9	12	15	18	20
Control	28	28	29	29	29	29	29	29	7.2	4.8①	6.4	6.2	6.7	6.6	6.7	5.0
Technician's Initials	JKM	JKM	JGK	JGK	JGK	BCM	PSH	DAS	JKM	JKM	JGK	JGK	JGK	BCM	PSH	DAS

WQ Instruments Used: Salinity: I-C-22 DO: I-A-20
Comments: ① Increased Aeration.

Test Set Up By: JGK, GSy
Data Verified By: G. Lauren
Date Verified: Jan 22, 1999

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

Client: Various
EVS Project No.: 9/852-01.1
EVS Work Order No.: 9800688

Test Species: Neanthes arenaceodentata
Source/Date Received: Donald Reish/Dec. 2, 1998
Test Initiation Date (Day 0): Dec. 8, 1998
Test Termination Date (Day 20): Dec. 28, 1998

Sample ID	Salinity (ppt)								Dissolved Oxygen (mg/L)							
	0	3	6	9	12	15	18	20	0	3	6	9	12	15	18	20
CR-23W	29	29	29	29	29	29	29	30	6.9	4.4①	6.5	6.4	6.5	0.5②	5.7	4.6
CR-22	29	29	29	29	29	29	29	30	7.2	6.6	6.8	6.6	6.7	6.2	6.7	5.0
CR-10	29	29	29	29	29	29	29	30	7.2	6.7	6.6	6.7	6.7	6.0	6.9	5.2
Technician's Initials	JTM	JTM	JGL	JGL	JGL	RGM	SAR	BSJ	JTM	JTM	JGL	JGL	JGL	RGM	SAR	BSJ

WQ Instruments Used: Salinity Ī-C-22 DO Ī-A-20
Comments: ① CR-23W, Rep C - 7.0 mg/L. Increased aeration for WQ jar ② CR 23W Rep A = 6.9 mg/L. Aeration reset for WQ jars

Test Set Up By: JGL, GSJ
Data Verified By: G Lauren
Date Verified: Jan 22, 1999

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURV. L AND FINAL WATER QUALITY DATA

Client Whatcom Waterway
EVS Project No. 91852-01.1
EVS Work Order No. 9800688

Test Type 20-d survival and growth
Test Species Hyalella azteca/edentata
Test Initiation Date (Day 0) Dec. 8, 1998
Test Termination Date Dec. 28, 1998

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☐ Salinity (ppt) ☑	DO (mg/L)
AN-SS-36	A	21	5	0	5	0		21.0	7.8	30	4.2
	B	22	5	0	5	0		21.0	7.8	30	4.1
	C	23	4	0	4	1		21.0	7.9	30	4.1
	D	24	5	0	5	0		21.0	7.5	30	3.0
	E	25	5	0	5	0		21.0	7.5	30	3.2 i
AN-SS-37	A	26	5	0	5	0		21.0	8.0	30	5.0
	B	27	4	0	4	1		21.0	8.2	30	5.0
	C	28	5	0	5	0		21.0	8.0	30	4.0
	D	29	0	0	0	5		21.0	7.8	30	4.2
	E	30	4	0	4	1		21.0	7.8	30	4.2
AN-SS-45	A	31	5	0	5	0	JMB	21.0	8.1	30	5.0
	B	32	4	0	4	1	JMB	21.0	8.0	30	4.9
	C	33	5	0	5	0	JMB	21.0	7.9	30	4.9
	D	34	5	0	5	0	JMB	21.0	8.0	30	4.8
	E	35	1	0	1	4	JMB	21.0	7.6	30	1.0
							Technician's Initials				

WQ Instruments Used: Temp. Calibrated Hg Thermometer pH #-A-30 Cond./Sal. #-C-22 DO #-A-20
Data Verified By G. Lauritzen Date Verified Jan 22, 1999

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

Client: Whatcom waterway
EVS Project No.: 91852-01-1
EVS Work Order No.: 9800688

Test Type: 20-d survival and growth
Test Species: Heanthes arenaceodentata
Test Initiation Date (Day 0): Dec. 8, 1998
Test Termination Date: Dec. 28, 1998

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☐ Salinity (ppt) ☑	DO (mg/L)
AN-SS-47	A	36	4	0	4	1	BSS	21.0	7.8	30	4.4
	B	37	1	0	1	4		21.0	7.8	30	3.8
	C	38	2	0	2	3		21.0	7.6	30	3.6
	D	39	3	0	3	2		21.0	7.5	30	2.6
	E	40	6	0	6	0		21.0	7.7	30	3.0
AN-SC-70	A	41	4	0	4	1		21.0	7.7	30	4.2
	B	42	5	0	5	0		21.0	7.9	30	5.2
	C	43	4	0	4	1		21.0	7.3	30	3.1
	D	44	4	0	4	1		21.0	7.9	30	5.0
	E	45	5	0	5	0		21.0	7.8	30	4.9
AN-SC-71	A	46	5	0	5	0	JMB	21.0	8.1	30	5.2
	B	47	4	0	4	1	JMB	21.0	8.1	30	5.1
	C	48	4	0	4	1	JMB	21.0	8.1	30	5.2
	D	49	5	0	5	0	JMB	21.0	7.8	29	4.2
	E	50	4	0	4	1	JMB	21.0	7.9	29	4.4
						Technician's Initials		BSS	BSS	JMB	BSS

WQ Instruments Used: Temp. Calibrated Hg thermometer pH I-A-30 Cond./Sal. II-C-22 DO II-A-20
Data Verified By
Date Verified Jan 27, 1999

Polychaete Worm Growth and Survival Test-20 d Survival

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-22	1.0000	0.6000	0.8000	1.0000	1.0000
CR-23-W	1.0000	0.8000	0.6000	0.8000	0.8000
CR-10	1.0000	1.0000	0.8000	0.8000	1.0000
D-Control	0.0000	1.0000	1.0000	0.2000	0.8000
AN-SS-36	1.0000	1.0000	0.8000	1.0000	1.0000
AN-SS-37	1.0000	0.8000	1.0000	0.0000	0.8000
AN-SS-45	1.0000	0.8000	1.0000	1.0000	0.2000
AN-SS-47	0.8000	0.2000	0.4000	0.6000	1.0000
AN-SC-70	0.8000	1.0000	0.8000	0.8000	1.0000
AN-SC-71	1.0000	0.8000	0.8000	1.0000	0.8000
AN-SC-72	1.0000	1.0000	1.0000	1.0000	0.6000
AN-SC-73	0.8000	0.8000	1.0000	0.8000	1.0000
AN-SC-77	0.8000	1.0000	0.4000	1.0000	0.8000
AN-SC-78	1.0000	0.8000	0.2000	0.4000	0.6000
AN-SC-80	1.0000	1.0000	0.6000	1.0000	0.8000
AN-SC-81	0.8000	1.0000	0.6000	0.4000	0.8000
AN-SC-82	0.8000	1.0000	0.8000	1.0000	1.0000
AN-SC-84	0.6000	0.6000	1.0000	0.8000	0.8000

			Transform: Untransformed					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-22	0.8800	0.1789	0.8800	0.6000	1.0000	20.328	5			
CR-23-W	0.8000	0.1414	0.8000	0.6000	1.0000	17.678	5	0.784	2.132	0.0222
CR-10	0.9200	0.1095	0.9200	0.8000	1.0000	11.907	5	-0.426	2.132	0.0188
D-Control	0.6000	0.4690	0.6000	0.0000	1.0000	78.174	5	1.247	2.132	0.1074
AN-SS-36	0.9600	0.0894	0.9600	0.8000	1.0000	9.317	5	-0.894	2.132	0.0171
AN-SS-37	0.7200	0.4147	0.7200	0.0000	1.0000	57.601	5	0.792	2.132	0.0870
AN-SS-45	0.8000	0.3464	0.8000	0.2000	1.0000	43.301	5	0.459	2.132	0.0648
AN-SS-47	0.6000	0.3162	0.6000	0.2000	1.0000	52.705	5	1.723	2.132	0.0563
AN-SC-70	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	0.000	2.132	0.0188
AN-SC-71	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	0.000	2.132	0.0188
AN-SC-72	0.9200	0.1789	0.9200	0.6000	1.0000	19.444	5	-0.354	2.132	0.0273
AN-SC-73	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	0.000	2.132	0.0188
AN-SC-77	0.8000	0.2449	0.8000	0.4000	1.0000	30.619	5	0.590	2.132	0.0392
AN-SC-78	0.6000	0.3162	0.6000	0.2000	1.0000	52.705	5	1.723	2.132	0.0563
AN-SC-80	0.8800	0.1789	0.8800	0.6000	1.0000	20.328	5	0.000	2.132	0.0273
AN-SC-81	0.7200	0.2280	0.7200	0.4000	1.0000	31.672	5	1.234	2.132	0.0358
AN-SC-82	0.9200	0.1095	0.9200	0.8000	1.0000	11.907	5	-0.426	2.132	0.0188
AN-SC-84	0.7600	0.1673	0.7600	0.6000	1.0000	22.017	5	1.095	2.132	0.0256

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.27552	1.035	-0.8982	1.40625
Bartlett's Test indicates unequal variances (p = 9.48E-03)	33.5888	33.4087		

Hypothesis Test (1-tail, 0.05)

Heteroscedastic t Test indicates no significant differences

Statistical comparisons made to reference sediment CR-22.

Reviewed by: GSL

Polychaete Worm Growth and Survival Test-Total Dry Weight

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-10	46.100	46.700	41.600	15.600	64.100
CR-22	56.000	37.300	53.300	58.100	53.700
CR-23-W	34.100	54.600	33.200	73.300	45.000
D-Control	0.000	50.000	61.900	2.800	44.700
AN-SS-36	45.200	44.900	63.100	48.900	58.400
AN-SS-37	57.900	33.900	52.000	0.000	48.100
AN-SS-45	64.700	81.300	43.100	53.800	5.300
AN-SS-47	52.000	0.300	34.700	25.400	50.600
AN-SC-70	35.100	34.900	33.500	65.400	51.900
AN-SC-71	60.600	34.900	35.800	54.800	39.000
AN-SC-72	65.100	46.800	69.800	40.800	14.100
AN-SC-73	34.700	24.500	84.900	24.500	53.200
AN-SC-77	45.900	64.700	21.100	70.600	41.700
AN-SC-78	56.100	35.500	20.300	17.600	37.700
AN-SC-80	57.300	47.000	27.100	39.300	52.800
AN-SC-81	24.800	49.900	37.700	22.700	21.000
AN-SC-82	38.200	61.800	35.200	45.600	59.200
AN-SC-84	28.200	24.600	61.900	32.800	22.200

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-10	42.820	17.472	42.820	15.600	64.100	40.803	5			
CR-22	51.680	8.267	51.680	37.300	58.100	15.996	5	-1.025	1.860	138.949
CR-23-W	48.040	16.620	48.040	33.200	73.300	34.596	5	-0.484	1.860	216.262
D-Control	31.880	28.530	31.880	0.000	61.900	89.492	5	0.731	1.860	416.254
AN-SS-36	52.100	8.222	52.100	44.900	63.100	15.780	5	-1.075	1.860	138.671
AN-SS-37	38.380	23.206	38.380	0.000	57.900	60.464	5	0.342	1.860	313.815
AN-SS-45	49.640	28.527	49.640	5.300	81.300	57.469	5	-0.456	1.860	416.199
AN-SS-47	32.600	21.213	32.600	0.300	52.000	65.069	5	0.832	1.860	280.882
AN-SC-70	44.160	14.076	44.160	33.500	65.400	31.875	5	-0.134	1.860	187.217
AN-SC-71	45.020	11.854	45.020	34.900	60.600	26.330	5	-0.233	1.860	165.790
AN-SC-72	47.320	22.180	47.320	14.100	69.800	46.873	5	-0.356	1.860	296.495
AN-SC-73	44.360	25.514	44.360	24.500	84.900	57.515	5	-0.111	1.860	355.626
AN-SC-77	48.800	19.711	48.800	21.100	70.600	40.392	5	-0.508	1.860	258.034
AN-SC-78	33.440	15.487	33.440	17.600	56.100	46.314	5	0.898	1.860	202.737
AN-SC-80	44.700	11.922	44.700	27.100	57.300	26.672	5	-0.199	1.860	166.397
AN-SC-81	31.220	12.341	31.220	21.000	49.900	39.529	5	1.213	1.860	170.172
AN-SC-82	48.000	12.057	48.000	35.200	61.800	25.120	5	-0.546	1.860	167.600
AN-SC-84	33.940	16.133	33.940	22.200	61.900	47.533	5	0.835	1.860	210.328

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.57967	1.035	-0.2044	0.01547
Bartlett's Test indicates equal variances (p = 0.48)	16.66	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

Statistical comparisons made to reference sediment CR-10.

Polychaete Worm Growth and Survival Test-Growth Rate

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-10	0.4360	0.4420	0.4950	0.1700	0.6160
CR-22	0.5350	0.5967	0.6412	0.5560	0.5120
CR-23-W	0.3160	0.6575	0.5283	0.8912	0.5375
D-Control	0.4750	0.5940	0.1150	0.5338	
AN-SS-36	0.4270	0.4240	0.7637	0.4640	0.5590
AN-SS-37	0.5540	0.3987	0.4950	0.5762	
AN-SS-45	0.6220	0.9912	0.4060	0.5130	0.2400
AN-SS-47	0.6250	0.0000	0.8425	0.3983	0.3967
AN-SC-70	0.4137	0.3240	0.3938	0.7925	0.4940
AN-SC-71	0.5810	0.4112	0.4225	0.5230	0.4625
AN-SC-72	0.6260	0.4430	0.6730	0.3830	0.2100
AN-SC-73	0.4087	0.2813	0.8240	0.2813	0.5070
AN-SC-77	0.5487	0.6220	0.5025	0.6810	0.4962
AN-SC-78	0.5360	0.4188	0.9900	0.4150	0.6033
AN-SC-80	0.5480	0.4450	0.4267	0.3680	0.6350
AN-SC-81	0.2850	0.4740	0.6033	0.5425	0.2375
AN-SC-82	0.4525	0.5930	0.4150	0.4310	0.5670
AN-SC-84	0.4450	0.3850	0.5940	0.3850	0.2525

			Transform: Untransformed					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-10	0.4318	0.1632	0.4318	0.1700	0.6160	37.804	5			
CR-22	0.5682	0.0514	0.5682	0.5120	0.6412	9.041	5	-1.782	1.860	0.0109
CR-23-W	0.5861	0.2103	0.5861	0.3160	0.8912	35.876	5	-1.296	1.860	0.0264
D-Control	0.4294	0.2152	0.4294	0.1150	0.5940	50.108	4	0.019	1.895	0.0299
AN-SS-36	0.5276	0.1429	0.5276	0.4240	0.7637	27.082	5	-0.987	1.860	0.0175
AN-SS-37	0.5060	0.0793	0.5060	0.3987	0.5762	15.671	4	-0.826	1.895	0.0153
AN-SS-45	0.5544	0.2820	0.5544	0.2400	0.9912	50.853	5	-0.842	1.860	0.0395
AN-SS-47	0.4525	0.3133	0.4525	0.0000	0.8425	69.241	5	-0.131	1.860	0.0464
AN-SC-70	0.4836	0.1830	0.4836	0.3240	0.7925	37.841	5	-0.472	1.860	0.0224
AN-SC-71	0.4801	0.0714	0.4801	0.4112	0.5810	14.872	5	-0.606	1.860	0.0118
AN-SC-72	0.4670	0.1880	0.4670	0.2100	0.6730	40.260	5	-0.316	1.860	0.0231
AN-SC-73	0.4604	0.2243	0.4604	0.2813	0.8240	48.712	5	-0.231	1.860	0.0286
AN-SC-77	0.5701	0.0798	0.5701	0.4962	0.6810	13.997	5	-1.702	1.860	0.0123
AN-SC-78	0.5926	0.2361	0.5926	0.4150	0.9900	39.844	5	-1.253	1.860	0.0306
AN-SC-80	0.4845	0.1063	0.4845	0.3680	0.6350	21.929	5	-0.605	1.860	0.0141
AN-SC-81	0.4285	0.1602	0.4285	0.2375	0.6033	37.398	5	0.033	1.860	0.0195
AN-SC-82	0.4917	0.0822	0.4917	0.4150	0.5930	16.720	5	-0.733	1.860	0.0124
AN-SC-84	0.4123	0.1236	0.4123	0.2525	0.5940	29.979	5	0.213	1.860	0.0156

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.86685	1.035	0.32605	0.95295
Bartlett's Test indicates equal variances (p = 0.05)	27.3411	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

Statistical comparisons made to reference sediment CR-10.

Reviewed by: GSL

Polychaete Worm Growth and Survival Test-Avg Individual Dry Weight

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-10	9.220	9.340	10.400	3.900	12.820
CR-22	11.200	12.433	13.325	11.620	10.740
CR-23-W	6.820	13.650	11.067	18.325	11.250
D-Control	10.000	12.380	2.800	11.175	
AN-SS-36	9.040	8.980	15.775	9.780	11.680
AN-SS-37	11.580	8.475	10.400	12.025	
AN-SS-45	12.940	20.325	8.620	10.760	5.300
AN-SS-47	13.000	0.300	17.350	8.467	8.433
AN-SC-70	8.775	6.980	8.375	16.350	10.380
AN-SC-71	12.120	8.725	8.950	10.960	9.750
AN-SC-72	13.020	9.360	13.960	8.160	4.700
AN-SC-73	8.675	6.125	16.980	6.125	10.640
AN-SC-77	11.475	12.940	10.550	14.120	10.425
AN-SC-78	11.220	8.875	20.300	8.800	12.567
AN-SC-80	11.460	9.400	9.033	7.860	13.200
AN-SC-81	6.200	9.980	12.567	11.350	5.250
AN-SC-82	9.550	12.360	8.800	9.120	11.840
AN-SC-84	9.400	8.200	12.380	8.200	5.550

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-10	9.136	3.265	9.136	3.900	12.820	35.735	5			
CR-22	11.864	1.027	11.864	10.740	13.325	8.660	5	-1.782	1.860	4.357
CR-23-W	12.222	4.206	12.222	6.820	18.325	34.409	5	-1.296	1.860	10.542
D-Control	9.089	4.304	9.089	2.800	12.380	47.351	4	0.019	1.895	11.960
AN-SS-36	11.051	2.857	11.051	8.980	15.775	25.857	5	-0.987	1.860	7.001
AN-SS-37	10.620	1.586	10.620	8.475	12.025	14.933	4	-0.826	1.895	6.112
AN-SS-45	11.589	5.639	11.589	5.300	20.325	48.659	5	-0.842	1.860	15.790
AN-SS-47	9.510	6.339	9.510	0.300	17.350	66.653	5	-0.117	1.860	18.907
AN-SC-70	10.172	3.660	10.172	6.980	16.350	35.981	5	-0.472	1.860	8.946
AN-SC-71	10.101	1.428	10.101	8.725	12.120	14.136	5	-0.606	1.860	4.722
AN-SC-72	9.840	3.760	9.840	4.700	13.960	38.214	5	-0.316	1.860	9.223
AN-SC-73	9.709	4.486	9.709	6.125	16.980	46.204	5	-0.231	1.860	11.448
AN-SC-77	11.902	1.596	11.902	10.425	14.120	13.409	5	-1.702	1.860	4.911
AN-SC-78	12.352	4.722	12.352	8.800	20.300	38.231	5	-1.253	1.860	12.258
AN-SC-80	10.191	2.125	10.191	7.860	13.200	20.853	5	-0.605	1.860	5.644
AN-SC-81	9.069	3.205	9.069	5.250	12.567	35.336	5	0.033	1.860	7.784
AN-SC-82	10.334	1.644	10.334	8.800	12.360	15.911	5	-0.733	1.860	4.969
AN-SC-84	8.746	2.472	8.746	5.550	12.380	28.265	5	0.213	1.860	6.237

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.87011	1.035	0.313	0.98633
Bartlett's Test indicates equal variances (p = 0.05)	27.5194	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

Statistical comparisons made to reference sediment CR-10

Polychaete Worm Growth and Survival Test-20 d Survival

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-10	1.0000	1.0000	0.8000	0.8000	1.0000
CR-22	1.0000	0.6000	0.8000	1.0000	1.0000
CR-23-W	1.0000	0.8000	0.6000	0.8000	0.8000
D-Control	0.0000	1.0000	1.0000	0.2000	0.8000
AN-SS-36	1.0000	1.0000	0.8000	1.0000	1.0000
AN-SS-37	1.0000	0.8000	1.0000	0.0000	0.8000
AN-SS-45	1.0000	0.8000	1.0000	1.0000	0.2000
AN-SS-47	0.8000	0.2000	0.4000	0.6000	1.0000
AN-SC-70	0.8000	1.0000	0.8000	0.8000	1.0000
AN-SC-71	1.0000	0.8000	0.8000	1.0000	0.8000
AN-SC-72	1.0000	1.0000	1.0000	1.0000	0.6000
AN-SC-73	0.8000	0.8000	1.0000	0.8000	1.0000
AN-SC-77	0.8000	1.0000	0.4000	1.0000	0.8000
AN-SC-78	1.0000	0.8000	0.2000	0.4000	0.6000
AN-SC-80	1.0000	1.0000	0.6000	1.0000	0.8000
AN-SC-81	0.8000	1.0000	0.6000	0.4000	0.8000
AN-SC-82	0.8000	1.0000	0.8000	1.0000	1.0000
AN-SC-84	0.6000	0.6000	1.0000	0.8000	0.8000

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-10	0.9200	0.1095	0.9200	0.8000	1.0000	11.907	5			
CR-22	0.8800	0.1789	0.8800	0.6000	1.0000	20.328	5	0.426	2.132	0.0188
CR-23-W	0.8000	0.1414	0.8000	0.6000	1.0000	17.678	5	1.500	2.132	0.0136
D-Control	0.6000	0.4690	0.6000	0.0000	1.0000	78.174	5	1.486	2.132	0.0989
AN-SS-36	0.9600	0.0894	0.9600	0.8000	1.0000	9.317	5	-0.632	2.132	0.0085
AN-SS-37	0.7200	0.4147	0.7200	0.0000	1.0000	57.601	5	1.043	2.132	0.0785
AN-SS-45	0.8000	0.3464	0.8000	0.2000	1.0000	43.301	5	0.739	2.132	0.0563
AN-SS-47	0.6000	0.3162	0.6000	0.2000	1.0000	52.705	5	2.138	2.132	0.0478
AN-SC-70	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	0.577	2.132	0.0102
AN-SC-71	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	0.577	2.132	0.0102
AN-SC-72	0.9200	0.1789	0.9200	0.6000	1.0000	19.444	5	0.000	2.132	0.0188
AN-SC-73	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	0.577	2.132	0.0102
AN-SC-77	0.8000	0.2449	0.8000	0.4000	1.0000	30.619	5	1.000	2.132	0.0307
*AN-SC-78	0.6000	0.3162	0.6000	0.2000	1.0000	52.705	5	2.138	2.132	0.0478
AN-SC-80	0.8800	0.1789	0.8800	0.6000	1.0000	20.328	5	0.426	2.132	0.0188
AN-SC-81	0.7200	0.2280	0.7200	0.4000	1.0000	31.672	5	1.768	2.132	0.0273
AN-SC-82	0.9200	0.1095	0.9200	0.8000	1.0000	11.907	5	0.000	2.132	0.0102
AN-SC-84	0.7600	0.1673	0.7600	0.6000	1.0000	22.017	5	1.789	2.132	0.0171

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.27552	1.035	-0.8982	1.40625
Bartlett's Test indicates unequal variances (p = 9.48E-03)	33.5888	33.4087		

Hypothesis Test (1-tail, 0.05)

Heteroscedastic t Test indicates significant differences

Statistical comparisons made to reference sediment CR-10.

Reviewed by: GSL

Polychaete Worm Growth and Survival Test-Total Dry Weight

Start Date:	12/8/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	12/28/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway				

Conc-%	1	2	3	4	5
D-Control	0.000	50.000	61.900	2.800	44.700
CR-10	46.100	46.700	41.600	15.600	64.100
CR-22	56.000	37.300	53.300	58.100	53.700
CR-23-W	34.100	54.600	33.200	73.300	45.000
AN-SS-36	45.200	44.900	63.100	48.900	58.400
AN-SS-37	57.900	33.900	52.000	0.000	48.100
AN-SS-45	64.700	81.300	43.100	53.800	5.300
AN-SS-47	52.000	0.300	34.700	25.400	50.600
AN-SC-70	35.100	34.900	33.500	65.400	51.900
AN-SC-71	60.600	34.900	35.800	54.800	39.000
AN-SC-72	65.100	46.800	69.800	40.800	14.100
AN-SC-73	34.700	24.500	84.900	24.500	53.200
AN-SC-77	45.900	64.700	21.100	70.600	41.700
AN-SC-78	56.100	35.500	20.300	17.600	37.700
AN-SC-80	57.300	47.000	27.100	39.300	52.800
AN-SC-81	24.800	49.900	37.700	22.700	21.000
AN-SC-82	38.200	61.800	35.200	45.600	59.200
AN-SC-84	28.200	24.600	61.900	32.800	22.200

			Transform: Untransformed					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	31.880	28.530	31.880	0.000	61.900	89.492	5			
CR-10	42.820	17.472	42.820	15.600	64.100	40.803	5	-0.731	1.860	416.254
CR-22	51.680	8.267	51.680	37.300	58.100	15.996	5	-1.491	1.860	328.139
CR-23-W	48.040	16.620	48.040	33.200	73.300	34.596	5	-1.094	1.860	405.452
AN-SS-36	52.100	8.222	52.100	44.900	63.100	15.780	5	-1.523	1.860	327.861
AN-SS-37	38.380	23.206	38.380	0.000	57.900	60.464	5	-0.395	1.860	503.006
AN-SS-45	49.640	28.527	49.640	5.300	81.300	57.469	5	-0.984	1.860	605.389
AN-SS-47	32.600	21.213	32.600	0.300	52.000	65.069	5	-0.045	1.860	470.072
AN-SC-70	44.160	14.076	44.160	33.500	65.400	31.875	5	-0.863	1.860	376.408
AN-SC-71	45.020	11.854	45.020	34.900	60.600	26.330	5	-0.951	1.860	354.980
AN-SC-72	47.320	22.180	47.320	14.100	69.800	46.873	5	-0.955	1.860	485.686
AN-SC-73	44.360	25.514	44.360	24.500	84.900	57.515	5	-0.729	1.860	544.816
AN-SC-77	48.800	19.711	48.800	21.100	70.600	40.392	5	-1.091	1.860	447.224
AN-SC-78	33.440	15.487	33.440	17.600	56.100	46.314	5	-0.107	1.860	391.928
AN-SC-80	44.700	11.922	44.700	27.100	57.300	26.672	5	-0.927	1.860	355.587
AN-SC-81	31.220	12.341	31.220	21.000	49.900	39.529	5	0.047	1.860	359.363
AN-SC-82	48.000	12.057	48.000	35.200	61.800	25.120	5	-1.164	1.860	356.790
AN-SC-84	33.940	16.133	33.940	22.200	61.900	47.533	5	-0.141	1.860	399.518

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.57967	1.035	-0.2044	0.01547
Bartlett's Test indicates equal variances (p = 0.48)	16.66	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

Statistical comparisons made to negative control (D-control)

Reviewed by: GSL

Polychaete Worm Growth and Survival Test-Growth Rate

Start Date:	12/8/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	12/28/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway				

Conc-%	1	2	3	4	5
D-Control	0.4750	0.5940	0.1150	0.5338	
CR-10	0.4360	0.4420	0.4950	0.1700	0.6160
CR-22	0 5350	0.5967	0.6412	0 5560	0.5120
CR-23-W	0.3160	0.6575	0.5283	0.8912	0.5375
AN-SS-36	0.4270	0.4240	0.7637	0.4640	0.5590
AN-SS-37	0.5540	0.3987	0.4950	0.5762	
AN-SS-45	0.6220	0.9912	0.4060	0.5130	0.2400
AN-SS-47	0.6250	0.0000	0.8425	0.3983	0.3967
AN-SC-70	0.4137	0.3240	0.3938	0.7925	0.4940
AN-SC-71	0.5810	0.4112	0.4225	0.5230	0.4625
AN-SC-72	0.6260	0.4430	0.6730	0.3830	0.2100
AN-SC-73	0.4087	0.2813	0.8240	0.2813	0.5070
AN-SC-77	0.5487	0.6220	0.5025	0.6810	0.4962
AN-SC-78	0.5360	0.4188	0.9900	0.4150	0.6033
AN-SC-80	0.5480	0.4450	0.4267	0.3680	0.6350
AN-SC-81	0.2850	0.4740	0.6033	0.5425	0.2375
AN-SC-82	0.4525	0.5930	0.4150	0.4310	0.5670
AN-SC-84	0.4450	0.3850	0.5940	0.3850	0.2525

			Transform: Untransformed					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.4294	0.2152	0.4294	0.1150	0.5940	50.108	4			
CR-10	0.4318	0.1632	0.4318	0.1700	0.6160	37.804	5	-0.019	1.895	0.0299
CR-22	0.5682	0.0514	0.5682	0.5120	0.6412	9.041	5	-1.415	1.895	0.0182
CR-23-W	0.5861	0.2103	0.5861	0.3160	0.8912	35.876	5	-1.100	1.895	0.0385
AN-SS-36	0.5276	0.1429	0.5276	0.4240	0.7637	27.082	5	-0.824	1.895	0.0269
AN-SS-37	0.5060	0.0793	0.5060	0.3987	0.5762	15.671	4	-0.668	1.943	0.0255
AN-SS-45	0.5544	0.2820	0.5544	0.2400	0.9912	50.853	5	-0.729	1.895	0.0556
\N-SS-47	0.4525	0.3133	0.4525	0.0000	0.8425	69.241	5	-0.125	1.895	0.0647
AN-SC-70	0.4836	0.1830	0.4836	0.3240	0.7925	37.841	5	-0.409	1.895	0.0332
AN-SC-71	0.4801	0.0714	0.4801	0.4112	0.5810	14.872	5	-0.500	1.895	0.0194
AN-SC-72	0.4670	0.1880	0.4670	0.2100	0.6730	40.260	5	-0.280	1.895	0.0341
AN-SC-73	0.4604	0.2243	0.4604	0.2813	0.8240	48.712	5	-0.210	1.895	0.0414
AN-SC-77	0.5701	0.0798	0.5701	0.4962	0.6810	13.997	5	-1.368	1.895	0.0200
AN-SC-78	0.5926	0.2361	0.5926	0.4150	0.9900	39.844	5	-1.070	1.895	0.0441
AN-SC-80	0.4845	0.1063	0.4845	0.3680	0.6350	21.929	5	-0.506	1.895	0.0224
AN-SC-81	0.4285	0.1602	0.4285	0.2375	0.6033	37.398	5	0.008	1.895	0.0294
AN-SC-82	0.4917	0.0822	0.4917	0.4150	0.5930	16.720	5	-0.603	1.895	0.0202
AN-SC-84	0.4123	0.1236	0.4123	0.2525	0.5940	29.979	5	0.151	1.895	0.0244

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.86685	1.035	0.32605	0.95295
Bartlett's Test indicates equal variances (p = 0.05)	27.3411	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

Statistical comparisons made to negative control (D-control)

Polychaete Worm Growth and Survival Test-Avg Individual Dry Weight

Start Date:	12/8/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	12/28/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway				

Conc-%	1	2	3	4	5
D-Control	10.000	12.380	2.800	11.175	
CR-10	9.220	9.340	10.400	3.900	12.820
CR-22	11.200	12.433	13.325	11.620	10.740
CR-23-W	6.820	13.650	11.067	18.325	11.250
AN-SS-36	9.040	8.980	15.775	9.780	11.680
AN-SS-37	11.580	8.475	10.400	12.025	
AN-SS-45	12.940	20.325	8.620	10.760	5.300
AN-SS-47	13.000	0.300	17.350	8.467	8.433
AN-SC-70	8.775	6.980	8.375	16.350	10.380
AN-SC-71	12.120	8.725	8.950	10.960	9.750
AN-SC-72	13.020	9.360	13.960	8.160	4.700
AN-SC-73	8.675	6.125	16.980	6.125	10.640
AN-SC-77	11.475	12.940	10.550	14.120	10.425
AN-SC-78	11.220	8.875	20.300	8.800	12.567
AN-SC-80	11.460	9.400	9.033	7.860	13.200
AN-SC-81	6.200	9.980	12.567	11.350	5.250
AN-SC-82	9.550	12.360	8.800	9.120	11.840
AN-SC-84	9.400	8.200	12.380	8.200	5.550

			Transform: Untransformed					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	9.089	4.304	9.089	2.800	12.380	47.351	4			
CR-10	9.136	3.265	9.136	3.900	12.820	35.735	5	-0.019	1.895	11.960
CR-22	11.864	1.027	11.864	10.740	13.325	8.660	5	-1.415	1.895	7.282
CR-23-W	12.222	4.206	12.222	6.820	18.325	34.409	5	-1.100	1.895	15.384
AN-SS-36	11.051	2.857	11.051	8.980	15.775	25.857	5	-0.824	1.895	10.745
AN-SS-37	10.620	1.586	10.620	8.475	12.025	14.933	4	-0.668	1.943	10.219
AN-SS-45	11.589	5.639	11.589	5.300	20.325	48.659	5	-0.729	1.895	22.259
AN-SS-47	9.510	6.339	9.510	0.300	17.350	66.653	5	-0.113	1.895	26.342
AN-SC-70	10.172	3.660	10.172	6.980	16.350	35.981	5	-0.409	1.895	13.293
AN-SC-71	10.101	1.428	10.101	8.725	12.120	14.136	5	-0.500	1.895	7.761
AN-SC-72	9.840	3.760	9.840	4.700	13.960	38.214	5	-0.280	1.895	13.656
AN-SC-73	9.709	4.486	9.709	6.125	16.980	46.204	5	-0.210	1.895	16.571
AN-SC-77	11.902	1.596	11.902	10.425	14.120	13.409	5	-1.368	1.895	8.008
AN-SC-78	12.352	4.722	12.352	8.800	20.300	38.231	5	-1.070	1.895	17.632
AN-SC-80	10.191	2.125	10.191	7.860	13.200	20.853	5	-0.506	1.895	8.967
AN-SC-81	9.069	3.205	9.069	5.250	12.567	35.336	5	0.008	1.895	11.771
AN-SC-82	10.334	1.644	10.334	8.800	12.360	15.911	5	-0.603	1.895	8.084
AN-SC-84	8.746	2.472	8.746	5.550	12.380	28.265	5	0.151	1.895	9.744

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.87011	1.035	0.313	0.98633
Bartlett's Test indicates equal variances (p = 0.05)	27.5194	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

Statistical comparisons made to negative control (D-control)

Reviewed by: GSL

Polychaete Worm Growth and Survival Test-20 d Survival

Start Date:	12/8/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	12/28/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway				

Conc-%	1	2	3	4	5
D-Control	0.0000	1.0000	1.0000	0.2000	0.8000
CR-10	1.0000	1.0000	0.8000	0.8000	1.0000
CR-22	1.0000	0.6000	0.8000	1.0000	1.0000
CR-23-W	1.0000	0.8000	0.6000	0.8000	0.8000
AN-SS-36	1.0000	1.0000	0.8000	1.0000	1.0000
AN-SS-37	1.0000	0.8000	1.0000	0.0000	0.8000
AN-SS-45	1.0000	0.8000	1.0000	1.0000	0.2000
AN-SS-47	0.8000	0.2000	0.4000	0.6000	1.0000
AN-SC-70	0.8000	1.0000	0.8000	0.8000	1.0000
AN-SC-71	1.0000	0.8000	0.8000	1.0000	0.8000
AN-SC-72	1.0000	1.0000	1.0000	1.0000	0.6000
AN-SC-73	0.8000	0.8000	1.0000	0.8000	1.0000
AN-SC-77	0.8000	1.0000	0.4000	1.0000	0.8000
AN-SC-78	1.0000	0.8000	0.2000	0.4000	0.6000
AN-SC-80	1.0000	1.0000	0.6000	1.0000	0.8000
AN-SC-81	0.8000	1.0000	0.6000	0.4000	0.8000
AN-SC-82	0.8000	1.0000	0.8000	1.0000	1.0000
AN-SC-84	0.6000	0.6000	1.0000	0.8000	0.8000

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.6000	0.4690	0.6000	0.0000	1.0000	78.174	5			
CR-10	0.9200	0.1095	0.9200	0.8000	1.0000	11.907	5	-1.486	2.132	0.0989
CR-22	0.8800	0.1789	0.8800	0.6000	1.0000	20.328	5	-1.247	2.132	0.1074
CR-23-W	0.8000	0.1414	0.8000	0.6000	1.0000	17.678	5	-0.913	2.132	0.1023
AN-SS-36	0.9600	0.0894	0.9600	0.8000	1.0000	9.317	5	-1.686	2.132	0.0972
AN-SS-37	0.7200	0.4147	0.7200	0.0000	1.0000	57.601	5	-0.429	2.132	0.1671
AN-SS-45	0.8000	0.3464	0.8000	0.2000	1.0000	43.301	5	-0.767	2.132	0.1450
AN-SS-47	0.6000	0.3162	0.6000	0.2000	1.0000	52.705	5	0.000	2.132	0.1364
AN-SC-70	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	-1.300	2.132	0.0989
AN-SC-71	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	-1.300	2.132	0.0989
AN-SC-72	0.9200	0.1789	0.9200	0.6000	1.0000	19.444	5	-1.425	2.132	0.1074
AN-SC-73	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	-1.300	2.132	0.0989
AN-SC-77	0.8000	0.2449	0.8000	0.4000	1.0000	30.619	5	-0.845	2.132	0.1194
AN-SC-78	0.6000	0.3162	0.6000	0.2000	1.0000	52.705	5	0.000	2.132	0.1364
AN-SC-80	0.8800	0.1789	0.8800	0.6000	1.0000	20.328	5	-1.247	2.132	0.1074
AN-SC-81	0.7200	0.2280	0.7200	0.4000	1.0000	31.672	5	-0.514	2.132	0.1160
AN-SC-82	0.9200	0.1095	0.9200	0.8000	1.0000	11.907	5	-1.486	2.132	0.0989
AN-SC-84	0.7600	0.1673	0.7600	0.6000	1.0000	22.017	5	-0.718	2.132	0.1057

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.27552	1.035	-0.8982	1.40625
Bartlett's Test indicates unequal variances (p = 9.48E-03)	33.5888	33.4087		

Hypothesis Test (1-tail, 0.05)

Heteroscedastic t Test indicates no significant differences

Statistical comparisons made to negative control (D-control)

Reviewed by: GSL

Test: PW-Polychaete Worm Growth and Survival Test Test ID: EVS8442
Species: NA-Neanthes arenaceodentata Protocol: PSEP 95
Sample ID: VARIOUS Sample Type: SEDIMENT1-Marine
Start Date: 08/12/98 End Date: 28/12/98 Lab ID: BCEVS-EVS Environment Consultants

	53	3	AN-SC-72	5	5	5	0.5	1282.4	1352.2
	54	4	AN-SC-72	5	5	5	0.5	1292.8	1333.6
	55	5	AN-SC-72	5	3	3	0.5	1280.8	1294.9
	56	1	AN-SC-73	5	4	4	0.5	1294.4	1329.1
	57	2	AN-SC-73	5	4	4	0.5	1293.8	1318.3
	58	3	AN-SC-73	5	5	5	0.5	1291.4	1376.3
	59	4	AN-SC-73	5	4	4	0.5	1292.4	1316.9
	60	5	AN-SC-73	5	5	5	0.5	1291.8	1345.0
	61	1	AN-SC-77	5	4	4	0.5	1290.2	1336.1
	62	2	AN-SC-77	5	5	5	0.5	1293.7	1358.4
	63	3	AN-SC-77	5	2	2	0.5	1284.3	1305.4
	64	4	AN-SC-77	5	5	5	0.5	1282.8	1353.4
	65	5	AN-SC-77	5	4	4	0.5	1290.9	1332.6
	66	1	AN-SC-78	5	5	5	0.5	1296.7	1352.8
	67	2	AN-SC-78	5	4	4	0.5	1277.6	1313.1
	68	3	AN-SC-78	5	1	1	0.5	1285.3	1305.6
	69	4	AN-SC-78	5	2	2	0.5	1296.1	1313.7
	70	5	AN-SC-78	5	3	3	0.5	1300.0	1337.7
	71	1	AN-SC-80	5	5	5	0.5	1290.9	1348.2
	72	2	AN-SC-80	5	5	5	0.5	1294.4	1341.4
	73	3	AN-SC-80	5	3	3	0.5	1285.2	1312.3
	74	4	AN-SC-80	5	5	5	0.5	1283.8	1323.1
	75	5	AN-SC-80	5	4	4	0.5	1294.8	1347.6
	76	1	AN-SC-81	5	4	4	0.5	1293.8	1318.6
	77	2	AN-SC-81	5	5	5	0.5	1272.5	1322.4
	78	3	AN-SC-81	5	3	3	0.5	1293.4	1331.1
	79	4	AN-SC-81	5	2	2	0.5	1285.5	1308.2
	80	5	AN-SC-81	5	4	4	0.5	1286.5	1307.5
	81	1	AN-SC-82	5	4	4	0.5	1289.8	1328.0
	82	2	AN-SC-82	5	5	5	0.5	1300.7	1362.5
	83	3	AN-SC-82	5	4	4	0.5	1301.6	1336.8
	84	4	AN-SC-82	5	5	5	0.5	1297.5	1343.1
	85	5	AN-SC-82	5	5	5	0.5	1293.0	1352.2
	86	1	AN-SC-84	5	3	3	0.5	1290.5	1318.7
	87	2	AN-SC-84	5	3	3	0.5	1293.7	1318.3
	88	3	AN-SC-84	5	5	5	0.5	1297.3	1359.2
	89	4	AN-SC-84	5	4	4	0.5	1276.6	1309.4
	90	5	AN-SC-84	5	4	4	0.5	1290.4	1312.6

Comments: Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)

Test: PW-Polychaete Worm Growth and Survival Test Test ID: EVS8442
Species: NA-Neanthes arenaceodentata Protocol: PSEP 95
Sample ID: VARIOUS Sample Type: SEDIMENT1-Marine
Start Date: 08/12/98 End Date: 28/12/98 Lab ID: BCEVS-EVS Environment Consultants

Pos	ID	Rep	Group	Survival Start	Survival Day 20	# of Worms Weighed	Initial Worm Wt (mg/worm)	Pan Weight (mg)	Pan + Worms (mg)
	1	1	D-Control	5	0	0	0.5	1271.2	1271.2
	2	2	D-Control	5	5	5	0.5	1273.4	1323.4
	3	3	D-Control	5	5	5	0.5	1282.6	1344.5
	4	4	D-Control	5	1	1	0.5	1265.2	1268.0
	5	5	D-Control	5	4	4	0.5	1286.0	1330.7
	6	1	CR-10	5	5	5	0.5	1264.5	1310.6
	7	2	CR-10	5	5	5	0.5	1309.9	1356.6
	8	3	CR-10	5	4	4	0.5	1269.5	1311.1
	9	4	CR-10	5	4	4	0.5	1270.3	1285.9
	10	5	CR-10	5	5	5	0.5	1303.2	1367.3
	11	1	CR-22	5	5	5	0.5	1258.9	1314.9
	12	2	CR-22	5	3	3	0.5	1260.1	1297.4
	13	3	CR-22	5	4	4	0.5	1281.2	1334.5
	14	4	CR-22	5	5	5	0.5	1281.6	1339.7
	15	5	CR-22	5	5	5	0.5	1268.8	1322.5
	16	1	CR-23-W	5	5	5	0.5	1290.2	1324.3
	17	2	CR-23-W	5	4	4	0.5	1277.7	1332.3
	18	3	CR-23-W	5	3	3	0.5	1272.9	1306.1
	19	4	CR-23-W	5	4	4	0.5	1302.8	1376.1
	20	5	CR-23-W	5	4	4	0.5	1279.8	1324.8
	21	1	AN-SS-36	5	5	5	0.5	1289.8	1335.0
	22	2	AN-SS-36	5	5	5	0.5	1260.3	1305.2
	23	3	AN-SS-36	5	4	4	0.5	1259.0	1322.1
	24	4	AN-SS-36	5	5	5	0.5	1278.9	1327.8
	25	5	AN-SS-36	5	5	5	0.5	1267.5	1325.9
	26	1	AN-SS-37	5	5	5	0.5	1268.3	1326.2
	27	2	AN-SS-37	5	4	4	0.5	1276.9	1310.8
	28	3	AN-SS-37	5	5	5	0.5	1283.8	1335.8
	29	4	AN-SS-37	5	0	0	0.5	1281.6	1281.6
	30	5	AN-SS-37	5	4	4	0.5	1288.5	1336.6
	31	1	AN-SS-45	5	5	5	0.5	1292.2	1356.9
	32	2	AN-SS-45	5	4	4	0.5	1283.0	1364.3
	33	3	AN-SS-45	5	5	5	0.5	1298.4	1341.5
	34	4	AN-SS-45	5	5	5	0.5	1284.4	1338.2
	35	5	AN-SS-45	5	1	1	0.5	1292.5	1297.8
	36	1	AN-SS-47	5	4	4	0.5	1283.7	1335.7
	37	2	AN-SS-47	5	1	1	0.5	1294.0	1294.3
	38	3	AN-SS-47	5	2	2	0.5	1300.6	1335.3
	39	4	AN-SS-47	5	3	3	0.5	1296.4	1321.8
	40	5	AN-SS-47	6	6	6	0.5	1284.0	1334.6
	41	1	AN-SC-70	5	4	4	0.5	1292.9	1328.0
	42	2	AN-SC-70	5	5	5	0.5	1287.6	1322.5
	43	3	AN-SC-70	5	4	4	0.5	1284.3	1317.8
	44	4	AN-SC-70	5	4	4	0.5	1282.5	1347.9
	45	5	AN-SC-70	5	5	5	0.5	1297.8	1349.7
	46	1	AN-SC-71	5	5	5	0.5	1282.0	1342.6
	47	2	AN-SC-71	5	4	4	0.5	1276.9	1311.8
	48	3	AN-SC-71	5	4	4	0.5	1272.1	1307.9
	49	4	AN-SC-71	5	5	5	0.5	1269.1	1323.9
	50	5	AN-SC-71	5	4	4	0.5	1293.9	1332.9
	51	1	AN-SC-72	5	5	5	0.5	1284.9	1350.0
	52	2	AN-SC-72	5	5	5	0.5	1293.8	1340.6

58	C	AN-SC-73	5	5	5	1291.4	1376.3 OK
59	D	AN-SC-73	5	4	4	1292.4	1316.9 OK
60	E	AN-SC-73	5	5	5	1291.8	1345 OK
61	A	AN-SC-77	5	4	4	1290.2	1336.1 OK
62	B	AN-SC-77	5	5	5	1293.7	1358.4 OK
63	C	AN-SC-77	5	2	2	1284.3	1305.4 OK
64	D	AN-SC-77	5	5	5	1282.8	1353.4 OK
65	E	AN-SC-77	5	4	4	1290.9	1332.6 OK
66	A	AN-SC-78	5	5	5	1296.7	1352.8 OK
67	B	AN-SC-78	5	4	4	1277.6	1313.1 OK
68	C	AN-SC-78	5	1	1	1285.3	1305.6 OK
69	D	AN-SC-78	5	2	2	1296.1	1313.7 OK
70	E	AN-SC-78	5	3	3	1300	1337.7 OK
71	A	AN-SC-80	5	5	5	1290.9	1348.2 OK
72	B	AN-SC-80	5	5	5	1294.4	1341.4 OK
73	C	AN-SC-80	5	3	3	1285.2	1312.3 OK
74	D	AN-SC-80	5	5	5	1283.8	1323.1 OK
75	E	AN-SC-80	5	4	4	1294.8	1347.6 OK
76	A	AN-SC-81	5	4	4	1293.8	1318.6 OK
77	B	AN-SC-81	5	5	5	1272.5	1322.4 OK
78	C	AN-SC-81	5	3	3	1293.4	1331.1 OK
79	D	AN-SC-81	5	2	2	1285.5	1308.2 OK
80	E	AN-SC-81	5	4	4	1286.5	1307.5 OK
81	A	AN-SC-82	5	4	4	1289.8	1328 OK
82	B	AN-SC-82	5	5	5	1300.7	1362.5 OK
83	C	AN-SC-82	5	4	4	1301.6	1336.8 OK
84	D	AN-SC-82	5	5	5	1297.5	1343.1 OK
85	E	AN-SC-82	5	5	5	1293	1352.2 OK
86	A	AN-SC-84	5	3	3	1290.5	1318.7 OK
87	B	AN-SC-84	5	3	3	1293.7	1318.3 OK
88	C	AN-SC-84	5	5	5	1297.3	1359.2 OK
89	D	AN-SC-84	5	4	4	1276.6	1309.4 OK
90	E	AN-SC-84	5	4	4	1290.4	1312.6 OK

	C	AN–SS–36	5		4	1259	1322.1 OK
24	D	AN–SS–36	5	5	5	1278.9	1327.8 OK
25	E	AN–SS–36	5	5	5	1267.5	1325.9 OK
26	A	AN–SS–37	5	5	5	1268.3	1326.2 OK
27	B	AN–SS–37	5	4	4	1276.9	1310.8 OK
28	C	AN–SS–37	5	5	5	1283.8	1335.8 OK
29	D	AN–SS–37	5	0	0	1281.6	1281.6 CHECK FOR ERROR
30	E	AN–SS–37	5	4	4	1288.5	1336.6 OK
31	A	AN–SS–45	5	5	5	1292.2	1356.9 OK
32	B	AN–SS–45	5	4	4	1283	1364.3 OK
33	C	AN–SS–45	5	5	5	1298.4	1341.5 OK
34	D	AN–SS–45	5	5	5	1284.4	1338.2 OK
35	E	AN–SS–45	5	1	1	1292.5	1297.8 OK
36	A	AN–SS–47	5	4	4	1283.7	1335.7 OK
37	B	AN–SS–47	5	1	1	1294	1294.3 OK
38	C	AN–SS–47	5	2	2	1300.6	1335.3 OK
39	D	AN–SS–47	5	3	3	1296.4	1321.8 OK
40	E	AN–SS–47	5	6	6	1284	1334.6 OK
41	A	AN–SC–70	5	4	4	1292.9	1328 OK
42	B	AN–SC–70	5	5	5	1287.6	1322.5 OK
43	C	AN–SC–70	5	4	4	1284.3	1317.8 OK
44	D	AN–SC–70	5	4	4	1282.5	1347.9 OK
45	E	AN–SC–70	5	5	5	1297.8	1349.7 OK
46	A	AN–SC–71	5	5	5	1282	1342.6 OK
47	B	AN–SC–71	5	4	4	1276.9	1311.8 OK
48	C	AN–SC–71	5	4	4	1272.1	1307.9 OK
49	D	AN–SC–71	5	5	5	1269.1	1323.9 OK
50	E	AN–SC–71	5	4	4	1293.9	1332.9 OK
51	A	AN–SC–72	5	5	5	1284.9	1350 OK
52	B	AN–SC–72	5	5	5	1293.8	1340.6 OK
53	C	AN–SC–72	5	5	5	1282.4	1352.2 OK
54	D	AN–SC–72	5	5	5	1292.8	1333.6 OK
55	E	AN–SC–72	5	3	3	1280.8	1294.9 OK
56	A	AN–SC–73	5	4	4	1294.4	1329.1 OK
57	B	AN–SC–73	5	4	4	1293.8	1318.3 OK

H:\user\lab1\stats\polydrywt.wk1 and Balance Room C:\polydrywt.wk1

EVS ENVIRONMENT CONSULTANTS

MARINE POLYCHAETE DRY WEIGHT DATA SHEET

CLIENT: Anchor Environmental (LLC)
PROJECT #: 9/852-01.1
WORK ORDER #: 9800688

TEST SPECIES: Neanthes arenaceodentata
TEST INITIATION DATE: Dec.8,1998
FILE NAME: a:\polydryw\test688.wk1
BALANCE TYPE: Mettler Toledo AG104

Pan #	Rep	Sample ID:	Survival At Start	Survival At Day 20	# Worms Weighed	Pan Weight (mg)	Pan + Worm Weight (mg)
1	A	Control Sediment	5	0	0	1271.2	1271.2 CHECK FOR ERROR
2	B	Control Sediment	5	5	5	1273.4	1323.4 OK
3	C	Control Sediment	5	5	5	1282.6	1344.5 OK
4	D	Control Sediment	5	1	1	1265.2	1268.0 OK
5	E	Control Sediment	5	4	4	1286.0	1330.7 OK
6	A	CR-10	5	5	5	1264.5	1310.6 OK
7	B	CR-10	5	5	5	1309.9	1356.6 OK
8	C	CR-10	5	4	4	1269.5	1311.1 OK
9	D	CR-10	5	4	4	1270.3	1285.9 OK
10	E	CR-10	5	5	5	1303.2	1367.3 OK
11	A	CR-22	5	5	5	1258.9	1314.9 OK
12	B	CR-22	5	3	3	1260.1	1297.4 OK
13	C	CR-22	5	4	4	1281.2	1334.5 OK
14	D	CR-22	5	5	5	1281.6	1339.7 OK
15	E	CR-22	5	5	5	1268.8	1322.5 OK
16	A	CR-23-W	5	5	5	1290.2	1324.3 OK
17	B	CR-23-W	5	4	4	1277.7	1332.3 OK
18	C	CR-23-W	5	3	3	1272.9	1306.1 OK
19	D	CR-23-W	5	4	4	1302.8	1376.1 OK
20	E	CR-23-W	5	4	4	1279.8	1324.8 OK
21	A	AN-SS-36	5	5	5	1289.8	1335 OK
22	B	AN-SS-36	5	5	5	1260.3	1305.2 OK

H:\user\lab1\stats\polydrywt.wk1 and Balance Room C:\polydrywt.wk1

G. Lauren
Jan 27, 1999

EVS ENVIRONMENT CONSULTANTS

MARINE POLYCHAETE DRY WEIGHT DATA SHEET

CLIENT: Anchor Environmental
PROJECT #: 9/852-01.1
WORK ORDER #: 9800688

TEST SPECIES: Nenthes arenaceodentata
TEST INITIATION DATE: Dec.08,1998.
FILE NAME: a:\polydrywa:\polydryw\inw688.wk1
BALANCE TYPE: Mettler Toledo AG104

Pan #	Rep	Sample ID:	Survival At Start	Survival At Day 20	# Worms Weighed	Pan Weight (mg)	Pan + Worm Weight (mg)
	1	IN.W.	5		5	1267.8	1270.0 OK
	2	IN.W.	5		5	1265.8	1267.9 OK
	3	IN.W.	5		5	1281.0	1283.0 OK
	4	IN.W.	5		5	1283.7	1286.6 OK

Note:
By visual observation about 50% of worms were normal in size (average weight 0.42 mg/worm), and about 50% were big in size (pan # 4 represent this group: 0.58 mg/worm).

Technician Initials: JGK Technician Initials: JGK

H:\user\lab1\stats\polydrywt.wk1 and Balance Room C:\polydrywt.wk1

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

Client: Various
EVS Project No.: 9/852-01-1
EVS Work Order No.: 9800688

Test Type: 20-d survival and growth
Test Species: Heanthes arenaceodentata
Test Initiation Date (Day 0): Dec. 8, 1998
Test Termination Date: Dec. 28, 1998

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☐ Salinity (ppt) ☑	DO (mg/L)
CR-23-W	A	16	5	0	5	0	[illegible]	21.0	7.9	29	5.4
	B	17	4	0	4	1		21.0	7.7	29	4.6
	C	18	3	0	3	2		21.0	7.8	29	5.2
	D	19	4	0	4	1		21.0	7.7	29	5.2
	E	20	4	0	4	1		21.0	7.7	29	5.1
							Technician's Initials	[illegible] RAS	[illegible] RAS	[illegible] RAS	[illegible] RAS

WQ Instruments Used: Temp. Calibrated Hg thermometers pH 11-14-30 Cond./Sal. 11-C-22 DO 11-4-20
Data Verified By: [signature]
Date Verified: Jan 22, 1999

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

Client: Various
EVS Project No.: 9/852-01.1
EVS Work Order No.: 9800688

Test Type: 20-d survival and growth
Test Species: Heteromastus arenacodentata
Test Initiation Date (Day 0): Dec. 8, 1998
Test Termination Date: Dec. 28, 1998

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☐ Salinity (ppt) ☑	DO (mg/L)
Control/Sed.	A	1	0	5	0	0	BST	21.0	7.8	29	~~5.4~~ ~~2~~ 4.8
	B	2	5	0	5	0		21.0	7.7	29	~~7~~ ~~5.7~~ 5.7
	C ①	3	0	5	0	~~5~~ 0		21.0	7.6	29	~~7.6~~ ~~5.7~~ 5.6
	D *	4	~~5~~ ~~4~~ 1	0	~~5~~ ~~4~~ 1	~~0~~ 4		21.0	7.3	29	~~7.3~~ 3.8
	E	5	~~5~~ 4	0	~~5~~ 4	1		21.0	7.8	30	~~7.8~~ 5.8
CR-10	A	6	5	0	5	0		21.0	7.2	30	0.9
	B	7	5	0	5	0		21.0	7.9	30	4.8
	C	8	4	0	4	1		21.0	7.9	30	5.2
	D	9	4	0	4	1		21.0	7.4	30	0.8
	E	10	5	0	5	0	↓	21.0	7.8	30	3.8
CR-22	A	11	5	0	5	0	GH	21.0	7.9	30	~~5.6~~ ~~7.9~~ ~
	B	12	3	0	3	2		21.0	7.8	30	~~5.6~~ ~~7~~ 6
	C	13	4	0	4	1		21.0	7.9	30	~~5.5~~ ~~7~~ 9
	D	14	5	0	5	0		21.0	7.8	30	~~5.5~~ ~~7~~ 6
	E	15	5	0	5	0	↓	21.0	7.8	30	~~5.2~~ ~~7~~ 6
								Technician's Initials	GH BST	GH BST	GH BST

~~* exchanged with W.Q. jar in tear down.~~
① Pan # 3 used to tear down W.Q. jar + W.Q. Jar has 5 worm alive

WQ Instruments Used: Temp. Calibrated Thermometer pH 4-A-30 Cond./Sal. 11-C-22 DO 11-A-20
Data Verified By
Date Verified: Jan 27, 1999

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Statistics use 5 "alive" for rep. C. GSL

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

Client: Whatcom Waterway
EVS Project No.: 9/852-01-1
EVS Work Order No.: 9800688

Test Type: 20-d survival and growth
Test Species: Neanthes arenaceodentata
Test Initiation Date (Day 0): Dec. 8, 1998
Test Termination Date: Dec. 28, 1998

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☐ Salinity (ppt) ☑	DO (mg/L)
AN-SC-82	A	81	4	0	4	1	JMB	21.0	8.1	30	5.0
	B	82	5	0	5	0	JMB	21.0	7.7	30	4.9
	C	83	84	0	84	81	JMB	21.0	7.9	30	4.8
	D	84	5	0	5	0	JMB	21.0	7.5	30	2.2
	E	85	5	0	5	0	JMB	21.0	8.0	30	4.6
AN-SC-84	A	86	3	0	3	2	JMB	21.0	7.3	30	1.6
	B	87	3	1	4	1	JMB	21.0	7.2	30	1.7
	C	88	5	0	5	0	JMB	21.0	7.8	30	4.9
	D	89	4	0	4	1	JMB	21.0	7.8	30	5.2
	E	90	4	0	4	1	JMB	21.0	7.8	30	3.2
							Technician's Initials	JMB	JMB	JMB	JMB

WQ Instruments Used: Temp Calibrated Hg thermometer pH YI-A-30 Cond./Sal. YI-C-22 DO YI-A-20
Data Verified By: S Ciuccio
Date Verified: Jan 27, 1999

EVS CONSULTANTS

SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: Whatcom Waterway
EVS Project No.: 9/852-01.1
EVS Work Order No.: 9800688

Test Type: 20-d survival and growth
Test Species: Ampelisca abdita
Test Initiation Date (Day 0): Dec 8, 1998
Test Termination Date: Dec 28, 1998

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☐ Salinity (ppt) ☑	DO (mg/L)
AN-SC-78	A	66	5	0	5	0	QA	21.0	7.9	30	4.2
	B	67	4	0	4	1		21.0	7.9	30	4.4
	C	68	1	0	1	4		21.0	7.8	30	4.4
	D	69	2	0	2	3		21.0	7.6	30	3.6
	E	70	3	0	3	2		21.0	8.1	30	5.2
AN-SC-80	A	71	5	0	5	0	BAS	21.0	7.9	29	5.1
	B	72	5	0	5	0		21.0	7.8	29	5.1
	C	73	3	0	3	2		21.0	7.9	29	5.3
	D	74	5	0	5	0		21.0	7.5	29	2.4
	E	75	~~5~~ 4	0	~~5~~ 4	1		21.0	7.9	29	4.8
AN-SC-81	A	76	4 (1)	0	4	1	QVS	21.0	8.1	30	5.0
	B	77	5 (2)	0	5	0	QVS	21.0	7.9	30	5.0
	C	78	3	0	3	~~0~~ 2	QVS	21.0	7.5	30	2.4
	D	79	2	0	2	3	QVS	21.0	7.6	30	4.1
	E	80	4	0	4	1	QVS	21.0	7.6	30	3.4
							Technician's Initials	BAS	BAS	BAS	BAS

WQ Instruments Used: Temp. Calibrated Hg thermometer pH Π-A-30 Cond./Sal. Δ-C-22 DO Π-A-20
Data Verified By: C Lassen
Date Verified: Jan 27, 1999

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(1) 1 worm broken. (2) 2 worms broken.

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

Client: Whatcom Waterway
EVS Project No.: 9/852-01.1
EVS Work Order No.: 9800688

Test Type: 20-d Survival and Growth
Test Species: Heanthes arenaceodentata
Test Initiation Date (Day 0): Dec-8, 1998
Test Termination Date: Dec-28, 1998

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☐ Salinity (ppt) ☑	DO (mg/L)
AN-SC-72	A	51	5	0	5	0	SH	21.0	7.9	30	4.9
	B	52	5	0	5	0		21.0	7.9	30	4.8
	C	53	5	0	5	0		21.0	8.0	30	5.2
	D	54	~~4~~ 5	0	~~4~~ 5	~~1~~ 0		21.0	7.4	30	2.4
	E	55	3	0	3	2	↓	21.0	8.1	30	4.8
AN-SC-73	A	56	4	0	4	1	JMB	21.0	7.5	30	3.0
	B	57	4	0	4	1	JMB	21.0	7.5	30	2.8
	C	58	5	0	5	0	JMB	21.0	7.6	30	4.2
	D	59	4	0	4	1	JMB	21.0	7.8	30	4.6
	E	60	5	0	5	0	JMB	21.0	7.7	30	4.4
AN-SC-77	A	61	4	0	4	1	JVS	21.0	7.9	30	5.2
	B	62①	5	0	5	0	JVS	21.0	7.8	30	5.2
	C	63②	2	0	2	3	JVS	21.0	7.9	30	5.3
	D	64	5	0	5	0	JVS	21.0	8.0	30	5.2
	E	65	4	0	4	1	JVS	21.0	8.0	30	5.3
						Technician's Initials		SH JVS	SH JVS	SH JVS	SH JVS

WQ Instruments Used: Temp. Calibrated Thermometer pH T-A-30 Cond./Sal. T-C-22 DO T-A-20
Data Verified By: _____ Date Verified: G. Lanver Jan 27, 1999

Forms\Lab\Datasht\Sediment\SURVIVAL.WPD February 21, 1997

① One other worm of a different type found in addition to 5 N. arenaceodentata. JVS ② 1 Brittlestar found JVS

EVS CONSULTANTS
LARVAL DEVELOPMENT TOXICITY TEST - FINAL WATER QUALITY

Client NIMITZ MARINE
Project No. 7852-01.1
EVS Work Order No. 9852-01-F 950884
Logbook HIV Pages 145-147

Test Species M. galloprovincialis
Test Initiation Date/Time NOVEMBER 26 1995 1645h
Test Termination Date NOVEMBER 27 1995
Test Duration 48h

Sample ID	Conc/Rep	Temperature (°C)	pH	Salinity (ppt)	Dissolved Oxygen (mg/L)
AN-SS-30	A	17.0	7.8	17.0 30	5.9
	B	16.0	7.9	30	6.0
	C	16.0	7.8	30	6.1
	D	16.0	7.7	30	5.2
	E	16.0	7.8	30	5.6
AN-SS-37	A	16.0	7.8	30	5.5
	B	16.0	7.8	30	5.3
	C	16.0	7.7	30	4.7
	D	16.0	7.8	30	6.0
	E	16.0	7.8	30	5.3
AN-SS-45	A	16.0	7.8	30	5.6
	B	16.0	7.9	29	5.8
	C	16.0	8.0	29	6.4
	D	16.0	~~8.4~~ 7.9	29	5.5
	E	16.0	7.8	30	5.7
Tech. Init.		CWB	JHM CWB	JHM CWB	JHM CWB

WQ Instruments Used: Temp. Calibrated thermometer pH II-A-30 Salinity II-C-22 DO II-A-20

Comments

Test Set Up By JHK, JHM Data Verified By C. Walker Date Verified DEC 27/95

EVS CONSULTANTS
48-h LARVAL DEVELOPMENT TOXICITY TEST - DAILY WATER QUALITY DATA

Client ——

EVS Project No. 9/852-01.1

EVS Work Order No. 9800689

Logbook #10 Pages 145-147

Test Initiation Date/Time Nov. 25/98 (1640H)

Test Termination Date Nov. 27/98

Test Species M. galloprovincialis

Sample ID	Temperature (°C)			pH			Salinity (ppt)			Dissolved Oxygen (mg/L)		
	0	24	48	0	24	48	0	24	48	0	24	48
Negative Control	15.0	15.5	16.0	8.0	8.0	8.0	29	29	30	8.0	7.3	7.5
CR-10	15.0	15.5	16.0	8.0	7.9	7.9	29	29	31	7.7	6.9	6.9
CR-22	15.0	15.5	16.0	8.0	7.9	7.9	29	29	30	7.3	6.8	7.0
CR-23W	15.0	15.5	16.0	8.0	7.9	7.9	29	29	31	7.2	6.3	6.3 7.3
Technician Initials	RGM	JGK	CMB	RGM	JGK	CMB	CMB RGM	JGK	JGK	RGM 459	JGK	CMB

WQ Instruments Used: Temp. Calibrated Hg thermo pH II-A-30 Salinity II-C-22 DO II-A-20

Comments

Test Set Up By JGK, PAH Data Verified By C. Peterson Date Verified Dec 22/98

EVS CONSULTANTS
48-h LARVAL DEVELOPMENT TOXICITY TEST - DAILY WATER QUALITY DATA

Client Whatcom Waterways
EVS Project No. 9852-01.4
EVS Work Order No. 9800689
Logbook #10 Pages 145-147

Test Initiation Date/Time Nov. 25/98 (1640h)
Test Termination Date Nov. 27/98
Test Species M. galloprovincialis

Sample ID	Temperature (°C)			pH			Salinity (ppt)			Dissolved Oxygen (mg/L)		
	0	24	48	0	24	48	0	24	48	0	24	48
AN-SC-80	15.0	15.5	16.0	8.0	7.9	7.7	29	30	31	6.2	5.9	6.6
AN-SC-81	15.0	15.5	15.5	8.0	7.9	7.8	29	30	31	6.0	6.0	6.4
AN-SC-82	15.0	15.5	15.5	8.1	7.9	7.8	29	30	31	6.0	5.7	6.2
AN-SS-84	15.0	15.5	15.5	7.9	7.8	7.8	29	29	31	6.0	6.0	6.4
Technician Initials	BGM	JGH	CWB	BGM	JGH	CWB	BGM	JGH	JGH	BGM/GSY	JGH	JGH/CWB

WQ Instruments Used: Temp. Calibrated Hg thermo pH II-A-30 Salinity II-C-22 DO II-A-20
Comments

Test Set Up By JGH, PAH Data Verified By C. McPherson Date Verified Dec 22/98

EVS CONSULTANTS
48-h LARVAL DEVELOPMENT TOXICITY TEST - DAILY WATER QUALITY DATA

Client Whatcom Waterways
EVS Project No. 9/852-01.4
EVS Work Order No. 9800689
Logbook #10 Pages 145-147

Test Initiation Date/Time Nov. 25/98 (1640h)
Test Termination Date Nov. 27/98
Test Species M. galloprovincialis

Sample ID	Temperature (°C)			pH			Salinity (ppt)			Dissolved Oxygen (mg/L)		
	0	24	48	0	24	48	0	24	48	0	24	48
AN-SS-36	15.0	15.5	15.5	8.0	7.9	7.9	29	30	30	6.8	6.4	6.5
AN-SS-37	15.0	15.5	15.5	8.1	7.9	7.8	29	30	31	6.4	5.8	6.1
AN-SS-45	15.0	15.5	15.5	8.1	7.9	7.8	29	30	30	6.1	5.8	6.3
AN-SS-47	15.0	15.5	16.0	8.0	8.0	7.9	29	29	30	6.2	6.0	6.6
AN-SC-70	15.0	15.5	16.0	7.9	7.9	7.8	29	30	31	6.2	6.2	6.5
AN-SC-71	15.0	15.5	16.0	8.0	7.9	7.8	29	30	31	6.4	6.0	6.3
AN-SC-72	15.0	15.5	16.0	7.9	7.9	7.8	29	29	31	6.3	6.0	6.4
AN-SC-73	15.0	15.5	16.0	7.9	7.9	7.8	29	30	31	6.3	6.2	6.4
AN-SC-77	15.0	15.5	16.0	7.9	7.8	7.8	29	29	31	6.0	6.0	6.4
AN-SC-78	15.0	15.5	16.0	8.0	8.0	7.9	29	30	31	6.0	5.6	6.0
Technician Initials	BGM	JGK	CAB	BGM	JGK	CAB	BGM	JGK	JGK	BGM GSY	JGK	JGK CAB

WQ Instruments Used: Temp. Calibrated Hg thermo pH II-A-30 Salinity II-C-22 DO II-A-20

Comments

Test Set Up By JGK, PAH Data Verified By C. M. Pilson Date Verified Dec 27/98

9/852-01.1

SAMPLE ID	%NORMAL MEAN±SD	%SURVIVAL MEAN±SD	%SURVIVAL/NORMAL MEAN±SD
NEGATIVE CONTROL	94.1 ± 1.1	96.8 ± 3.6	91.8 ± 5.0
CR-10	92.9 ± 4.0	75.5 ± 8.9*	70.0 ± 7.5*
CR-22	97.4 ± 2.0	70.4 ± 6.1*	68.6 ± 5.7*
CR-23W	95.9 ± 0.8	71.6 ± 3.6*	68.7 ± 3.6*
AN-SS-36	92.4 ± 4.2†	65.9 ± 4.9*Δ•	60.8 ± 4.4*Δ†•
AN-SS-37	93.2 ± 1.4†•	68.1 ± 2.2*•	63.4 ± 3.0*•
AN-SS-45	78.9 ± 7.2*Δ†•	64.2 ± 8.5*Δ	51.1 ± 10.6*Δ†•
AN-SS-47	68.1 ± 9.7*Δ†•	56.6 ± 5.0*Δ†•	38.7 ± 7.8*Δ†•
AN-SC-70	97.7 ± 1.0	74.4 ± 4.8*	72.7 ± 4.8*
AN-SC-71	91.0 ± 2.2*†•	75.0 ± 5.5*	68.3 ± 4.0*
AN-SC-72	97.0 ± 0.8	71.0 ± 5.5*	68.8 ± 5.1*
AN-SC-73	96.0 ± 1.2	70.8 ± 5.0*	68.0 ± 3.6*
AN-SC-77	95.0 ± 0.9†	77.1 ± 3.2*	73.2 ± 2.9*
AN-SC-78	91.0 ± 2.6*†•	71.4 ± 5.8*	65.0 ± 6.1*
AN-SC-80	74.8 ± 6.8*Δ†•	72.8 ± 8.2*	54.7 ± 9.3*Δ†•
AN-SC-81	83.3 ± 1.5*Δ†•	70.5 ± 3.5*	58.7 ± 2.0*Δ†•
AN-SC-82	78.0 ± 11.3*Δ†•	76.5 ± 6.4*	59.8 ± 11.3*
AN-SC-84	97.1 ± 1.0	81.0 ± 2.5*	78.7 ± 2.0*

* - INDICATES SIGNIFICANT DIFFERENCE BETWEEN SAMPLE AND NEGATIVE CONTROL.

Δ - INDICATES SIGNIFICANT DIFFERENCE BETWEEN SAMPLE AND REFERENCE SEDIMENT CR-10.

† - INDICATES SIGNIFICANT DIFFERENCE BETWEEN SAMPLE AND REFERENCE SEDIMENT CR-22.

• - INDICATES SIGNIFICANT DIFFERENCE BETWEEN SAMPLE AND REFERENCE SEDIMENT CR-23W

CAM 12/22/98

EVS CONSULTANTS
LARVAL DEVELOPMENT SEDIMENT TOXICITY TEST DATA SUMMARY

Client MUNICIPAL WATERWAY

EVS Project No. 9152.01

EVS Work Order No. 9810[illegible]

EVS Analysts SAS JGK BOM CNB SSH JPM PMI

Test Type/Duration 48h PUNAHOU LAGOON

Test Initiation Date (Day 0) NOVEMBER 25, 1998

SAMPLE

Identification VARIOUS

Amount Received 9 x 1L, 10 x 1L

Date Collected OCTOBER 27-29, 1998

Date Received OCTOBER 28-30, 1998

TEST SPECIES INFORMATION

Organism *Mytilus galloprovincialis*

Source Carlsbad Aquafarms Inc.

Date Received NOVEMBER 25, 1998

Reference Toxicant SDS

Current Reference Toxicant Result NORMAL RANGE/ACCEPTABLE.

(EC50 and 95% CL) 3.3 (3.2 - 3.4) mg/L SDS ; 3.2 (3.1 - 3.3) mg/L SDS

Reference Toxicant Warning Limits (mean ± 2SD)

3.7 ± 1.6 mg/L SDS ; 3.4 ± 1.3 mg/L SDS

TEST CONDITIONS

Temperature Range (°C) 15.0 - 17.0

pH Range 7.7 - 8.1

Dissolved Oxygen Range (mg/L) 4.7 - 8.0

Salinity Range (ppt) 29-31

Photoperiod (L:D h) 14:10

Ammonia Type and Ranges (mg/L N) OVERLYING

Start (0 h) <0.02 - 0.37 End 0.04 - 0.94

Sulphide Type and Ranges (mg/L S) OVERLYING

Start (0 h) <0.02 - <0.05 End <0.02

Other → INITIAL EMBRYO DENSITY: 295 embryos/mL

DILUTION AND CONTROL MEDIUM

Water Type FILTERED, UV-STERILIZED SEAWATER

Temperature (°C) 15.0

pH 8.0

Dissolved Oxygen (mg/L) 8.0

Salinity (ppt) 29

Other AMMONIA (mg/L N): <0.02

SULFIDES (mg/L S): <0.02

Sample ID	Mean ± SD		
	% Normal Larvae	% Surviving Larvae	% Normal/Surviving Larvae
PLS. SEE ATTACHED			
RESULTS PAGE.			

Data Verified By C. J. H. [illegible]

Date Verified 12/2/98

APPENDIX E

Raw Data for the 48-h *Mytilus galloprovincialis* Sediment Toxicity Test

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.

End of Report

RESULTS OF ANALYSIS - Water

File No. K2528

	Ammonia Nitrogen N	Sulphide S
ANSC 71 1998 Dec 28	7.76	<0.02
ANSC 77 1998 Dec 28	5.38	<0.05
ANSS 47 1998 Dec 28	6.04	<0.05
ANSC 73 1998 Dec 28	5.37	<0.05
ANSC 80 1998 Dec 28	5.56	<0.05
ANSS 37 1998 Dec 28	0.99	0.02
ANSS 36 1998 Dec 28	5.58	0.03
ANSS 45 1998 Dec 28	4.85	0.09
Control 1998 Dec 28	8.63	0.06
ANSC 78 1998 Dec 28	4.75	<0.02
CR 22 1998 Dec 28	4.40	<0.02
ANSC 72 1998 Dec 28	7.39	<0.02
ANSC 82 1998 Dec 28	7.60	<0.02
ANSC 70 1998 Dec 28	2.26	0.03
ANSC 81 1998 Dec 28	7.94	<0.02
CR 10 1998 Dec 28	2.75	0.6

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Day 20, Neanthes, interstitial Ammonia and overlying Sulphide.

RESULTS OF ANALYSIS - Water

File No. K2528

	Ammonia Nitrogen N	Sulphide S
CR 23W 1998 Dec 28	9.68	0.02
ANSC 84 1998 Dec 28	6.23	0.02

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Day 20, Neanthes, interstitial Ammonia and overlying Sulphide.

REMARKS

File No. K2528

The detection limit for Sulphide has been increased for some of the samples reported in the following data tables due to turbidity in the samples.

Appendix 1 - QUALITY CONTROL - Replicates

File No. K2404

Vater		CR-22	CR-22
		98 12 18	QC # 143325
Nutrients			
Ammonia Nitrogen	N	10.0	10.1

Results are expressed as milligrams per litre.
Results are for Day 10, Neanthes, interstitial water.
< = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Water

File No. K2404

		CR-22	CR-23W	AN-SC-82	AN-SC-72
		98 12 18	98 12 18	98 12 18	98 12 18
Nutrients					
Ammonia Nitrogen	N	10.0	11.7	4.15	5.25

Results are expressed as milligrams per litre.
Results are for Day 10, Neanthes, interstitial water.
< = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Water

File No. K2404

		CR-10
		98 12 18
Nutrients		
Ammonia Nitrogen	N	5.80

Results are expressed as milligrams per litre.
Results are for Day 10, Neanthes, interstitial water.
< = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Water

File No. K2404

		AN-SC-80	AN-SC-81	AN-SC-84
		98 12 18	98 12 18	98 12 18
Nutrients				
Ammonia Nitrogen	N	5.87	4.01	4.88

Results are expressed as milligrams per litre.
Results are for Day 10, Neanthes, interstitial water.
< = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Water

File No. K2404

		AN-SC-70	AN-SC-71	AN-SC-73	AN-SC-77	AN-SC-78
		98 12 18	98 12 18	98 12 18	98 12 18	98 12 18
Nutrients						
Ammonia Nitrogen	N	3.95	4.87	6.41	4.92	6.52

Results are expressed as milligrams per litre.
Results are for Day 10, Neanthes, interstitial water.
< = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Water

File No. K2404

		Control	AN-SS-36	AN-SS-37	AN-SS-45	AN-SS-47
		98 12 18	98 12 18	98 12 18	98 12 18	98 12 18
Nutrients						
Ammonia Nitrogen	N	2.58	5.45	6.98	6.68	12.0

Results are expressed as milligrams per litre.
Results are for Day 10, Neanthes, interstitial water.
< = Less than the detection limit indicated.

Appendix 1 - QUALITY CONTROL - Replicates

File No. K2101

Water	AN-SC-77	AN-SC-77
	98 12 08	QC # 142357
Inorganic Parameters		
Sulphide S	<0.02	<0.02

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Day 0, Neanthes, interstitial ammonia and overlying sulphide.

RESULTS OF ANALYSIS - Water

File No. K2101

	Ammonia Nitrogen N	Sulphide S
AN-SC-77 1998 Dec 8	5.86	<0.02
AN-SC-78 1998 Dec 8	13.8	<0.02
AN-SC-80 1998 Dec 8	7.04	<0.02
AN-SC-81 1998 Dec 8	5.40	<0.02
AN-SC-82 1998 Dec 8	6.26	<0.02
AN-SC-84 1998 Dec 8	7.96	<0.02
AN-SS-36 1998 Dec 8	4.76	<0.02
AN-SS-37 1998 Dec 8	5.96	<0.02
AN-SS-45 1998 Dec 8	9.32	<0.02
AN-SS-47 1998 Dec 8	10.6	<0.02
AN-SC-70 1998 Dec 8	6.88	0.03
AN-SC-71 1998 Dec 8	6.28	0.02
AN-SC-72 1998 Dec 8	6.90	0.03
AN-SC-73 1998 Dec 8	8.58	0.02

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Day 0, Neanthes, interstitial ammonia and overlying sulphide.

ASL

RESULTS OF ANALYSIS - Water

File No. K2101

	Ammonia Nitrogen N	Sulphide S
CR-10 1998 Dec 8	8.34	0.02
CR-22 1998 Dec 8	25.6	<0.02
CR-23W 1998 Dec 8	24.4	<0.02
Control 1998 Dec 8	0.17	<0.02

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as Day 0, Neanthes, interstitial ammonia and overlying sulphide.

Polychaete Acute Test-96 Hr Survival

Start Date:	08/12/98	Test ID:	RTNACD9811	Sample ID:	REF-Ref Toxicant
End Date:	12/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	CD-Cadmium
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC), 9/852-01.1 (9800688)				

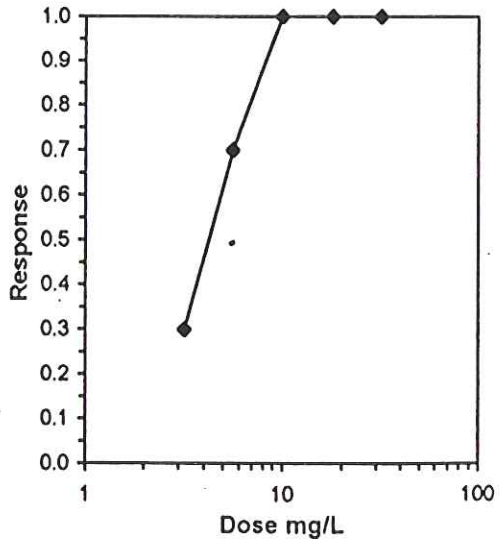
Conc-mg/L	1
D-Control	1.0000
3.2	0.7000
5.6	0.3000
10	0.0000
18	0.0000
32	0.0000

Conc-mg/L	Mean	SD	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
D-Control	1.0000	0.0000	0	10	10	1			0	10
3.2	0.7000	0.0000	3	7	10	1	0.1053	0.0500	3	10
*5.6	0.3000	0.0000	7	3	10	1	0.0015	0.0500	7	10
10	0.0000	0.0000	10	0	10	1			10	10
18	0.0000	0.0000	10	0	10	1			10	10
32	0.0000	0.0000	10	0	10	1			10	10

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	3.2	5.6	4.2332	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL		
0.0%				
5.0%				
10.0%				
20.0%				
Auto-30.0%	4.2332	3.1780	5.6388	mg/L Cd



Test: PA-Polychaete Acute Test			Test ID: RTNACD9811
Species: NA-Neanthes arenaceodentata			Protocol: PSEP 95
Sample ID: REF-Ref Toxicant			Sample Type: CD-Cadmium
Start Date: 08/12/98	End Date: 12/12/98		Lab ID: BCEVS-EVS Environment Consultants

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	10				10	
	2	1	3.2	10				7	
	3	1	5.6	10				3	
	4	1	10.0	10				0	
	5	1	18.0	10				0	
	6	1	32.0	10				0	

Comments: Anchor Environmental (LLC), 9/852-01.1 (9800688)

EVS CONSULTANTS
MARINE SPECIES REFERENCE TOXICANT TEST DATA

Client: Various
EVS Project No.: 9852-01-1
EVS Work Order No.: 9800688
Test Initiation Date: Dec. 8, 1998

Reference Toxicant: Cadmium
EVS Stock ID/Preparation Date: 98-C-005 / Nov 98
Test Species: Neanthes arenaceodentata
Source/Collection Date: Donald Reish / Dec. 1, 1998
No. Organisms/Test Volume: 10 / 900 mL

Concentration mg/L Cd	Number of Survivors (24 to 96 hours)				Dissolved Oxygen (mg/L)					Temperature (°C)					pH					Salinity (ppt)	
	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
32.0	0	—	—	—	7.5	7.5	7.3	7.2	7.1	19.5	20.5	21.0	21.0	21.0	7.9	7.7	7.8	7.9	7.9	30	30
18.0	0	—	—	—	7.4	7.5	7.2	7.2	7.1	19.5	20.5	21.0	21.0	21.0	7.9	7.7	7.8	7.9	7.8	30	30
10.0	8	8	0	—	7.3	7.2	7.3	7.2	7.2	19.5	20.5	21.0	21.0	21.0	7.9	7.7	7.9	7.9	7.8	30	30
5.6	10	10	3	3	7.3	7.3	7.3	7.1	7.2	19.5	20.5	21.0	21.0	21.0	7.9	7.7	7.9	8.0	8.0	30	30
3.2	10	10	7	7	7.3	7.3	7.2	7.2	7.2	19.5	20.5	21.0	21.0	21.0	7.9	7.7	7.9	8.0	7.9	30	30
Ctrl	10	10	10	10	7.3	7.3	7.0	7.2	7.2	19.5	20.5	21.0	21.0	21.0	7.9	7.6	7.8	7.9	7.9	30	30
Technician	BJ	JGK	JKM	BJ	BJ	BJ	JKM	JKM	BJ	BJ	BJ	JKM	JKM	BJ	BJ	BJ	JKM	JKM	BJ	BJ	BJ

WQ Instruments Used: Temperature: Calibrated Hg Thermometer pH: II-A-30 DO: II-A-20 Salinity: II-C-22
Comments:

Test Set Up By: JGK, GSy
Data Verified By: C Lamoureux
Date Verified: Jan 27, 1999

EVS CONSULTANTS
MARINE POLYCHAETE SEDIMENT TOXICITY TEST DATA SUMMARY

Client Various
EVS Project No. 9/852-01.1
Work Order No. 9800688

EVS Analysts JCH, GSY, JAM Bay
Test Type/Duration Acut - 96-h
Test Initiation Date (Day 0) Dec. 3, 1998

SAMPLE
Identification Cd Ref. Tox. stock soln lot #98-C-005
Amount ~~Received~~ Prepared 1L
Date ~~Collected~~ Prepared Oct. 2, 1998
Date Received /

TEST SPECIES INFORMATION
Organism Neanthes arenaceodentata
Source/Date Received Donald Reish / Dec. 2, 1998
Day 0 Dry Weight (mg/worm) 0.50
Reference Toxicant Cadmium
Current Reference Toxicant Result
(96-h LC50 and 95% CL) 4.2 mg/L Cd
95% CL: 3.2 to 5.6 mg/L Cd
Reference Toxicant Warning Limits (mean ± 2SD)
9.6 ± 4.7 mg/L Cd

TEST CONDITIONS
Temperature Range (°C) 19.5 - 21.0
pH Range 7.6 - 8.0
Dissolved Oxygen Range (mg/L) 7.1 - 7.5
Salinity Range (ppt) 30
Photoperiod (L:D h) Constant ambient light
Ammonia Type and Ranges (mg/L N) n/a
☐ Inter: Day 0 _____ Day 10 _____ Day 20 _____
☐ Over: Day 0 _____ Day 10 _____ Day 20 _____
Sulphide Type and Ranges (mg/L S) n/a
☐ Inter: Day 0 _____ Day 10 _____ Day 20 _____
☐ Over: Day 0 _____ Day 10 _____ Day 20 _____

DILUTION AND CONTROL MEDIUM
Water Type UV Sterilized, Filtered Sea Water
Temperature (°C) 20.0
pH 7.9
Dissolved Oxygen (mg/L) 7.7
Salinity (ppt) 30
Other n/a

Sample ID mg/L Cd	Mean ± SD			
	Survival (%)	Individual Dry Weight (mg/worm)	Individual Growth Rate (mg/worm/day)	Total Dry Weight (mg)
Negative Control	100.0			
3.2	70.0			
5.6	30.0			
10.0	0			
18.0	0			
32.0	0			

Data Verified By G Lawrence Date Verified Jan 27, 1999

Polychaete Worm Growth and Survival Test-Total Dry Weight

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-23-W	34.100	54.600	33.200	73.300	45.000
CR-10	46.100	46.700	41.600	15.600	64.100
CR-22	56.000	37.300	53.300	58.100	53.700
D-Control	0.000	50.000	61.900	2.800	44.700
AN-SS-36	45.200	44.900	63.100	48.900	58.400
AN-SS-37	57.900	33.900	52.000	0.000	48.100
AN-SS-45	64.700	81.300	43.100	53.800	5.300
AN-SS-47	52.000	0.300	34.700	25.400	50.600
AN-SC-70	35.100	34.900	33.500	65.400	51.900
AN-SC-71	60.600	34.900	35.800	54.800	39.000
AN-SC-72	65.100	46.800	69.800	40.800	14.100
AN-SC-73	34.700	24.500	84.900	24.500	53.200
AN-SC-77	45.900	64.700	21.100	70.600	41.700
AN-SC-78	56.100	35.500	20.300	17.600	37.700
AN-SC-80	57.300	47.000	27.100	39.300	52.800
AN-SC-81	24.800	49.900	37.700	22.700	21.000
AN-SC-82	38.200	61.800	35.200	45.600	59.200
AN-SC-84	28.200	24.600	61.900	32.800	22.200

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-23-W	48.040	16.620	48.040	33.200	73.300	34.596	5			
CR-10	42.820	17.472	42.820	15.600	64.100	40.803	5	0.484	1.860	216.262
CR-22	51.680	8.267	51.680	37.300	58.100	15.996	5	-0.438	1.860	128.147
D-Control	31.880	28.530	31.880	0.000	61.900	89.492	5	1.094	1.860	405.452
AN-SS-36	52.100	8.222	52.100	44.900	63.100	15.780	5	-0.490	1.860	127.869
AN-SS-37	38.380	23.206	38.380	0.000	57.900	60.464	5	0.757	1.860	303.013
AN-SS-45	49.640	28.527	49.640	5.300	81.300	57.469	5	-0.108	1.860	405.397
AN-SS-47	32.600	21.213	32.600	0.300	52.000	65.069	5	1.281	1.860	270.080
AN-SC-70	44.160	14.076	44.160	33.500	65.400	31.875	5	0.398	1.860	176.416
AN-SC-71	45.020	11.854	45.020	34.900	60.600	26.330	5	0.331	1.860	154.988
AN-SC-72	47.320	22.180	47.320	14.100	69.800	46.873	5	0.058	1.860	285.694
AN-SC-73	44.360	25.514	44.360	24.500	84.900	57.515	5	0.270	1.860	344.824
AN-SC-77	48.800	19.711	48.800	21.100	70.600	40.392	5	-0.066	1.860	247.232
AN-SC-78	33.440	15.487	33.440	17.600	56.100	46.314	5	1.437	1.860	191.936
AN-SC-80	44.700	11.922	44.700	27.100	57.300	26.672	5	0.365	1.860	155.595
AN-SC-81	31.220	12.341	31.220	21.000	49.900	39.529	5	1.817	1.860	159.371
AN-SC-82	48.000	12.057	48.000	35.200	61.800	25.120	5	0.004	1.860	156.798
AN-SC-84	33.940	16.133	33.940	22.200	61.900	47.533	5	1.361	1.860	199.526

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.57967	1.035	-0.2044	0.01547
Bartlett's Test indicates equal variances (p = 0.48)	16.66	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

Statistical comparisons made to reference sediment CR-23-W.

Reviewed by: GSL

Polychaete Worm Growth and Survival Test-Growth Rate

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-23-W	0.3160	0.6575	0.5283	0.8912	0.5375
CR-10	0.4360	0.4420	0.4950	0.1700	0.6160
CR-22	0.5350	0.5967	0.6412	0.5560	0.5120
D-Control	0.4750	0.5940	0.1150	0.5338	
AN-SS-36	0.4270	0.4240	0.7637	0.4640	0.5590
AN-SS-37	0.5540	0.3987	0.4950	0.5762	
AN-SS-45	0.6220	0.9912	0.4060	0.5130	0.2400
AN-SS-47	0.6250	0.0000	0.8425	0.3983	0.3967
AN-SC-70	0.4137	0.3240	0.3938	0.7925	0.4940
AN-SC-71	0.5810	0.4112	0.4225	0.5230	0.4625
AN-SC-72	0.6260	0.4430	0.6730	0.3830	0.2100
AN-SC-73	0.4087	0.2813	0.8240	0.2813	0.5070
AN-SC-77	0.5487	0.6220	0.5025	0.6810	0.4962
AN-SC-78	0.5360	0.4188	0.9900	0.4150	0.6033
AN-SC-80	0.5480	0.4450	0.4267	0.3680	0.6350
AN-SC-81	0.2850	0.4740	0.6033	0.5425	0.2375
AN-SC-82	0.4525	0.5930	0.4150	0.4310	0.5670
AN-SC-84	0.4450	0.3850	0.5940	0.3850	0.2525

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-23-W	0.5861	0.2103	0.5861	0.3160	0.8912	35.876	5			
CR-10	0.4318	0.1632	0.4318	0.1700	0.6160	37.804	5	1.296	1.860	0.0264
CR-22	0.5682	0.0514	0.5682	0.5120	0.6412	9.041	5	0.185	1.860	0.0174
D-Control	0.4294	0.2152	0.4294	0.1150	0.5940	50.108	4	1.100	1.895	0.0385
AN-SS-36	0.5276	0.1429	0.5276	0.4240	0.7637	27.082	5	0.515	1.860	0.0240
AN-SS-37	0.5060	0.0793	0.5060	0.3987	0.5762	15.671	4	0.714	1.895	0.0238
AN-SS-45	0.5544	0.2820	0.5544	0.2400	0.9912	50.853	5	0.201	1.860	0.0460
AN-SS-47	0.4525	0.3133	0.4525	0.0000	0.8425	69.241	5	0.792	1.860	0.0530
AN-SC-70	0.4836	0.1830	0.4836	0.3240	0.7925	37.841	5	0.822	1.860	0.0289
AN-SC-71	0.4801	0.0714	0.4801	0.4112	0.5810	14.872	5	1.068	1.860	0.0183
AN-SC-72	0.4670	0.1880	0.4670	0.2100	0.6730	40.260	5	0.944	1.860	0.0296
AN-SC-73	0.4604	0.2243	0.4604	0.2813	0.8240	48.712	5	0.914	1.860	0.0352
AN-SC-77	0.5701	0.0798	0.5701	0.4962	0.6810	13.997	5	0.159	1.860	0.0188
AN-SC-78	0.5926	0.2361	0.5926	0.4150	0.9900	39.844	5	-0.046	1.860	0.0372
AN-SC-80	0.4845	0.1063	0.4845	0.3680	0.6350	21.929	5	0.964	1.860	0.0206
AN-SC-81	0.4285	0.1602	0.4285	0.2375	0.6033	37.398	5	1.333	1.860	0.0260
AN-SC-82	0.4917	0.0822	0.4917	0.4150	0.5930	16.720	5	0.935	1.860	0.0190
AN-SC-84	0.4123	0.1236	0.4123	0.2525	0.5940	29.979	5	1.593	1.860	0.0221

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.86685	1.035	0.32605	0.95295
Bartlett's Test indicates equal variances (p = 0.05)	27.3411	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

Statistical comparisons made to reference sediment CR-23-W

Reviewed by: GSL

Polychaete Worm Growth and Survival Test-Avg Individual Dry Weight

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS-Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-23-W	6.820	13.650	11.067	18.325	11.250
CR-10	9.220	9 340	10.400	3.900	12.820
CR-22	11.200	12 433	13 325	11.620	10.740
D-Control	10.000	12.380	2.800	11.175	
AN-SS-36	9.040	8.980	15.775	9.780	11.680
AN-SS-37	11.580	8.475	10.400	12.025	
AN-SS-45	12.940	20.325	8.620	10.760	5.300
AN-SS-47	13.000	0.300	17.350	8.467	8.433
AN-SC-70	8.775	6.980	8.375	16.350	10.380
AN-SC-71	12.120	8.725	8.950	10.960	9.750
AN-SC-72	13.020	9.360	13.960	8.160	4.700
AN-SC-73	8.675	6.125	16.980	6.125	10.640
AN-SC-77	11.475	12.940	10.550	14.120	10.425
AN-SC-78	11.220	8.875	20.300	8.800	12.567
AN-SC-80	11.460	9.400	9.033	7.860	13.200
AN-SC-81	6.200	9.980	12.567	11.350	5.250
AN-SC-82	9.550	12.360	8.800	9.120	11.840
AN-SC-84	9.400	8.200	12.380	8.200	5.550

			Transform: Untransformed					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-23-W	12.222	4.206	12.222	6.820	18.325	34.409	5			
CR-10	9.136	3.265	9.136	3.900	12.820	35.735	5	1.296	1.860	10.542
CR-22	11.864	1.027	11.864	10.740	13.325	8.660	5	0.185	1.860	6.970
D-Control	9.089	4.304	9.089	2.800	12.380	47.351	4	1.100	1.895	15.384
AN-SS-36	11.051	2.857	11.051	8.980	15.775	25.857	5	0.515	1.860	9.615
AN-SS-37	10.620	1.586	10.620	8.475	12.025	14.933	4	0.714	1.895	9.536
AN-SS-45	11.589	5.639	11.589	5.300	20.325	48.659	5	0.201	1.860	18.404
AN-SS-47	9.510	6.339	9.510	0.300	17.350	66.653	5	0.797	1.860	21.521
AN-SC-70	10.172	3.660	10.172	6.980	16.350	35.981	5	0.822	1.860	11.560
AN-SC-71	10.101	1.428	10.101	8.725	12.120	14.136	5	1.068	1.860	7.336
AN-SC-72	9.840	3.760	9.840	4.700	13.960	38.214	5	0.944	1.860	11.837
AN-SC-73	9.709	4.486	9.709	6.125	16.980	46.204	5	0.914	1.860	14.062
AN-SC-77	11.902	1.596	11.902	10.425	14.120	13.409	5	0.159	1.860	7.525
AN-SC-78	12.352	4.722	12.352	8.800	20.300	38.231	5	-0.046	1.860	14.872
AN-SC-80	10.191	2.125	10.191	7.860	13.200	20.853	5	0.964	1.860	8.257
AN-SC-81	9.069	3.205	9.069	5.250	12.567	35.336	5	1.333	1.860	10.398
AN-SC-82	10.334	1.644	10.334	8.800	12.360	15.911	5	0.935	1.860	7.583
AN-SC-84	8.746	2.472	8.746	5.550	12.380	28.265	5	1.593	1.860	8.851

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.87011	1.035	0.313	0.98633
Bartlett's Test indicates equal variances (p = 0.05)	27.5194	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

Statistical comparisons made to reference sediment CR-23-W

Polychaete Worm Growth and Survival Test-20 d Survival

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-23-W	1.0000	0.8000	0.6000	0.8000	0.8000
CR-10	1.0000	1.0000	0.8000	0.8000	1.0000
CR-22	1.0000	0.6000	0.8000	1.0000	1.0000
D-Control	0.0000	1.0000	1.0000	0.2000	0.8000
AN-SS-36	1.0000	1.0000	0.8000	1.0000	1.0000
AN-SS-37	1.0000	0.8000	1.0000	0.0000	0.8000
AN-SS-45	1.0000	0.8000	1.0000	1.0000	0.2000
AN-SS-47	0.8000	0.2000	0.4000	0.6000	1.0000
AN-SC-70	0.8000	1.0000	0.8000	0.8000	1.0000
AN-SC-71	1.0000	0.8000	0.8000	1.0000	0.8000
AN-SC-72	1.0000	1.0000	1.0000	1.0000	0.6000
AN-SC-73	0.8000	0.8000	1.0000	0.8000	1.0000
AN-SC-77	0.8000	1.0000	0.4000	1.0000	0.8000
AN-SC-78	1.0000	0.8000	0.2000	0.4000	0.6000
AN-SC-80	1.0000	1.0000	0.6000	1.0000	0.8000
AN-SC-81	0.8000	1.0000	0.6000	0.4000	0.8000
AN-SC-82	0.8000	1.0000	0.8000	1.0000	1.0000
AN-SC-84	0.6000	0.6000	1.0000	0.8000	0.8000

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-23-W	0.8000	0.1414	0.8000	0.6000	1.0000	17.678	5			
CR-10	0.9200	0.1095	0.9200	0.8000	1.0000	11.907	5	-1.500	2.132	0.0136
CR-22	0.8800	0.1789	0.8800	0.6000	1.0000	20.328	5	-0.784	2.132	0.0222
D-Control	0.6000	0.4690	0.6000	0.0000	1.0000	78.174	5	0.913	2.132	0.1023
AN-SS-36	0.9600	0.0894	0.9600	0.8000	1.0000	9.317	5	-2.138	2.132	0.0119
AN-SS-37	0.7200	0.4147	0.7200	0.0000	1.0000	57.601	5	0.408	2.132	0.0819
AN-SS-45	0.8000	0.3464	0.8000	0.2000	1.0000	43.301	5	0.000	2.132	0.0597
AN-SS-47	0.6000	0.3162	0.6000	0.2000	1.0000	52.705	5	1.291	2.132	0.0512
AN-SC-70	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	-1.000	2.132	0.0136
AN-SC-71	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	-1.000	2.132	0.0136
AN-SC-72	0.9200	0.1789	0.9200	0.6000	1.0000	19.444	5	-1.177	2.132	0.0222
AN-SC-73	0.8800	0.1095	0.8800	0.8000	1.0000	12.448	5	-1.000	2.132	0.0136
AN-SC-77	0.8000	0.2449	0.8000	0.4000	1.0000	30.619	5	0.000	2.132	0.0341
AN-SC-78	0.6000	0.3162	0.6000	0.2000	1.0000	52.705	5	1.291	2.132	0.0512
AN-SC-80	0.8800	0.1789	0.8800	0.6000	1.0000	20.328	5	-0.784	2.132	0.0222
AN-SC-81	0.7200	0.2280	0.7200	0.4000	1.0000	31.672	5	0.667	2.132	0.0307
AN-SC-82	0.9200	0.1095	0.9200	0.8000	1.0000	11.907	5	-1.500	2.132	0.0136
AN-SC-84	0.7600	0.1673	0.7600	0.6000	1.0000	22.017	5	0.408	2.132	0.0205

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.27552	1.035	-0.8982	1.40625
Bartlett's Test indicates unequal variances (p = 9.48E-03)	33.5888	33.4087		

Hypothesis Test (1-tail, 0.05)

Heteroscedastic t Test indicates no significant differences

Statistical comparisons made to co-reference sediment CR-23-W

Polychaete Worm Growth and Survival Test-Total Dry Weight

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-22	56.000	37.300	53.300	58.100	53.700
CR-23-W	34.100	54.600	33.200	73.300	45.000
CR-10	46.100	46.700	41.600	15.600	64.100
D-Control	0.000	50.000	61.900	2.800	44.700
AN-SS-36	45.200	44.900	63.100	48.900	58.400
AN-SS-37	57.900	33.900	52.000	0.000	48.100
AN-SS-45	64.700	81.300	43.100	53.800	5.300
AN-SS-47	52.000	0.300	34.700	25.400	50.600
AN-SC-70	35.100	34.900	33.500	65.400	51.900
AN-SC-71	60.600	34.900	35.800	54.800	39.000
AN-SC-72	65.100	46.800	69.800	40.800	14.100
AN-SC-73	34.700	24.500	84.900	24.500	53.200
AN-SC-77	45.900	64.700	21.100	70.600	41.700
AN-SC-78	56.100	35.500	20.300	17.600	37.700
AN-SC-80	57.300	47.000	27.100	39.300	52.800
AN-SC-81	24.800	49.900	37.700	22.700	21.000
AN-SC-82	38.200	61.800	35.200	45.600	59.200
AN-SC-84	28.200	24.600	61.900	32.800	22.200

			Transform: Untransformed					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-22	51.680	8.267	51.680	37.300	58.100	15.996	5			
CR-23-W	48.040	16.620	48.040	33.200	73.300	34.596	5	0.438	1.860	128.147
CR-10	42.820	17.472	42.820	15.600	64.100	40.803	5	1.025	1.860	138.949
D-Control	31.880	28.530	31.880	0.000	61.900	89.492	5	1.491	1.860	328.139
AN-SS-36	52.100	8.222	52.100	44.900	63.100	15.780	5	-0.081	1.860	50.556
AN-SS-37	38.380	23.206	38.380	0.000	57.900	60.464	5	1.207	1.860	225.700
AN-SS-45	49.640	28.527	49.640	5.300	81.300	57.469	5	0.154	1.860	328.084
*AN-SS-47	32.600	21.213	32.600	0.300	52.000	65.069	5	1.874	1.860	192.767
AN-SC-70	44.160	14.076	44.160	33.500	65.400	31.875	5	1.030	1.860	99.103
AN-SC-71	45.020	11.854	45.020	34.900	60.600	26.330	5	1.030	1.860	77.675
AN-SC-72	47.320	22.180	47.320	14.100	69.800	46.873	5	0.412	1.860	208.381
AN-SC-73	44.360	25.514	44.360	24.500	84.900	57.515	5	0.610	1.860	267.511
AN-SC-77	48.800	19.711	48.800	21.100	70.600	40.392	5	0.301	1.860	169.919
*AN-SC-78	33.440	15.487	33.440	17.600	56.100	46.314	5	2.323	1.860	114.623
AN-SC-80	44.700	11.922	44.700	27.100	57.300	26.672	5	1.076	1.860	78.282
*AN-SC-81	31.220	12.341	31.220	21.000	49.900	39.529	5	3.080	1.860	82.058
AN-SC-82	48.000	12.057	48.000	35.200	61.800	25.120	5	0.563	1.860	79.485
*AN-SC-84	33.940	16.133	33.940	22.200	61.900	47.533	5	2.188	1.860	122.213

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.57967	1.035	-0.2044	0.01547
Bartlett's Test indicates equal variances (p = 0.48)	16.66	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates significant differences

Statistical comparisons made to reference sediment CR-22

Reviewed by: GSL

Polychaete Worm Growth and Survival Test-Growth Rate

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date.		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-22	0.5350	0.5967	0.6412	0.5560	0.5120
CR-23-W	0.3160	0.6575	0 5283	0.8912	0.5375
CR-10	0 4360	0.4420	0.4950	0.1700	0.6160
D-Control	0 4750	0.5940	0.1150	0.5338	
AN-SS-36	0.4270	0 4240	0.7637	0.4640	0 5590
AN-SS-37	0.5540	0.3987	0.4950	0.5762	
AN-SS-45	0.6220	0.9912	0.4060	0.5130	0.2400
AN-SS-47	0.6250	0.0000	0.8425	0.3983	0.3967
AN-SC-70	0.4137	0.3240	0.3938	0.7925	0.4940
AN-SC-71	0.5810	0.4112	0.4225	0.5230	0.4625
AN-SC-72	0.6260	0.4430	0.6730	0.3830	0.2100
AN-SC-73	0.4087	0.2813	0.8240	0.2813	0.5070
AN-SC-77	0.5487	0.6220	0.5025	0.6810	0.4962
AN-SC-78	0.5360	0.4188	0.9900	0.4150	0.6033
AN-SC-80	0 5480	0.4450	0.4267	0.3680	0.6350
AN-SC-81	0.2850	0.4740	0.6033	0.5425	0.2375
AN-SC-82	0.4525	0.5930	0.4150	0.4310	0.5670
AN-SC-84	0.4450	0.3850	0.5940	0.3850	0.2525

			Transform: Untransformed					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-22	0.5682	0.0514	0.5682	0.5120	0.6412	9.041	5			
CR-23-W	0.5861	0.2103	0.5861	0.3160	0.8912	35.876	5	-0.185	1.860	0.0174
CR-10	0.4318	0.1632	0.4318	0.1700	0.6160	37.804	5	1.782	1.860	0.0109
D-Control	0.4294	0.2152	0.4294	0.1150	0.5940	50.108	4	1.415	1.895	0.0182
AN-SS-36	0 5276	0.1429	0.5276	0.4240	0.7637	27.082	5	0.598	1.860	0.0086
AN-SS-37	0.5060	0.0793	0.5060	0.3987	0.5762	15.671	4	1.430	1.895	0.0036
AN-SS-45	0.5544	0.2820	0.5544	0.2400	0.9912	50.853	5	0.107	1.860	0.0305
AN-SS-47	0.4525	0.3133	0.4525	0.0000	0.8425	69.241	5	0.815	1.860	0.0375
AN-SC-70	0.4836	0.1830	0.4836	0.3240	0.7925	37.841	5	0.995	1.860	0.0134
*AN-SC-71	0.4801	0.0714	0.4801	0.4112	0.5810	14.872	5	2.241	1.860	0.0029
AN-SC-72	0.4670	0.1880	0.4670	0.2100	0.6730	40.260	5	1.161	1.860	0.0141
AN-SC-73	0.4604	0.2243	0.4604	0.2813	0.8240	48.712	5	1.047	1.860	0.0197
AN-SC-77	0.5701	0.0798	0.5701	0.4962	0.6810	13.997	5	-0.045	1.860	0.0033
AN-SC-78	0.5926	0.2361	0.5926	0.4150	0.9900	39.844	5	-0.226	1.860	0.0217
AN-SC-80	0.4845	0.1063	0.4845	0.3680	0.6350	21.929	5	1.585	1.860	0.0052
AN-SC-81	0.4285	0.1602	0.4285	0.2375	0.6033	37.398	5	1.857	1.860	0.0105
AN-SC-82	0.4917	0.0822	0.4917	0.4150	0.5930	16.720	5	1.764	1.860	0.0035
*AN-SC-84	0.4123	0.1236	0.4123	0.2525	0.5940	29.979	5	2.604	1.860	0.0067

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.86685	1.035	0.32605	0.95295
Bartlett's Test indicates equal variances (p = 0.05)	27.3411	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates significant differences

Statistical comparisons made to reference sediment CR-22

Polychaete Worm Growth and Survival Test-Avg Individual Dry Weight

Start Date:	08/12/98	Test ID:	EVS8442	Sample ID:	VARIOUS
End Date:	28/12/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	NA-Neanthes arenaceodentata
Comments:	Anchor Environmental (LLC)-Whatcom Waterway 9/852-01.1(9800688)				

Conc-%	1	2	3	4	5
CR-22	11.200	12.433	13.325	11.620	10.740
CR-23-W	6.820	13.650	11.067	18.325	11.250
CR-10	9.220	9.340	10.400	3.900	12.820
D-Control	10.000	12.380	2.800	11.175	
AN-SS-36	9.040	8.980	15.775	9.780	11.680
AN-SS-37	11.580	8.475	10.400	12.025	
AN-SS-45	12.940	20.325	8.620	10.760	5.300
AN-SS-47	13.000	0.300	17.350	8.467	8.433
AN-SC-70	8.775	6.980	8.375	16.350	10.380
AN-SC-71	12.120	8.725	8.950	10.960	9.750
AN-SC-72	13.020	9.360	13.960	8.160	4.700
AN-SC-73	8.675	6.125	16.980	6.125	10.640
AN-SC-77	11.475	12.940	10.550	14.120	10.425
AN-SC-78	11.220	8.875	20.300	8.800	12.567
AN-SC-80	11.460	9.400	9.033	7.860	13.200
AN-SC-81	6.200	9.980	12.567	11.350	5.250
AN-SC-82	9.550	12.360	8.800	9.120	11.840
AN-SC-84	9.400	8.200	12.380	8.200	5.550

			Transform: Untransformed					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-22	11.864	1.027	11.864	10.740	13.325	8.660	5			
CR-23-W	12.222	4.206	12.222	6.820	18.325	34.409	5	-0.185	1.860	6.970
CR-10	9.136	3.265	9.136	3.900	12.820	35.735	5	1.782	1.860	4.357
D-Control	9.089	4.304	9.089	2.800	12.380	47.351	4	1.415	1.895	7.282
AN-SS-36	11.051	2.857	11.051	8.980	15.775	25.857	5	0.598	1.860	3.429
AN-SS-37	10.620	1.586	10.620	8.475	12.025	14.933	4	1.430	1.895	1.433
AN-SS-45	11.589	5.639	11.589	5.300	20.325	48.659	5	0.107	1.860	12.219
AN-SS-47	9.510	6.339	9.510	0.300	17.350	66.653	5	0.820	1.860	15.336
AN-SC-70	10.172	3.660	10.172	6.980	16.350	35.981	5	0.995	1.860	5.374
*AN-SC-71	10.101	1.428	10.101	8.725	12.120	14.136	5	2.241	1.860	1.151
AN-SC-72	9.840	3.760	9.840	4.700	13.960	38.214	5	1.161	1.860	5.651
AN-SC-73	9.709	4.486	9.709	6.125	16.980	46.204	5	1.047	1.860	7.877
AN-SC-77	11.902	1.596	11.902	10.425	14.120	13.409	5	-0.045	1.860	1.340
AN-SC-78	12.352	4.722	12.352	8.800	20.300	38.231	5	-0.226	1.860	8.687
AN-SC-80	10.191	2.125	10.191	7.860	13.200	20.853	5	1.585	1.860	2.072
AN-SC-81	9.069	3.205	9.069	5.250	12.567	35.336	5	1.857	1.860	4.212
AN-SC-82	10.334	1.644	10.334	8.800	12.360	15.911	5	1.764	1.860	1.398
*AN-SC-84	8.746	2.472	8.746	5.550	12.380	28.265	5	2.604	1.860	2.665

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.87011	1.035	0.313	0.98633
Bartlett's Test indicates equal variances (p = 0.05)	27.5194	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates significant differences

Statistical comparisons made to reference sediment CR-22

Appendix 1 - QUALITY CONTROL - Replicates

File No. K1826

Water	AN-SC-71	AN-SS-71
	98 11 27	QC # 141486
Nutrients		
Ammonia Nitrogen N	0.21	0.21
Inorganic Parameters		
Sulphide S	<0.02	<0.02

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as 48 hour, Bivalve, overlying water.

RESULTS OF ANALYSIS - Water

File No. K1826

	Ammonia Nitrogen N	Sulphide S
AN-SS-36 1998 Nov 27	0.10	<0.02
AN-SS-37 1998 Nov 27	0.14	<0.02
AN-SS-45 1998 Nov 27	0.31	<0.02
AN-SS-47 1998 Nov 27	0.34	<0.02
AN-SC-70 1998 Nov 27	0.12	<0.02
AN-SC-71 1998 Nov 27	0.21	<0.02
AN-SC-72 1998 Nov 27	0.22	<0.02
AN-SC-73 1998 Nov 27	0.22	<0.02
AN-SC-77 1998 Nov 27	0.94	<0.02
AN-SC-78 1998 Nov 27	0.39	<0.02
AN-SC-80 1998 Nov 27	0.14	<0.02
AN-SC-81 1998 Nov 27	0.17	<0.02
AN-SC-82 1998 Nov 27	0.12	<0.02
AN-SC-84 1998 Nov 27	0.20	<0.02

Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as 48 hour, Bivalve, overlying water.

RESULTS OF ANALYSIS - Water

File No. K1764

	Ammonia Nitrogen N	Sulphide S
Negative Control 1998 Nov 24	<0.02	<0.02
CR-10 1998 Nov 24	0.09	<0.05
CR-22 1998 Nov 24	0.25	<0.05
CR-23W 1998 Nov 24	0.32	<0.05

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
These samples are identified as 0 hour, Bivalve, overlying water.

REMARKS

File No. K1764

The detection limit for Sulphide has been increased for some of the samples reported in the following data tables due to the Turbidity of these samples.

Bivalve Larval Survival and Development Test-Proportion Normal

Start Date:	25/11/98	Test ID:	rtmgsds29p	Sample ID:	REF-Ref Toxicant
End Date:	27/11/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SDS-Sodium dodecyl sulfate
Sample Date:		Protocol:	PSEP 95	Test Species:	MG-Mytilus galloprovincialis
Comments:	9/852-01.1; 9800689				

Conc-mg/L	1	2	3	4	5
D-Control	0.9468	0.9525	0.9364	0.9245	0.9470
1	0.9333	0.9438	0.9306		
1.8	0.9336	0.9300	0.9181		
3.2	0.5290	0.5287	0.5308		
5.6	0.0000	0.0000	0.0000		
10	0.0000	0.0000	0.0000		

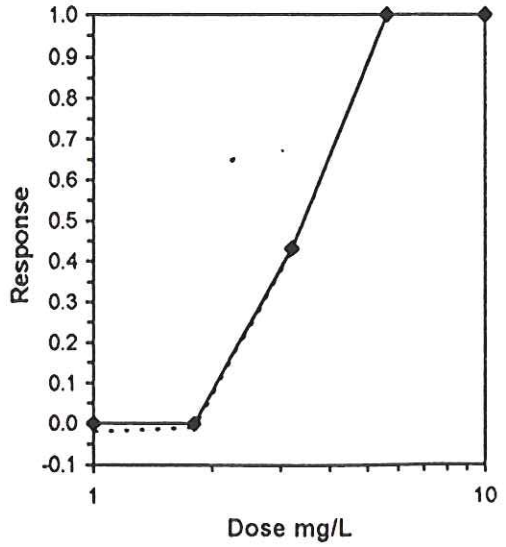
			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-mg/L	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
D-Control	0.9414	0.0111	1.3272	1.2925	1.3512	1.748	5				6	81
1	0.9359	0.0070	1.3151	1.3041	1.3315	1.101	3	0.950	2.466	0.0315	3	54
1.8	0.9272	0.0081	1.2979	1.2805	1.3102	1.191	3	2.296	2.466	0.0315	4	62
*3.2	0.5295	0.0011	0.8149	0.8141	0.8162	0.138	3	40.150	2.466	0.0315	172	367
5.6	0.0000	0.0000	0.0413	0.0394	0.0424	4.007	3				441	441
10	0.0000	0.0000	0.0591	0.0566	0.0635	6.571	3				217	217

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96692	0.825	-0.6763	0.6657
Bartlett's Test indicates equal variances (p = 0.04)	8.39622	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	1.8	3.2	2.4		0.0156	0.01656	0.19776	0.00031	9.5E-12	3, 10

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	3.3130	3.2172	3.4117
5.0%	3.3271	3.2201	3.4377
10.0%	3.3412	3.2195	3.4676
20.0%	3.3692	3.2009	3.5463
Auto-0.0%	3.3130	3.2172	3.4117 mg/L SDS



 Reviewed by: 27/5/98

EVS CONSULTANTS
LARVAL DEVELOPMENT TOXICITY TEST - SEDIMENT (CONTROLS)

lient _____
EVS Project No. 9/855-511.01
EVS Work Order No. 9509657
Logbook #10 Pages 145-147
Initial Embryo Density 255 embryos/10mL

Test Species M. galloprovincialis
Source/Date Received Inland Reference Area 11/25/95
Test Initiation Date/Time November 25, 1995 1620
Test Termination Date November 27, 1995
Test Volume (mL) 200mL
Aliquot Size (mL) 10mL

Concentration	Rep.	Primary Count		Backup Count		Comments	Tech. Init.
		Normal Larvae	Abnormal Larvae	Normal Larvae	Abnormal Larvae		
Reference Toxicant							
10.0	A	0	78				SD
	B	0	77				SD
	C	0	62				SD
5.6	A	0	101				SD
	B	0	141				SD
	C	0	139				SD
3.2	A	146	130				SD
	B	129	115				SD
	C	138	122				SD
1.0	A	239	17				SD
	B	279	21				SD
	C	269	24				SD
0.10	A	266	19				SD
	B	252	15				SD
	C	268	20				SD
Control Seawater							
	A	267	15				SD
	B	231	14				SD
	C	265	18				SD
	D	245	20				SD
	E	250	14				SD

Data Verified By [signature] Date Verified 12/22/95

EVS CONSULTANTS
LARVAL DEVELOPMENT TOXICITY TEST - FINAL WATER QUALITY

lent —
EVS Project No. 9/852-01.1
EVS Work Order No. 9/852-01+4th project
Logbook #10 Pages 145-147

Test Species M. galloprovincialis
Test Initiation Date/Time November 25, 1996 / 1645h
Test Termination Date November 27, 1996
Test Duration 45h

Sample ID (mg/L SDS)	Conc/Rep	Temperature (°C)	pH	Salinity (ppt)	Dissolved Oxygen (mg/L)
10.0	A	16.0	7.5	28	2.2
	B	16.0	7.5	29	2.0
	C	16.0	7.5	28	2.2
	D				
	E				
5.6	A	16.0	7.8	29	4.8
	B	16.0	7.8	29	4.8
	C	16.0	7.8	28	4.8
	D				
	E				
3.2	A	16.0	7.9	29	6.3
	B	16.0	7.9	29	6.2
	C	16.0	7.9	29	6.2
	D				
	E				
Tech. Init.		CMB	JKH / CMB	CMB	CMB

WQ Instruments Used: Temp. Calibrated thermometer pH II-A-30 Salinity II-C-22 DO II-A-20

Comments

Test Set Up By JGK, PAH Data Verified By [illegible] Date Verified DEC 22/96

EVS CONSULTANTS
LARVAL DEVELOPMENT TOXICITY TEST DATA SUMMARY

Client —

EVS Project No. 9/852-01.1

EVS Work Order No. 9800687

EVS Analysts SVS JGK BAM GSY JEM

Test Type 48h Bivalve Larval Reftox

Test Initiation Date November 25, 1998

SAMPLE

Identification SDS REFTOX (EVS LOTH 98-S-053)

Amount ~~Received~~ PREPARED 1L OF 1000 mg/L SDS SOL'N

Date ~~Collected~~ PREPARED NOVEMBER 9, 1998

Date Received —

Temperature (°C) —

pH —

Dissolved Oxygen (mg/L) —

Salinity (ppt) —

Other —

TEST SPECIES INFORMATION

Organism Mytilus galloprovincialis

Source Carlsbad Aquafarms Inc.

Date Received November 25, 1998

Reference Toxicant SDS

Current Reference Toxicant Result NORMAL; WNR/NORMAL

(EC50 and 95% CL) 3.3(3.2-3.4) mg/L SDS; 3.2(3.1-3.3) mg/L SDS

Reference Toxicant Warning Limits

(mean ± 2SD) 3.7 ± 1.6 mg/L SDS; 3.4 ± 1.3 mg/L SDS

DILUTION AND CONTROL MEDIUM

Salt Water (Burrard Inlet) FILTERED, UV-STERILIZED

Temperature (°C) 15.0

pH 8.0

Dissolved Oxygen (mg/L) ~~29~~ 8.0

Salinity (ppt) 29

Other —

TEST CONDITIONS

Temperature Range (°C) 15.0 - 16.0

pH Range ~~8.1~~ 7.5 - 8.1

Dissolved Oxygen Range (mg/L) ~~8.1~~ 2.0 - 8.1

Salinity Range (ppt) 28 - ~~30~~ 31

Photoperiod (L:Dh) 14:10

Initial Embryo Density 255 embryos/level

Test Volume (mL) 900mL

Other —

Toxicity Test Results REPORTED BLIND.

Data Verified By C. McPherson

Date Verified Dec 23/98

Bivalve Larval Survival and Development Test-Proportion Alive

Start Date:	25/11/98	Test ID:	evs8468	Sample ID:	Various
End Date:	27/11/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	MG-Mytilus galloprovincialis

Comments: Whatcom Waterway; 9/852-01.1; 9800689

Conc-%	1	2	3	4	5
CR-23W	0.6947	0.7684	0.6842	0.7404	0.6947
AN-SS-36	0.6772	0.6772	0.6737	0.5719	0.6947
AN-SS-37	0.6737	0.7123	0.6737	0.6526	0.6912
AN-SS-45	0.7123	0.6807	0.4947	0.6491	0.6737
AN-SS-47	0.5895	0.5158	0.5719	0.5193	0.6351
AN-SC-70	0.7860	0.7053	0.7860	0.6807	0.7614
AN-SC-71	0.7298	0.7649	0.7018	0.7930	0.7614
AN-SC-72	0.7158	0.7474	0.6386	0.6737	0.7754
AN-SC-73	0.7333	0.6982	0.7088	0.7368	0.6632
AN-SC-77	0.8211	0.7719	0.7333	0.7544	0.7719
AN-SC-78	0.6281	0.7368	0.7228	0.6947	0.7860
AN-SC-80	0.6491	0.7123	0.6702	0.7544	0.8561
AN-SC-81	0.6877	0.7333	0.6561	0.7053	0.7439
AN-SC-82	0.7544	0.8105	0.6632	0.7684	0.8281
AN-SC-84	0.7965	0.8211	0.7754	0.8421	0.8175

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-23W	0.7165	0.0362	1.0100	0.9741	1.0687	4.032	5			
*AN-SS-36	0.6589	0.0493	0.9478	0.8576	0.9854	5.401	5	2.126	1.860	0.0016
*AN-SS-37	0.6807	0.0223	0.9705	0.9405	1.0046	2.475	5	1.868	1.860	0.0008
AN-SS-45	0.6421	0.0854	0.9309	0.7801	1.0046	9.421	5	1.827	1.860	0.0035
*AN-SS-47	0.5663	0.0502	0.8522	0.8012	0.9222	5.961	5	5.418	1.860	0.0016
AN-SC-70	0.7439	0.0483	1.0415	0.9703	1.0898	5.279	5	-1.030	1.860	0.0017
AN-SC-71	0.7502	0.0351	1.0482	0.9931	1.0984	3.863	5	-1.487	1.860	0.0012
AN-SC-72	0.7102	0.0551	1.0037	0.9258	1.0771	6.058	5	0.192	1.860	0.0020
AN-SC-73	0.7081	0.0299	1.0004	0.9516	1.0321	3.271	5	0.410	1.860	0.0010
AN-SC-77	0.7705	0.0324	1.0721	1.0282	1.1340	3.660	5	-2.455	1.860	0.0012
AN-SC-78	0.7137	0.0582	1.0077	0.9149	1.0898	6.378	5	0.066	1.860	0.0022
AN-SC-80	0.7284	0.0820	1.0269	0.9368	1.1818	9.472	5	-0.360	1.860	0.0041
AN-SC-81	0.7053	0.0353	0.9974	0.9442	1.0401	3.878	5	0.498	1.860	0.0012
AN-SC-82	0.7649	0.0643	1.0673	0.9516	1.1432	6.981	5	-1.509	1.860	0.0027
AN-SC-84	0.8105	0.0254	1.1211	1.0771	1.1622	2.888	5	-4.777	1.860	0.0010

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.72158	1.035	-0.231	0.93385
Bartlett's Test indicates equal variances (p = 0.34)	15.5557	29.1412		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates significant differences

*STAT. COMPARISONS MADE WITH REFERENCE SED. CR-23W.

Reviewed by GH 12/22/98

Bivalve Larval Survival and Development Test-Proportion Alive/Normal

Start Date:	25/11/98	Test ID:	evs8467	Sample ID:	Various
End Date:	27/11/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	MG-Mytilus galloprovincialis
Comments:	Whatcom Waterway; 9/852-01.1; 9800689				

Conc-%	1	2	3	4	5
CR-22	0.6702	0.6842	0.7298	0.6000	0.7439
AN-SS-36	0.5825	0.6246	0.6175	0.5509	0.6667
AN-SS-37	0.6281	0.6772	0.6211	0.5965	0.6491
AN-SS-45	0.6386	0.5228	0.3439	0.5193	0.5298
AN-SS-47	0.4281	0.3474	0.3018	0.3579	0.5018
AN-SC-70	0.7684	0.6947	0.7754	0.6632	0.7333
AN-SC-71	0.6596	0.7228	0.6246	0.7088	0.6982
AN-SC-72	0.6912	0.7228	0.6175	0.6632	0.7474
AN-SC-73	0.7053	0.6632	0.6842	0.7193	0.6281
AN-SC-77	0.7719	0.7333	0.6912	0.7228	0.7404
AN-SC-78	0.5544	0.6947	0.6737	0.6246	0.7018
AN-SC-80	0.4526	0.4702	0.5228	0.6246	0.6632
AN-SC-81	0.5789	0.6000	0.5579	0.5930	0.6070
AN-SC-82	0.6140	0.7789	0.4877	0.5193	0.5895
AN-SC-84	0.7684	0.8000	0.7649	0.8105	0.7895

			Transform: Arcsin Square Root						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-22	0.6856	0.0568	0.9767	0.8861	1.0401	6.230	5			
*AN-SS-36	0.6084	0.0439	0.8951	0.8364	0.9553	5.040	5	2.410	1.860	0.0021
AN-SS-37	0.6344	0.0304	0.9217	0.8825	0.9665	3.439	5	1.793	1.860	0.0018
*AN-SS-45	0.5109	0.1058	0.7961	0.6266	0.9258	13.492	5	3.271	1.860	0.0057
*AN-SS-47	0.3874	0.0783	0.6707	0.5816	0.7872	11.977	5	6.790	1.860	0.0038
AN-SC-70	0.7270	0.0480	1.0222	0.9516	1.0771	5.257	5	-1.253	1.860	0.0025
AN-SC-71	0.6828	0.0401	0.9731	0.9113	1.0163	4.405	5	0.108	1.860	0.0021
AN-SC-72	0.6884	0.0508	0.9796	0.9041	1.0442	5.595	5	-0.078	1.860	0.0025
AN-SC-73	0.6800	0.0360	0.9700	0.9149	1.0124	3.964	5	0.209	1.860	0.0019
AN-SC-77	0.7319	0.0292	1.0270	0.9816	1.0729	3.217	5	-1.625	1.860	0.0018
AN-SC-78	0.6498	0.0613	0.9385	0.8399	0.9931	6.788	5	0.970	1.860	0.0029
*AN-SC-80	0.5467	0.0934	0.8329	0.7380	0.9516	11.364	5	2.857	1.860	0.0047
*AN-SC-81	0.5874	0.0195	0.8733	0.8434	0.8933	2.261	5	3.615	1.860	0.0015
AN-SC-82	0.5979	0.1134	0.8870	0.7731	1.0813	13.555	5	1.489	1.860	0.0068
AN-SC-84	0.7867	0.0198	1.0910	1.0646	1.1204	2.212	5	-3.905	1.860	0.0016

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.6869	1.035	0.18945	1.50881
Bartlett's Test indicates equal variances (p = 0.02)	26.7266	29.1412		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates significant differences

STAT. COMPARISONS HAVE WITH ~~REFERENCE~~ REFERENCED SED. CR-22.

Reviewed by: 22/12/98

Bivalve Larval Survival and Development Test-Proportion Normal

Start Date:	25/11/98	Test ID: evs8467	Sample ID: Various
End Date:	27/11/98	Lab ID: BCEVS-EVS Environment C	Sample Type: SEDIMENT1-Marine
Sample Date:		Protocol: PSEP 95	Test Species: MG-Mytilus galloprovincialis
Comments:	Whatcom Waterway; 9/852-01.1; 9800689		

Conc-%	1	2	3	4	5
CR-22	0.9948	0.9653	0.9952	0.9661	0.9507
AN-SS-36	0.8601	0.9223	0.9167	0.9632	0.9596
AN-SS-37	0.9323	0.9507	0.9219	0.9140	0.9391
AN-SS-45	0.8966	0.7680	0.6950	0.8000	0.7865
AN-SS-47	0.7262	0.6735	0.5276	0.6892	0.7901
AN-SC-70	0.9777	0.9851	0.9866	0.9742	0.9631
AN-SC-71	0.9038	0.9450	0.8900	0.8938	0.9171
AN-SC-72	0.9657	0.9671	0.9670	0.9844	0.9638
AN-SC-73	0.9617	0.9497	0.9653	0.9762	0.9471
AN-SC-77	0.9402	0.9500	0.9426	0.9581	0.9591
AN-SC-78	0.8827	0.9429	0.9320	0.8990	0.8929
AN-SC-80	0.6973	0.6601	0.7801	0.8279	0.7746
AN-SC-81	0.8418	0.8182	0.8503	0.8408	0.8160
AN-SC-82	0.8140	0.9610	0.7354	0.6758	0.7119
AN-SC-84	0.9648	0.9744	0.9864	0.9625	0.9657

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-22	0.9744	0.0198	1.4232	1.3468	1.5016	5.047	5			
*AN-SS-36	0.9244	0.0417	1.3000	1.1874	1.3777	5.960	5	2.609	2.132	0.0048
*AN-SS-37	0.9316	0.0144	1.3073	1.2731	1.3470	2.208	5	3.348	2.132	0.0026
*AN-SS-45	0.7892	0.0724	1.0990	0.9858	1.2433	8.480	5	6.162	2.132	0.0059
*AN-SS-47	0.6813	0.0969	0.9740	0.8130	1.0948	10.621	5	7.977	2.132	0.0068
AN-SC-70	0.9773	0.0095	1.4222	1.3776	1.4548	2.195	5	0.029	2.132	0.0026
*AN-SC-71	0.9099	0.0222	1.2679	1.2327	1.3340	3.231	5	4.199	2.132	0.0029
AN-SC-72	0.9696	0.0084	1.3972	1.3794	1.4455	1.949	5	0.757	2.132	0.0025
AN-SC-73	0.9600	0.0119	1.3713	1.3387	1.4159	2.281	5	1.481	2.132	0.0026
*AN-SC-77	0.9500	0.0087	1.3459	1.3237	1.3671	1.482	5	2.318	2.132	0.0024
*AN-SC-78	0.9099	0.0261	1.2685	1.2212	1.3294	3.709	5	4.030	2.132	0.0031
*AN-SC-80	0.7480	0.0679	1.0477	0.9484	1.1430	7.474	5	7.903	2.132	0.0048
*AN-SC-81	0.8334	0.0154	1.1507	1.1275	1.1735	1.786	5	8.157	2.132	0.0024
*AN-SC-82	0.7796	0.1134	1.0993	0.9650	1.3721	14.869	5	4.056	2.132	0.0136
AN-SC-84	0.9707	0.0099	1.4013	1.3759	1.4540	2.301	5	0.624	2.132	0.0026

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	1.02081	1.035	0.89937	4.5187
Bartlett's Test indicates unequal variances (p = 1.03E-04)	42.4939	29.1412		

Hypothesis Test (1-tail, 0.05)

Heteroscedastic t Test indicates significant differences

* STAT. COMPARISONS MADE WITH REFERENCE SED. CR-22.

Reviewed by: 22/9

Bivalve Larval Survival and Development Test-Proportion Alive

Start Date:	25/11/98	Test ID:	evs8466	Sample ID:	Various
End Date:	27/11/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date		Protocol:	PSEP 95	Test Species:	MG-Mytilus galloprovincialis
Comments:	Whatcom Waterway; 9/852-01.1; 9800689				

Conc-%	1	2	3	4	5
CR-10	0.7298	0.7228	0.7193	0.9123	0.6912
AN-SS-36	0.6772	0.6772	0.6737	0.5719	0.6947
AN-SS-37	0.6737	0.7123	0.6737	0.6526	0.6912
AN-SS-45	0.7123	0.6807	0.4947	0.6491	0.6737
AN-SS-47	0.5895	0.5158	0.5719	0.5193	0.6351
AN-SC-70	0.7860	0.7053	0.7860	0.6807	0.7614
AN-SC-71	0.7298	0.7649	0.7018	0.7930	0.7614
AN-SC-72	0.7158	0.7474	0.6386	0.6737	0.7754
AN-SC-73	0.7333	0.6982	0.7088	0.7368	0.6632
AN-SC-77	0.8211	0.7719	0.7333	0.7544	0.7719
AN-SC-78	0.6281	0.7368	0.7228	0.6947	0.7860
AN-SC-80	0.6491	0.7123	0.6702	0.7544	0.8561
AN-SC-81	0.6877	0.7333	0.6561	0.7053	0.7439
AN-SC-82	0.7544	0.8105	0.6632	0.7684	0.8281
AN-SC-84	0.7965	0.8211	0.7754	0.8421	0.8175

			Transform: Arcsin Square Root						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
CR-10	0.7551	0.0891	1.0609	0.9816	1.2701	11.126	5			
*AN-SS-36	0.6589	0.0493	0.9478	0.8576	0.9854	5.401	5	1.967	1.860	0.0062
AN-SS-37	0.6807	0.0223	0.9705	0.9405	1.0046	2.475	5	1.679	1.860	0.0054
*AN-SS-45	0.6421	0.0854	0.9309	0.7801	1.0046	9.421	5	1.977	1.860	0.0080
*AN-SS-47	0.5663	0.0502	0.8522	0.8012	0.9222	5.961	5	3.632	1.860	0.0061
AN-SC-70	0.7439	0.0483	1.0415	0.9703	1.0898	5.279	5	0.334	1.860	0.0063
AN-SC-71	0.7502	0.0351	1.0482	0.9931	1.0984	3.863	5	0.229	1.860	0.0058
AN-SC-72	0.7102	0.0551	1.0037	0.9258	1.0771	6.058	5	0.964	1.860	0.0066
AN-SC-73	0.7081	0.0299	1.0004	0.9516	1.0321	3.271	5	1.105	1.860	0.0056
AN-SC-77	0.7705	0.0324	1.0721	1.0282	1.1340	3.660	5	-0.200	1.860	0.0058
AN-SC-78	0.7137	0.0582	1.0077	0.9149	1.0898	6.378	5	0.885	1.860	0.0067
AN-SC-80	0.7284	0.0820	1.0269	0.9368	1.1818	9.472	5	0.497	1.860	0.0087
AN-SC-81	0.7053	0.0353	0.9974	0.9442	1.0401	3.878	5	1.143	1.860	0.0057
AN-SC-82	0.7649	0.0643	1.0673	0.9516	1.1432	6.981	5	-0.101	1.860	0.0072
AN-SC-84	0.8105	0.0254	1.1211	1.0771	1.1622	2.888	5	-1.099	1.860	0.0056

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.60889	1.035	0.45571	2.15602
Bartlett's Test indicates equal variances (p = 0.12)	20.3356	29.1412		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates significant differences

* STAT. COMPARISONS MADE WITH REFERENCE SED. CR-10.

Reviewed by: 12/22/98

Bivalve Larval Survival and Development Test-Proportion Alive/Normal

Start Date:	25/11/98	Test ID:	evs8465	Sample ID:	Various
End Date:	27/11/98	Lab ID:	BCEVS-EVS Environment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	MG-Mytilus galloprovincialis
Comments:	Whatcom Waterway; 9/852-01.1; 9800689				

Conc-%	1	2	3	4	5
D-Control	0.9368	0.9860	0.9298	0.8596	0.8772
CR-10	0.6667	0.6947	0.6351	0.8281	0.6772
CR-22	0.6702	0.6842	0.7298	0.6000	0.7439
CR-23W	0.6737	0.7368	0.6526	0.7123	0.6596
AN-SS-36	0.5825	0.6246	0.6175	0.5509	0.6667
AN-SS-37	0.6281	0.6772	0.6211	0.5965	0.6491
AN-SS-45	0.6386	0.5228	0.3439	0.5193	0.5298
AN-SS-47	0.4281	0.3474	0.3018	0.3579	0.5018
AN-SC-70	0.7684	0.6947	0.7754	0.6632	0.7333
AN-SC-71	0.6596	0.7228	0.6246	0.7088	0.6982
AN-SC-72	0.6912	0.7228	0.6175	0.6632	0.7474
AN-SC-73	0.7053	0.6632	0.6842	0.7193	0.6281
AN-SC-77	0.7719	0.7333	0.6912	0.7228	0.7404
AN-SC-78	0.5544	0.6947	0.6737	0.6246	0.7018
AN-SC-80	0.4526	0.4702	0.5228	0.6246	0.6632
AN-SC-81	0.5789	0.6000	0.5579	0.5930	0.6070
AN-SC-82	0.6140	0.7789	0.4877	0.5193	0.5895
AN-SC-84	0.7684	0.8000	0.7649	0.8105	0.7895

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.9179	0.0505	1.2942	1.1868	1.4520	8.073	5			
*CR-10	0.7004	0.0746	0.9945	0.9222	1.1432	8.672	5	4.946	1.860	0.0068
*CR-22	0.6856	0.0568	0.9767	0.8861	1.0401	6.230	5	5.872	1.860	0.0054
*CR-23W	0.6870	0.0362	0.9776	0.9405	1.0321	4.022	5	6.342	1.860	0.0046
*AN-SS-36	0.6084	0.0439	0.8951	0.8364	0.9553	5.040	5	7.843	1.860	0.0048
*AN-SS-37	0.6344	0.0304	0.9217	0.8825	0.9665	3.439	5	7.629	1.860	0.0044
*AN-SS-45	0.5109	0.1058	0.7961	0.6266	0.9258	13.492	5	7.433	1.860	0.0084
*AN-SS-47	0.3874	0.0783	0.6707	0.5816	0.7872	11.977	5	10.579	1.860	0.0065
*AN-SC-70	0.7270	0.0480	1.0222	0.9516	1.0771	5.257	5	5.177	1.860	0.0051
*AN-SC-71	0.6828	0.0401	0.9731	0.9113	1.0163	4.405	5	6.358	1.860	0.0047
*AN-SC-72	0.6884	0.0508	0.9796	0.9041	1.0442	5.595	5	5.964	1.860	0.0052
*AN-SC-73	0.6800	0.0360	0.9700	0.9149	1.0124	3.964	5	6.512	1.860	0.0046
*AN-SC-77	0.7319	0.0292	1.0270	0.9816	1.0729	3.217	5	5.452	1.860	0.0045
*AN-SC-78	0.6498	0.0613	0.9385	0.8399	0.9931	6.788	5	6.500	1.860	0.0056
*AN-SC-80	0.5467	0.0934	0.8329	0.7380	0.9516	11.364	5	7.316	1.860	0.0074
*AN-SC-81	0.5874	0.0195	0.8733	0.8434	0.8933	2.261	5	8.852	1.860	0.0042
*AN-SC-82	0.5979	0.1134	0.8870	0.7731	1.0813	13.555	5	5.717	1.860	0.0094
*AN-SC-84	0.7867	0.0198	1.0910	1.0646	1.1204	2.212	5	4.237	1.860	0.0043

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.71233	1.035	0.39249	1.2209
Bartlett's Test indicates equal variances (p = 0.02)	30.8756	33.4087		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates significant differences

* STAT. COMPARISONS MADE WITH D-CONTROL (NEGATIVE CONTROL).

Reviewed by Dec 29/18

Bivalve Larval Survival and Development Test-Proportion Normal

Start Date:	25/11/98	Test ID:	evs8465	Sample ID:	Various
End Date:	27/11/98	Lab ID:	BCEVS-EVS Enyironment C	Sample Type:	SEDIMENT1-Marine
Sample Date:		Protocol:	PSEP 95	Test Species:	MG-Mytilus galloprovincialis
Comments:	Whatcom Waterway; 9/852-01.1; 9800689				

Conc-%	1	2	3	4	5
D-Control	0.9468	0.9525	0.9364	0.9245	0.9470
CR-10	0.9135	0.9612	0.8829	0.9077	0.9797
CR-22	0.9948	0.9653	0.9952	0.9661	0.9507
CR-23W	0.9697	0.9589	0.9538	0.9621	0.9495
AN-SS-36	0.8601	0.9223	0.9167	0.9632	0.9596
AN-SS-37	0.9323	0.9507	0.9219	0.9140	0.9391
AN-SS-45	0.8966	0.7680	0.6950	0.8000	0.7865
AN-SS-47	0.7262	0.6735	0.5276	0.6892	0.7901
AN-SC-70	0.9777	0.9851	0.9866	0.9742	0.9631
AN-SC-71	0.9038	0.9450	0.8900	0.8938	0.9171
AN-SC-72	0.9657	0.9671	0.9670	0.9844	0.9638
AN-SC-73	0.9617	0.9497	0.9653	0.9762	0.9471
AN-SC-77	0.9402	0.9500	0.9426	0.9581	0.9591
AN-SC-78	0.8827	0.9429	0.9320	0.8990	0.8929
AN-SC-80	0.6973	0.6601	0.7801	0.8279	0.7746
AN-SC-81	0.8418	0.8182	0.8503	0.8408	0.8160
AN-SC-82	0.8140	0.9610	0.7354	0.6758	0.7119
AN-SC-84	0.9648	0.9744	0.9864	0.9625	0.9657

			Transform: Arcsin Square Root						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.9414	0.0111	1.3272	1.2925	1.3512	1.748	5			
CR-10	0.9290	0.0401	1.3112	1.2216	1.4278	6.529	5	0.403	2.132	0.0034
CR-22	0.9744	0.0198	1.4232	1.3468	1.5016	5.047	5	-2.845	2.132	0.0024
CR-23W	0.9588	0.0078	1.3671	1.3441	1.3958	1.453	5	-2.924	2.132	0.0004
AN-SS-36	0.9244	0.0417	1.3000	1.1874	1.3777	5.960	5	0.753	2.132	0.0028
AN-SS-37	0.9316	0.0144	1.3073	1.2731	1.3470	2.208	5	1.201	2.132	0.0006
*AN-SS-45	0.7892	0.0724	1.0990	0.9858	1.2433	8.480	5	5.313	2.132	0.0039
*AN-SS-47	0.6813	0.0969	0.9740	0.8130	1.0948	10.621	5	7.450	2.132	0.0048
AN-SC-70	0.9773	0.0095	1.4222	1.3776	1.4548	2.195	5	-5.463	2.132	0.0006
*AN-SC-71	0.9099	0.0222	1.2679	1.2327	1.3340	3.231	5	2.814	2.132	0.0009
AN-SC-72	0.9696	0.0084	1.3972	1.3794	1.4455	1.949	5	-4.376	2.132	0.0005
AN-SC-73	0.9600	0.0119	1.3713	1.3387	1.4159	2.281	5	-2.534	2.132	0.0006
AN-SC-77	0.9500	0.0087	1.3459	1.3237	1.3671	1.482	5	-1.369	2.132	0.0004
*AN-SC-78	0.9099	0.0261	1.2685	1.2212	1.3294	3.709	5	2.504	2.132	0.0012
*AN-SC-80	0.7480	0.0679	1.0477	0.9484	1.1430	7.474	5	7.653	2.132	0.0028
*AN-SC-81	0.8334	0.0154	1.1507	1.1275	1.1735	1.786	5	12.736	2.132	0.0004
*AN-SC-82	0.7796	0.1134	1.0993	0.9650	1.3721	14.869	5	3.086	2.132	0.0116
AN-SC-84	0.9707	0.0099	1.4013	1.3759	1.4540	2.301	5	-4.169	2.132	0.0007

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.0606	1.035	0.8825	4.45764
Bartlett's Test indicates unequal variances (p = 1.25E-05)	53.3695	33.4087		

Hypothesis Test (1-tail, 0.05)

Heteroscedastic t Test indicates significant differences

*STAT. COMPARISONS MADE WITH D-CONTROL (NEGATIVE CONTROL).

Reviewed by GSH Dec 27/98

Test: BV-Bivalve Larval Survival and Development Test — Test ID: evs8465
Species: MG-Mytilus galloprovincialis — Protocol: PSEP 95
Sample ID: Various — Sample Type: SEDIMENT1-Marine
Start Date: 25/11/98 — End Date: 27/11/98 — Lab ID: BCEVS-EVS Environment Consultants

Pos	ID	Rep	Group	Initial Density	Number Normal	Number Abnormal	Notes
	1	1	D-Control	285	267	15	
	2	2	D-Control	285	281	14	
	3	3	D-Control	285	265	18	
	4	4	D-Control	285	245	20	
	5	5	D-Control	285	250	14	
	6	1	CR-10	285	190	18	
	7	2	CR-10	285	198	8	
	8	3	CR-10	285	181	24	
	9	4	CR-10	285	236	24	
	10	5	CR-10	285	193	4	
	11	1	CR-22	285	191	1	
	12	2	CR-22	285	195	7	
	13	3	CR-22	285	208	1	
	14	4	CR-22	285	171	6	
	15	5	CR-22	285	212	11	
	16	1	CR-23W	285	192	6	
	17	2	CR-23W	285	210	9	
	18	3	CR-23W	285	186	9	
	19	4	CR-23W	285	203	8	
	20	5	CR-23W	285	188	10	
	21	1	AN-SS-36	285	166	27	
	22	2	AN-SS-36	285	178	15	
	23	3	AN-SS-36	285	176	16	
	24	4	AN-SS-36	285	157	6	
	25	5	AN-SS-36	285	190	8	
	26	1	AN-SS-37	285	179	13	
	27	2	AN-SS-37	285	193	10	
	28	3	AN-SS-37	285	177	15	
	29	4	AN-SS-37	285	170	16	
	30	5	AN-SS-37	285	185	12	
	31	1	AN-SS-45	285	182	21	
	32	2	AN-SS-45	285	149	45	
	33	3	AN-SS-45	285	98	43	
	34	4	AN-SS-45	285	148	37	
	35	5	AN-SS-45	285	151	41	
	36	1	AN-SS-47	285	122	46	
	37	2	AN-SS-47	285	99	48	
	38	3	AN-SS-47	285	86	77	
	39	4	AN-SS-47	285	102	46	
	40	5	AN-SS-47	285	143	38	
	41	1	AN-SC-70	285	219	5	
	42	2	AN-SC-70	285	198	3	
	43	3	AN-SC-70	285	221	3	
	44	4	AN-SC-70	285	189	5	
	45	5	AN-SC-70	285	209	8	
	46	1	AN-SC-71	285	188	20	
	47	2	AN-SC-71	285	206	12	
	48	3	AN-SC-71	285	178	22	
	49	4	AN-SC-71	285	202	24	
	50	5	AN-SC-71	285	199	18	
	51	1	AN-SC-72	285	197	7	
	52	2	AN-SC-72	285	206	7	

EVS CONSULTANTS
LARVAL DEVELOPMENT TOXICITY TEST - SEDIMENT (SAMPLES)

Client [illegible]
EVS Project No. 7/557-01
EVS Work Order No. [illegible]
Logbook 410 Pages 145-147
Initial Embryo Density [illegible]

Test Species [illegible]
Source/Date Received [illegible]
Test Initiation Date/Time [illegible]
Test Termination Date [illegible]
Test Volume (mL) [illegible]
Aliquot Size (mL) [illegible]

Sample ID	Rep.	Primary Count		Backup Count		Comments	Tech. Init.
		Normal Larvae	Abnormal Larvae	Normal Larvae	Abnormal Larvae		
[illegible]	A	166	27				SV
	B	178	15				SV
	C	176	16				SV
	D	157	6				SV
	E	190	8				SV
[illegible]	A	179	11				SV
	B	193	10				SV
	C	171	15				SV
	D	190	10				SV
	E	195	12				SV
	A						
	B						
	C						
	D						
	E						
	A						
	B						
	C						
	D						
	E						

Data Verified By [illegible] Date Verified [illegible]

EVS CONSULTANTS
LARVAL DEVELOPMENT TOXICITY TEST - SEDIMENT (SAMPLES)

Client [illegible]
EVS Project No. [illegible]
EVS Work Order No. [illegible]
Logbook [illegible] Pages [illegible]
Initial Embryo Density [illegible]

Test Species [illegible]
Source/Date Received [illegible]
Test Initiation Date/Time [illegible]
Test Termination Date [illegible]
Test Volume (mL) [illegible]
Aliquot Size (mL) [illegible]

Sample ID	Rep.	Primary Count		Backup Count		Comments	Tech. Init.
		Normal Larvae	Abnormal Larvae	Normal Larvae	Abnormal Larvae		
AN-SC-S1	A	165	31				SA
	B	171	35				SA
	C	159	25				SA
	D	169	32				SA
	E	173	39				SA
AN-SC-S7	A	129	56				SA
	B	124	69				SA
	C	149	42				SA
	D	175	37				SA
	E	159	55				SA
AN-SC-S2	A	175	40				SA
	B	222	9	231	17		SA
	C	139	50				SA
	D	148	71				SA
	E	165	65				SA
AN-SC-S4	A	219	5				SA
	B	225	6				SA
	C	215	3				SA
	D	231	1				SA
	E	223	8				SA

Data Verified By [illegible] Date Verified [illegible]

EVS CONSULTANTS
LARVAL DEVELOPMENT TOXICITY TEST - FINAL WATER QUALITY

'ent —
EVS Project No. 9352-01.1
EVS Work Order No. 9306659
Logbook #10 Pages 145-147

Test Species N. galloprovincialis
Test Initiation Date/Time November 25, 1993 11:45h.
Test Termination Date November 27, 1993
Test Duration 45h.

Sample ID	Conc/Rep	Temperature (°C)	pH	Salinity (ppt)	Dissolved Oxygen (mg/L)
Neg. Control	A	16.0	8.0	30	7.5
	B	16.0	8.0	30	7.6
	C	16.0	8.0	30	7.7
	D	16.0	8.0	30	7.7
	E	16.0	8.0	30	7.7
Tech. Init.		CAB	JHM / CAB	JHM / CAB	JHM / CAB

WQ Instruments Used: Temp. Calibrated thermometer pH T-A-30 Salinity T-C-72 DO T-A-70

Comments

Set Up By JHK, CAH Data Verified By C. McPherson Date Verified Dec 27 '93

EVS CONSULTANTS
LARVAL DEVELOPMENT TOXICITY TEST - FINAL WATER QUALITY

Client Municipal Wastewater
EVS Project No. 9352-01.1
EVS Work Order No. 9852-01.1 980652
Logbook 11-10 Pages 145-147

Test Species M. galloprovincialis
Test Initiation Date/Time November 25, 1997 / 1540
Test Termination Date November 27, 1998
Test Duration 48h

Sample ID	Conc/Rep	Temperature (°C)	pH	Salinity (ppt)	Dissolved Oxygen (mg/L)
AN-SC-52	A	16.0	7.8	30	5.6
	B	16.0	~~7.8~~ 7.7	30	5.6
	C	16.0	7.9	30	6.1
	D	16.0	7.9	30	6.3
	E	16.0	7.9	30	6.4
AN-SC-84	A	16.0	7.7	30	5.2
	B	16.0	7.7	30	5.5
	C	16.0	7.5	30	5.6
	D	16.0	7.5	30	6.1
	E	16.0	7.8	30	6.2
Tech. Init.		CMS	JKM / CMS	JKM / CMS	JKM / CMS

WQ Instruments Used: Temp. Calibrated Thermometer pH D-A-30 Salinity D-C-72 DO D-A-70

Comments

Set Up By JKK, CMS Data Verified By C. McPherson Date Verified Dec 22 '97

EVS CONSULTANTS
LARVAL DEVELOPMENT TOXICITY TEST - FINAL WATER QUALITY

ient WILLAMETTE WATERWAY
S Project No. 9852-01.1
EVS Work Order No. 9852-01-7 78067
Logbook #10 Pages 145-147

Test Species M. galloprovincialis
Test Initiation Date/Time NOVEMBER 23 1998 / 1140H.
Test Termination Date NOVEMBER 27 1998
Test Duration 4 D.

Sample ID	Conc/Rep	Temperature (°C)	pH	Salinity (ppt)	Dissolved Oxygen (mg/L)
AN-SC-72	A	16.0	7.9	30	6.2
	B	16.0	7.8	30	6.3
	C	16.0	7.8	30	6.0
	D	16.0	7.8	30	5.0
	E	16.0	7.9	30	6.0
AN-SC-73	A	16.0	7.7	30	4.9
	B	16.0	7.7	30	5.2
	C	16.0	7.8	30	6.2
	D	16.0	7.8	30	6.3
	E	16.0	7.9	30	6.4
AN-SC-77	A	16.0	7.7	30	5.6
	B	16.0	7.8	30	6.0
	C	16.0	7.9	30	6.2
	D	16.0	7.8	29	5.7
	E	16.0	7.7	30	5.8
Tech. Init.		CHB	JKM / CHB	JKM / CHB	JKM / CHB

WQ Instruments Used: Temp. calibrated thermometer pH II-A-30 Salinity II-C-22 DO II-A-20

Comments

Set Up By JKM, PAH Data Verified By C. McPherson Date Verified Dec. 22/98