Final Report:

Chironomus dilutus* and *Hyalella azteca
10-Day Whole Sediment Toxicity Test Results
for
Tennessee Valley Authority-Kingston Monitoring and Analysis Project:
Emory River Sediment Samples

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Mr. Rick Sherrard
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Emory River
Final Report

Executive Summary

Great Lakes Environmental Center, Inc. (GLEC), via a contract with the Tennessee Valley Authority (TVA), conducted 10-day (screening) whole sediment toxicity tests to evaluate survival and growth for both *Chironomus dilutus* and *Hyalella azteca*. The whole sediment toxicity tests were performed with eight investigative sediment samples and one reference sediment sample, collected from predetermined locations on the Emory River. The Emory River is one of three rivers that were impacted by a fly ash spill at the Kingston Fossil Fuel Plant. These whole sediment toxicity tests are part of a large TVA project entitled "Kingston Monitoring and Analysis Project". The 10-day whole sediment toxicity test results will be used in conjunction with the chemical analysis results to select a subset of four sediment samples to be used in the follow-up long term (definitive) whole sediment toxicity tests with both *C. dilutus* and *H. azteca*.

The eight investigative sediment samples collected from the Emory River and used in the 10-day whole sediment toxicity tests were designated ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0 and ERM 5.5. All survival and growth results were compared to a reference sediment sample (Emory River reference control sediment) collected upstream of the spill site on the Emory River. Surface water collected from the Emory River was used as the overlying water in the eight investigative sediments, the reference control sediment, and the laboratory control sediment exposures. The tests were conducted following the U.S. Environmental Protection Agency (EPA) and the American Society for Testing and Materials (ASTM) whole sediment 10-day toxicity test methods for measuring toxicity. The endpoints of the whole sediment toxicity tests conducted with *C. dilutus* and *H. azteca* were survival and growth. These whole sediment toxicity tests were performed June 07 through June 17, 2011.

Survival and growth results from the *C. dilutus* and *H. azteca* toxicity tests for the eight investigative sediment samples were statistically compared to the reference sediment test results. Significant reductions ($p < 0.05$) in *C. dilutus* survival occurred in the investigative sediment samples ERM 2.5 and ERM 3.5 after 10 days of exposure relative to the organisms exposed to the Emory River reference control sediment. In addition, significant reductions in both *C. dilutus* growth and biomass occurred in investigative sediment samples ERM 0.5, ERM 0.8, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5 relative to the Emory River reference control organisms. Significant reductions ($p < 0.05$) in *H. azteca* survival occurred in investigative sediment samples ERM 2.5, EMR 3.0, ERM 3.5, and ERM 5.5 relative to the organisms exposed to the Emory River reference control sediment. *H. azteca* growth was significantly reduced in investigative sediment samples ERM 0.5, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5 after 10-days of exposure relative to the Emory River reference control sediment organisms. In addition, biomass was significantly reduced in investigative sediment samples ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5 relative to the Emory River reference control sediment after 10-days of exposure. All performance criteria were met in both the *C. dilutus* and *H. azteca* controls during the 10-day survival, growth, and biomass whole sediment toxicity tests.

Introduction

Great Lakes Environmental Center, Inc. (GLEC), under contract with the Tennessee Valley Authority (TVA), conducted and completed analysis of 10-day (screening) whole sediment toxicity tests for survival and growth with both *Chironomus dilutus* and *Hyalella azteca*. The whole sediment toxicity tests were performed with eight investigative sediment samples and one reference control sediment sample, all collected from the Emory River by the Tennessee Valley Authority (TVA), and Restoration Services, Inc. (RSI) personnel for whole sediment toxicity assessment.

The eight investigative sediment samples collected from the Emory River and used in the 10-day whole sediment toxicity tests were ERM 0.5, ERM 0.8, ERM 1.0, ERM, 2.5, ERM 3.0, ERM 3.5, ERM 4.0 and ERM 5.5. All survival and growth results were statistically compared to the reference sediment sample (Emory River reference control sediment) collected upstream of the spill site on the Emory River. Surface water collected from the Emory River upstream of the spill site was used as the overlying water in the eight investigative sediments, reference control and a laboratory control sediment tests.

As outlined in the TVA Kingston sediment study design, an additional laboratory control sediment and a water only control were also analyzed during the test period for the whole sediment toxicity tests. The overlying water for the water only and for the second laboratory control sediment tests was dechlorinated Traverse City, Michigan, municipal tap water (originated from Lake Michigan). The laboratory control sediment and water only control tests were used to measure the test acceptability and the health of the test organisms.

The whole sediment survival and growth toxicity test results for the eight sediment samples are summarized in the following tables:

- Table 1: 10-Day *C. dilutus* Average Percent Survival
- Table 2: 10-Day *C. dilutus* Growth and Biomass (expressed as average ash-free-dry-weight (AFDW))
- Table 3: Control Data: 10-Day *C. dilutus* Average Percent Survival
- Table 4: Control Data: 10-Day *C. dilutus* Growth and Biomass (expressed as average ash-free-dry-weight (AFDW)
- Table 5: 10-Day *H. azteca* Average Percent Survival
- Table 6 10-Day *H. azteca* Growth and Biomass
- Table 7: Control Data: 10-Day *H. azteca* Average Percent Survival
- Table 8: Control Data: 10-Day *H. azteca* Growth and Biomass

Water quality data for the overlying water used for each sediment sample tested are summarized in Table 9 for the *C. dilutus* tests and Table 10 for the *H. azteca* tests. A detailed summary of the overlying water quality measurements is provided in Appendix B. Summaries of the statistical analyses conducted on the whole sediment toxicity test data are provided in Table 11 for the *C. dilutus* tests, and in Table 12 for the *H. azteca* tests. The daily laboratory bench data sheets are maintained in files at GLEC, and are also provided on the enclosed compact diskettes. Chain of Custody forms and reference toxicant data are provided in Appendices A and F, respectively.

MATERIALS and METHODS

This study was performed at GLEC's Traverse City, Michigan laboratory following GLEC's written protocols, which are based on the procedures outlined by: EPA/600/R-99/064 *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates*, Second Edition; ASTM 1706-95B, *Standard Test Methods for Measuring the Toxicity of Sediment Associated Contaminants with Freshwater Invertebrates* (ASTM 2000); and GLEC Standard Operating Procedures (SOPs).

The eight investigative sediment samples, one reference sediment sample, and surface water (collected from the Emory River to be used as the overlying water for the whole sediment toxicity tests) were collected by Tennessee Valley Authority (TVA) and Restoration Services, Inc. (RSI) personnel May 23 through June 02, 2011, and shipped to the GLEC laboratory via a refrigerated carrier on June 02, 2011. The samples were received at GLEC on June 03, 2011. Upon arrival at GLEC the samples were assigned unique GLEC laboratory identification numbers and stored in the dark for four days at 0-6°C until test initiation. Additional surface water was collected on June 06, 2011, and arrived at the laboratory on June 08, 2011. Sample identification and collection information is provided in the table below.

Sample I.D.	GLEC Lab. ID Number	Date Sampled	Date Received
Emory Reference Sediment	8981	May 25, 2011	June 03, 2011
ERM 0.5	8982	May 23, 2011	June 03, 2011
ERM 0.8	8983	May 23, 2011	June 03, 2011
ERM 1.0	8984	May 23, 2011	June 03, 2011
ERM 2.5	8985	May 23, 2011	June 03, 2011
ERM 3.0	8986	May 24, 2011	June 03, 2011
ERM 3.5	8987	May 24, 2011	June 03, 2011
ERM 4.0	8988	May 23, 2011	June 03, 2011
ERM 5.5	8989	May 24, 2011	June 03, 2011
Emory River Water-ERM 9.0	8980	June 02, 2011	June 03, 2011
Emory River Water-ERM 9.0	8990	June 06, 2011	June 08, 2011

Investigative sediment and surface water samples received on June 03, 2011 were in good condition upon arrival at GLEC laboratory (i.e., no leaking containers, all custody seals intact), but two of the investigative sediment samples (two sample containers for each sediment sample)

and 21 cubitainers of surface water exceeded the acceptable temperature range of 0-6°C, as stated in the "TVA Kingston Sediment Study Design". Upon arrival at GLEC laboratory the temperature for each of the two containers per investigative sediment samples ERM 4.0 and ERM 5.5 were 7.0°C and 7.0°C, 6.3°C and 6.7°C, respectively. In addition, out of the 50 cubitainers of surface water sample received, 21 cubitainers exceeded the acceptable temperature range; receipt temperatures of the 21 cubitainers ranged from 6.1°C to 8.4°C, and are recorded in the TVA log book. The second batch of surface water received on June 8, 2011 also had 8 of the 40 cubitainers outside of the acceptable temperature range. The temperature of the eight cubitainers ranged from 6.1°C -7.2°C. In both instances Rick Sherrard from TVA was notified (via phone and e-mail) of the temperature exceedances, and he approved the use of the sediment and surface water samples for whole sediment toxicity testing (which is a deviation from the written study design). All temperature exceedances were noted on Chain of custody forms, sample check-in forms and sample check-in discrepancy/comment forms (Appendix A).

The 10-day *C. dilutus* and *H. azteca* toxicity tests were initiated on June 07, 2011, with each of the eight investigative sediment samples, the Emory River reference sediment, the two laboratory control sediments and one water only exposure. The surface water collected from the Emory River (ERM 9.0) was used as the overlying water in the eight investigative sediment samples, in the Emory River reference control sediment sample and in one laboratory control sediment. Laboratory water (dechlor: de-chlorinated tap water) was used as the overlying water in one laboratory control sediment and in the water-only control exposures.

Summary of Test Procedures: 10-Day *Chironomus dilutus* and *Hyalella azteca* Acute Whole Sediment Toxicity Tests

Second to third instar *C. dilutus* (11-12 days old at test initiation-purchased from Aquatic BioSystems) and *H. azteca* (12-13 days old-cultured in house) were used to initiate the 10-day whole sediment toxicity tests. *C. dilutus* and *H. azteca* were continuously exposed for 10 days to each of the eight investigative sediment samples, the Emory River reference sediment sample, the two laboratory control sediments and one water only control exposure. Consistent with the EPA method, there were eight replicate beakers for each sediment sample and for the laboratory controls; each replicate contained 10 animals. The Emory River reference control sediment was a 50:50 composite sample collected by TVA and RSI from two reference locations (ERM 8.0 and ERM 10.0) upstream of the spill site on the Emory River. The laboratory control sediment was a reference sediment collected from the Boardman River, a local stream with a nearly 100 percent forested watershed, located in the Pere Marquette State Forest, near Traverse City, Michigan.

Exposures were conducted in 470 mL glass test chambers, each containing 100 mL of whole sediment and 175 mL of overlying water. Prior to adding the whole sediment to each test chamber, the control and investigative sediments were separately homogenized using a pre-cleaned, stainless steel, all purpose mixer and a power drill until a uniform color and texture was achieved. After thorough homogenization, measured volumes of each investigative and reference sediment were weighed on a top loading balance to determine the average density (grams/unit volume) for each sample (Appendix E). While sediment additions were prepared by

volume, average densities were used as a quality control check for the prepared test sediments. The sediment mixture was then added to each test chamber using the pre-cleaned stainless steel spoon. After the addition of the sediment to the test chambers, the overlying water was immediately added; this was considered to be test day -1 (June 06, 2011). Test organisms were added the day following the addition of sediment and overlying water. This day represented test day 0.

Overlying water was intermittently supplied to each test chamber at least twice daily (once every 12-hours) via a static-renewal water delivery system. The overlying water for the Emory River reference control, the eight investigative sediment samples, and one of the laboratory controls was Emory River site water (ERM 9.0, which had an average hardness of 59 mg/L and an average alkalinity of 39 mg/L) (Appendix B-1). The overlying water for the second laboratory control sediment and the water only control consisted of de-chlorinated municipal (Traverse City, Michigan) tap (Lake Michigan) water, with an average hardness of 144 mg/L and an average alkalinity of 105 mg/L. Temperature, dissolved oxygen, pH, and specific conductance of the overlying waters were measured daily prior to use. The hardness, alkalinity, and total ammonia (as N) of Emory River surface water were measured at the beginning of the toxicity tests and when the Emory River water batch was nearly depleted.

The organisms in the *C. dilutus* test chambers were fed 1.5 mL of Tetrafin® goldfish food slurry (4 mg/mL dry solids) once daily. The *H. azteca* test chambers were fed a 1.0 mL mixture of yeast, trout food, and cerophyl (YTC; 1,780 (1700-1900) mg/L solids) once daily.

The test chambers were placed in a temperature controlled water bath under the specified conditions of 23 ± 1°C; photoperiod 16 hours light:8 hours dark; and light intensity of 364-478 lux (acceptable range 100-1000 lux).

Temperatures and the dissolved oxygen (DO) of the overlying water in the test chambers were measured daily in two alternating replicates for each test sediment and the results were recorded on the laboratory bench data sheets. If the DO dropped below 2.5 mg/L, the number of daily overlying water renewals was increased (up to 4 times per day) for all treatments until the DO recovered to greater than 3.0 mg/L. Once the DO had increased to above 3.0 mg/L, additional water renewals were suspended, until the DO values dropped below 2.5 mg/L. Alkalinity, hardness, pH, and total ammonia (as N) were measured in test exposures on test days 0 and 10 for both the *C. dilutus* (Table 9 and Appendix B-2) and *H. azteca* (Table 10 and Appendix B-3) tests. All test exposure water quality measurements were recorded on the laboratory bench data sheets.

Observations of organism behavior and any anomalies observed in the test chamber were made daily and recorded on the laboratory bench data sheets.

The number of *C. dilutus* surviving in each replicate test chamber was recorded at test termination (10 days), and a summary of the percent survival is provided in Tables 1 and 3. The average ash free dry weight [AFDW in milligrams (mg)] of the surviving organisms for each *C. dilutus* replicate, and the biomass [AFDW (mg) of the surviving organisms divided by the initial

number of organisms minus pupae and midges] was also determined at test termination, and the results are summarized in Tables 2 and 4.

The number of surviving *H. azteca* in each replicate chamber was recorded at test termination (10 days) and the survival data are summarized in Tables 5 and 7. The average dry weight [in milligrams (mg)] of the surviving organisms for each *H. azteca* replicate, and the biomass [dry weight (mg) of the surviving organisms divided by the initial number of organisms] was also determined at test termination, and the data are summarized in Tables 6 and 8.

A statistical analysis, using the program TOXCALC (version 5.0.32) and following statistical guidelines provided in EPA Method 600/R-99/064 and ASTM Method 1706-95B (2000), was used to compare the 10-day survival and growth with the control data. Prior to analysis, all percent survival data were transformed using an arc sine-square root transformation. All transformed data were then tested using either the homoscedatic or heteroscedastic t-tests, which are used for comparing a single treatment to a single control. The homoscedatic t-test assumes the data are normally distributed (Shapiro-Wilk Test or Kolmogorov D Test) and the variances are equal (F-test). If the variances are not equal, the data are analyzed using the heteroscedastic t-test. If the data are not normally distributed, then the data are analyzed using the nonparametric t-test (e.g., Steel's Many-One Rank Test or Wilcoxon Rank Sum Test with Bonferroni's Adjustment).

Growth data were initially evaluated for normal distribution and homogeneity of variances. In those cases where the data were not normally distributed or homogenous, the data were analyzed using either the homoscedatic t-test, heteroscedastic t-test, or the nonparametric test. In addition to growth being evaluated as average dry weight of the surviving organisms, growth was also analyzed as biomass (average dry weight of surviving organisms divided by the number of initial organisms). The survival and growth for each investigative sample was considered statistically different when significantly lower ($p < 0.05$) than observed in the Emory River reference control sediment (GLC Number 8981).

RESULTS and DISCUSSION

GLEC Laboratory Control Sediment and Water Only Controls

Organisms exposed to the GLEC laboratory control sediments and the water only control exposures achieved the minimum survival and growth requirements, as specified in the EPA /600/R-99/064 manual (those requirements are discussed in the following results section for each set of toxicity tests). The laboratory control sediment with laboratory water and the water only control were used to assess test acceptability and health of the test organisms. The laboratory water was used for culturing the test organisms and as the dilution water when performing GLEC's acute reference toxicant tests. The laboratory control sediment with the Emory River surface water (ERM 9.0) was used to measure the toxicity of the surface water being used as the overlying water in the whole sediment toxicity tests. The 10-day *C. dilutus* whole sediment toxicity test control survival, growth, and biomass results are summarized in Tables 3 and 4.

Control survival and growth results for the 10-day *H. azteca* whole sediment toxicity tests are provided in Tables 7 and 8.

10-Day *Chironomus dilutus*

The organisms exposed to the Emory River reference control sediment, the laboratory control sediments and to water only exceeded the minimum survival (70 percent) and growth (0.48 mg AFDW at test termination) criteria for an acceptable control for the *C. dilutus* tests (Tables 1, 2, 3 and 4). The *C. dilutus* exposed for 10 days to the Emory River reference control sediment had 98.8 percent survival, and 97.5 percent of the organisms exposed to the laboratory control sediment with Emory River surface water survived. The organisms exposed to the laboratory control sediment with laboratory water had 95.0 percent survival, and the water only control had 98.8 percent survival after 10 days of exposure. For reference, the acceptable requirements for survival and growth for the *C. dilutus* sediment toxicity tests can be found in the EPA manual /600/R-99/064, Table 12.3.

There was no statistically significant difference ($p \geq 0.05$) between *C. dilutus* survival, growth, or biomass in the laboratory control sediment with Emory River surface water and the laboratory control sediment with laboratory water. In addition, when the organisms exposed to the laboratory control sediment with laboratory water were statistically compared to the water only control, there was no difference in survival, growth or biomass between the two controls.

The overlying water quality measurements (Table 9) were also within the acceptable limits according to the EPA testing protocol (i.e., daily mean temperatures were 23 ± 1 °C; DO was maintained above 2.5 mg/L in the overlying water; and there were no variations greater than 50% in overlying water hardness, alkalinity, and ammonia measurements for each test type). Therefore, the *C. dilutus* whole sediment toxicity tests were conducted following the prescribed standard protocols, and are valid assessments of sediment toxicity, with the following exceptions:

- On June 9, 2011 the dissolved oxygen fell below 2.5 mg/L in the overlying water of the laboratory control sediment with laboratory water (2.4 mg/L), and in the investigative sediment sample ERM 3.0 (2.4 mg/L). In response to the drop in DO on June 9, 2011, we added a third overlying water renewal to all of the controls and investigative test sediment replicates.
- The third water renewal was discontinued on June 10, 2011 when all DO measurements were greater than 3.0 mg/L in all control and investigative test sediment replicates.
- DO concentrations also fell below 2.5 mg/L on June 11 2011, in the following controls and investigative samples, and a third overlying water renewal was added: laboratory control sediment with laboratory water (2.3 mg/L), laboratory control sediment with Emory River surface water (1.9 mg/L), ERM 0.8 (2.4 mg/L), and ERM 1.0 (2.3 mg/L).
- On June 12, 2011 the DO concentrations were still below 2.5 mg/L in the laboratory control sediment with Emory River surface water (2.0 and 2.3

mg/L) and in response, a fourth overlying water renewal was added to all the controls and to all sediment test replicates.

- The fourth renewal was continued on June 13, 2011 because the DO concentrations for the laboratory control sediment with Emory River surface water DO's were still at 2.3 mg/L and 2.8 mg/L.
- Fourth water renewals were discontinued on June 14, 2011 after DO concentrations increased above 3.0 mg/L in all controls and investigative sediment replicates.
- On, June 15, 2011 the DO concentrations fell below 2.5 mg/L in both the laboratory control sediment with laboratory water (2.1 and 2.1 mg/L) and laboratory control sediment with Emory River surface water (2.0 and 2.4 mg/L). In response a fourth overlying water renewal was added to all controls and sediment test replicates.

The four overlying water renewals were continued until test termination because DO concentrations remained below 3.0 mg/L in the following controls and investigative samples: laboratory control sediment with laboratory water, laboratory control sediment with Emory River surface water, Emory River reference control sediment, and investigative sediments ERM 0.8, ERM 1.0, ERM 3.0, and ERM 5.5. Based on our experience, these brief reductions in test chamber DO values are unlikely to have affected the test results (see EPA /600/R-99/064 manual, section 12.3.6.2.2).

All test chambers were observed daily to assess organism behavior. No unusual observations were noted in the test organisms exposed to these sediment samples.

Statistical Analysis for 10-Day *Chironomus dilutus* Tests

Emory River Reference Sediment Sample Compared to Investigative Sediment Samples ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0 and ERM 5.5

Survival and growth results from the Emory River reference control sediment sample (GLC Number: 8981) were compared statistically to the eight investigative sediment samples ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0 and ERM 5.5. Statistically significant reductions ($p < 0.05$) in *C. dilutus* survival occurred in investigative sediment samples ERM 2.5 (GLC Number: 8985) and ERM 3.5 (GLC Number: 8987) after 10 days of exposure relative to the Emory River reference control sediment (Tables 1, 2, and 11).

Chironomus growth [measured as AFDW of surviving organisms (mg)] was significantly reduced ($p<0.05$) in the following seven investigative sediment samples: ERM 0.5, ERM 0.8, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0 and ERM 5.5 (GLC Numbers: 8982, 8983, 8985, 8986, 8987, 8988, and 8989, respectively) relative to the Emory River reference control sediment sample (Tables 2 and 11). *C. dilutus* growth expressed as biomass [AFDW of surviving organisms divided by the initial number of organisms minus pupae and midges (mg)] was also reduced ($p<0.05$) in the following seven investigative sediment samples: ERM 0.5, ERM 0.8,

ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0 and ERM 5.5 (GLC Numbers: 8982, 8983, 8985, 8986, 8987, 8988, and 8989, respectively) after 10 days of exposure relative to the Emory River reference control sediment sample (Tables 2 and 11).

The statistical results for the *C. dilutus* survival and growth whole sediment toxicity tests are provided in Appendix C.

10-Day *Hyalella azteca*

The *H. azteca* in the 10-day Emory River reference control sediment, the laboratory control sediments and in the water only exposure control exceeded the minimum survival (80 percent), and measurable growth relative to the weight of organisms at test initiation criteria (Tables 5, 6, 7 and 8). After 10 days of exposure, *H. azteca* exposed to the Emory River reference control sediment had 93.8 percent survival, organisms exposed to the laboratory control sediment with Emory River surface water had 97.5 percent survival, and the organisms exposed to the laboratory control sediment with laboratory water and the water only control both had 98.8 percent survival. The requirements for acceptable survival and growth for *H. azteca* can be found in the EPA manual /600/R-99/064, Table 11.3.

There was no statistical difference ($p \geq 0.05$) in *H. azteca* survival in the laboratory control sediment with Emory River surface water relative to the laboratory control sediment with laboratory water or water only control (Tables 7 and 8). However, both growth and biomass were significantly reduced ($p < 0.05$) in the laboratory control sediment with Emory River surface water and water only control relative to the laboratory control sediment with laboratory water (Table 8). The mean growth and biomass for *H. azteca* exposed to the laboratory control sediment with laboratory water were 0.14278 mg and 0.14100 mg, respectively, whereas the mean growth and biomass for *H. azteca* exposed to laboratory control sediment with Emory River surface water were 0.12096 mg and 0.11825 mg, respectively. The mean growth and biomass for *H. azteca* exposed to water only control were 0.11725 mg and 0.11613 mg, respectively. It is not clear why these differences occurred.

The overlying water quality measurements (Table 10) were within the acceptable limits according to the EPA testing protocol (i.e., daily mean temperatures were 23 ± 1 °C; DO was maintained above 2.5 mg/L in the overlying water; and there were no variations greater than 50% in overlying water hardness, alkalinity or ammonia measurements for each test type).

All test chambers were checked daily to assess organism behavior and no unusual observations were noted. Consequently, the *H. azteca* whole sediment toxicity tests with samples Emory River reference, ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0 and ERM 5.5 are valid assessments of sediment toxicity.

Statistical Analysis for 10-Day *Hyalella azteca* Tests

Emory River Reference Sediment Sample Compared to Investigative Sediment Samples ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0 and ERM 5.5

Survival and growth results from the Emory River reference sediment sample (GLC Number: 8981) were compared statistically to the eight investigative sediment samples ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0 and ERM 5.5. Statistically significant reductions ($p<0.05$) in *H. azteca* survival occurred in the ERM 2.5, ERM 3.0, ERM 3.5, and ERM 5.5 sediment samples (GLC Numbers: 8985, 8986, 8987, and 8989, respectively) after 10 days of exposure relative to the Emory River reference control sediment (Tables 5, 6, and 12).

H. azteca growth in the surviving organisms (measured as average dry weight in mg) was significantly reduced in sediment samples ERM 0.5, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5 (GLC Numbers: 8982, 8985,8986, 8987, 8988, and 8989, respectively) relative to the Emory River reference control sediment (Tables 6 and 12). Statistically significant reductions in *H. azteca* growth as biomass (weight of surviving organisms divided by the initial number of organisms) occurred in sediment samples ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5 (GLC Numbers: 8985, 8986, 8987, 8988, and 8989, respectively) relative to the Emory River reference control sediment (Tables 6 and 12).

The statistical results for survival and growth in the *H. azteca* whole sediment toxicity tests are provided in Appendix D.

In-House Reference Toxicant Results for *Chironomus dilutus* and *Hyalella azteca*

The 96-hour LC_{50} values for in-house NaCl reference toxicant tests for *C. dilutus* were 8.87 mg/L, and 4.32 mg/L for *H. azteca*. Those 96-hour LC_{50} values were within ± 2 standard deviations of GLEC's in-house mean LC_{50} toxicity values. The summarized control charts are provided in Appendix F. At test termination, 100 percent of the control organisms in both the *C. dilutus* and *H. azteca* reference toxicant tests were alive.

SUMMARY

All performance criteria were met in both the *C. dilutus* and *H. azteca* controls during the 10-day survival, growth, and biomass whole sediment toxicity tests.

Significant reductions ($p< 0.05$) in *C. dilutus* survival occurred in investigative sediment samples ERM 2.5 and ERM 3.5 after 10 days of exposure relative to the Emory River reference control sediment. In addition, significant reductions in both *C. dilutus* growth and biomass occurred in investigative sediment samples ERM 0.5, ERM 0.8, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5 relative to the Emory River reference control organisms.

Significant reductions ($p < 0.05$) in *H. azteca* survival occurred in investigative sediment samples ERM 2.5, EMR 3.0, ERM 3.5, and ERM 5.5 relative to the organisms exposed to the Emory River reference control sediment. *H. azteca* growth was significantly reduced in investigative sediment samples ERM 0.5, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5 after 10-days of exposure relative to the Emory River reference control sediment organisms. In addition, biomass was significantly reduced in investigative sediment samples ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5 relative to the Emory River reference control sediment after 10-days of exposure.

If you have any questions, or if you would like additional information, please contact myself, Mick DeGraeve, or Dennis McCauley at (231) 941-2230. Thank you for the opportunity to provide this service to the Tennessee Valley Authority. We look forward to continuing to provide environmental services to you in the future.

Sincerely,

Mailee W. Garton
Laboratory Coordinator

Mick DeGraeve
Director of Strategic Planning
and Program Development

MWG:mg

TABLE 1. **Comparison of the Number of Surviving Organisms per Replicate and Percent Survival Between the Emory River Reference Control Sediment Sample and the Investigative Sediment Samples (ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5) for the Tennessee Valley Authority (TVA) *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted June 07-June 17, 2011.**

	Number Test Organisms Surviving per Replicate[r]									
Replicate Number	**Laboratory Control with Emory River Water ERM 9.0**	**Emory River Reference Control GLC# 8981**	**ERM 0.5 GLC# 8982**	**ERM 0.8 GLC# 8983**	**ERM 1.0 GLC# 8984**	**ERM 2.5 GLC# 8985**	**ERM 3.0 GLC# 8986**	**ERM 3.5 GLC# 8987**	**ERM 4.0 GLC# 8988**	**ERM 5.5 GLC# 8989**
1	10	10	10	7	10	4	10	10	10	10
2	9	10	10	9	10	8	10	8	10	10
3	10	10	10	10	10	8	10	8	10	10
4	9	10	10	10	10	7	10	8	10	10
5	10	10	10	10	9	8	10	8	10	10
6	10	9	10	10	9	6	10	10	10	10
7	10	10	10	10	10	7	10	10	10	10
8	10	10	10	10	10	8	10	8	10	10
10-Day Percent Survival	**97.5**	**98.8**	**100.0**	**95.0**	**97.5**	**70.0**[a]	**100.0**	**87.5**[a]	**100.0**	**100.0**

[r] Replicates initiated with 10 organisms each

[a] Significantly different ($p < 0.05$) from Emory River Reference Control Sediment (GLC# 8981)

TABLE 2. **Comparison of the Average[1] Ash-Free-Dry Weight (AFDW) (mg), Biomass[2] (AFDW) (mg) and Percent Survival Between the Emory River Reference Control Sediment Sample and the Investigative Sediment Samples (ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5) for the Tennessee Valley Authority (TVA), Emory River, *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted June 07-June 17, 2011.**

REPLICATE #	Laboratory Control		Emory River Reference Control		ERM 0.5		ERM 0.8		ERM 1.0		ERM 2.5		ERM 3.0		ERM 3.5		ERM 4.0		ERM 5.5	
	with Emory River Water ERM 9.0		GLC# 8981		GLC# 8982		GLC# 8983		GLC# 8984		GLC# 8985		GLC# 8986		GLC# 8987		GLC# 8988		GLC# 8989	
	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)
1	1.03300	1.03300	1.57500	1.57500	0.98600	0.98600	1.34714	0.94300	1.50400	1.50400	1.02750	0.41100	0.87000	0.87000	1.02667	1.02667	1.02400	1.02400	1.21500	1.21500
2	1.32556	1.19300	1.17400	1.17400	0.95400	0.95400	1.19333	1.07400	1.33700	1.33700	0.65375	0.52300	1.05200	1.05200	0.92750	0.74200	0.95800	0.95800	1.16000	1.16000
3	1.16300	1.16300	1.25500	1.25500	0.97300	0.97300	1.46300	1.46300	1.13700	1.13700	0.51625	0.41300	1.02500	1.02500	0.86625	0.69300	1.02600	1.02600	1.02900	1.02900
4	1.01000	0.90900	1.49400	1.49400	1.09700	1.09700	1.17500	1.17500	1.13600	1.13600	0.88000	0.61600	1.01700	1.01700	0.80000	0.64000	0.81700	0.81700	1.01300	1.01300
5	1.16400	1.16400	1.31400	1.31400	0.96900	0.96900	0.99400	0.99400	1.29222	1.16300	0.84000	0.67200	1.16900	1.16900	1.02500	0.82000	1.19400	1.19400	1.18200	1.18200
6	1.33700	1.33700	1.34444	1.21000	0.95800	0.95800	1.09600	1.09600	1.41889	1.27700	1.16167	0.69700	1.18500	1.18500	0.92500	0.92500	1.11000	1.11000	1.14200	1.14200
7	1.01300	1.01300	1.33800	1.33800	0.96300	0.96300	1.16667	1.16667	1.22200	1.22200	0.73571	0.51500	1.06800	1.06800	0.92000	0.92000	1.06900	1.06900	1.13600	1.13600
8	1.40100	1.40100	1.24800	1.24800	1.03100	1.03100	0.98200	0.98200	1.30100	1.30100	0.81750	0.65400	1.20600	1.20600	0.91000	0.72800	0.97300	0.97300	1.21000	1.21000
Average[1] Ash-Free-Dry-Weight (AFDW) (mg)	**1.18082**[a]		**1.34281**		**0.99138**[a]		**1.17714**[a]		**1.29351**		**0.82905**[a]		**1.07400**[a]		**0.92505**[a]		**1.02138**[a]		**1.13588**[a]	
Average (AFDW) Biomass[2] Weight (mg)		**1.15163**[a]		**1.32600**		**0.99138**[a]		**1.11171**[a]		**1.25963**		**0.56263**[a]		**1.07400**[a]		**0.81183**[a]		**1.02138**[a]		**1.13588**[a]
10-Day Percent Survival	**97.5**		**98.8**		**100.0**		**95.0**		**97.5**		**70.0**[a]		**100.0**		**87.5**[a]		**100.0**		**100.0**	

[1] Average Ash-Free-Dry-Weight (AFDW) is the total ash-free-dry weight of surviving organisms

[2] Biomass weight is the total Ash-Free-Dry-Weight of surviving organisms divided by the initial number of organisms minus pupae and midges.

[a] Significantly different ($p < 0.05$) from Emory River Reference Control Sediment (GLC# 8981)

Note: Average Ash-Free-Dry Weight of *Chironomus dilutus* at test initiation = 0.19963 mg

TABLE 3. Comparison of the Number of Surviving Organisms per Replicate and Percent Survival Between the Laboratory Control Sediment with Laboratory Control water and the Water Only Control and Laboratory Control Sediment with Emory River Water (ERM 9.0) for the Tennessee Valley Authority (TVA), Emory River, *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted June 07-June 17, 2011.

	Number Test Organisms Surviving per Replicate[r]			
Replicate Number	**Laboratory Control with Laboratory Water (Dechlor)**	**Water Only Control Laboratory Water (Dechlor)**	**Laboratory Control with Emory River Water ERM 9.0**	**Emory River Reference Control GLC# 8981**
1	10	10	10	10
2	10	10	9	10
3	9	10	10	10
4	9	9	9	10
5	8	10	10	10
6	10	10	10	9
7	10	10	10	10
8	10	10	10	10
10-Day Percent Survival	**95.0**	**98.8**	**97.5**	**98.8**

[r] Replicates initiated with 10 organisms each

TABLE 4. **Comparison of Average[1] Ash-Free-Dry Weight (AFDW) (mg), Biomass[2] (AFDW) (mg) and Percent Survival Between the Laboratory Control Sediment with Laboratory Control water and the Water Only Control and Laboratory Control Sediment with Emory River Water (ERM 9.0) for the Tennessee Valley Authority (TVA), Emory River, *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted June 07-June 17, 2011.**

REPLICATE #	Laboratory Control with Laboratory Water (Dechlor)		Water Only Control Laboratory Water (Dechlor)		Laboratory Control with Emory River Water ERM 9.0		Emory River Reference Control GLC# 8981	
	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)
1	1.22600	1.22600	1.24800	1.24800	1.03300	1.03300	1.57500	1.57500
2	0.95300	0.95300	0.98300	0.98300	1.32556	1.19300	1.17400	1.17400
3	0.90778	0.81700	0.92500	0.92500	1.16300	1.16300	1.25500	1.25500
4	1.18667	1.06800	0.91556	0.82400	1.01000	0.90900	1.49400	1.49400
5	0.77250	0.61800	0.92800	0.92800	1.16400	1.16400	1.31400	1.31400
6	1.12900	1.12900	0.84200	0.84200	1.33700	1.33700	1.34444	1.21000
7	1.22100	1.22100	0.87000	0.87000	1.01300	1.01300	1.33800	1.33800
8	1.16700	1.16700	0.77900	0.77900	1.40100	1.40100	1.24800	1.24800
Average[1] Dry Weight (mg)	**1.07037**		**0.93632**		**1.18082** [a]		**1.34281**	
Average Biomass[2] Weight (mg)		**1.02488**		**0.92487**		**1.15163** [a]		**1.32600**
10-Day Percent Survival	**95.0**		**98.8**		**97.5**		**98.8**	

[1] Average Ash-Free-Dry-Weight (AFDW) is the total ash-free-dry weight of surviving organisms

[2] Biomass weight is the total dry weight of surviving organisms divided by the initial number of organisms minus puape and midges

[a] Significantly different ($p < 0.05$) from Emory River Reference Control Sediment (GLC# 8981)

Note: Average Ash-Free-Dry Weight of *Chironomus dilutus* at test initiation = 0.19963 mg

TABLE 5. Comparison of the Number of Surviving Organisms per Replicate and Percent Survival Between the Emory River Reference Control Sediment Sample and the Investigative Sediment Samples (ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5) for the Tennessee Valley Authority (TVA) *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted June 07-June 17, 2011.

	Number Test Organisms Surviving per Replicate[r]									
Replicate Number	**Laboratory Control with Emory River Water ERM 9.0**	**Emory River Reference Control GLC# 8981**	**ERM 0.5 GLC# 8982**	**ERM 0.8 GLC# 8983**	**ERM 1.0 GLC# 8984**	**ERM 2.5 GLC# 8985**	**ERM 3.0 GLC# 8986**	**ERM 3.5 GLC# 8987**	**ERM 4.0 GLC# 8988**	**ERM 5.5 GLC# 8989**
1	9	10	9	10	10	5	4	4	10	7
2	10	10	10	10	7	2	6	1	8	6
3	10	10	7	7	8	5	3	0	10	8
4	10	8	9	9	10	4	3	2	10	8
5	10	9	10	10	8	7	4	1	7	8
6	10	10	10	10	10	3	6	4	7	9
7	9	10	9	10	10	6	6	4	8	6
8	10	8	10	10	8	6	7	4	10	7
10-Day Percent Survival	**97.5**	**93.8**	**92.5**	**95.0**	**88.8**	**47.5[a]**	**48.8[a]**	**25.0[a]**	**87.5**	**73.8[a]**

[r] Replicates initiated with 10 organisms each

[a] Significantly different ($p < 0.05$) from Emory River Reference Control Sediment (GLC# 8981)

TABLE 6. **Comparison of the Average[1] Dry Weight (mg), Biomass[2] (mg) and Percent Survival Between the Emory River Reference Control Sediment Sample and the Investigative Sediment Samples (ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM 3.5, ERM 4.0, and ERM 5.5) for the Tennessee Valley Authority (TVA), Emory River, *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted June 07-June 17, 2011.**

REPLICATE #	Laboratory Control		Emory River Reference Control		ERM 0.5		ERM 0.8		ERM 1.0		ERM 2.5		ERM 3.0		ERM 3.5		ERM 4.0		ERM 5.5	
	with Emory River Water ERM 9.0		GLC# 8981		GLC# 8982		GLC# 8983		GLC# 8984		GLC# 8985		GLC# 8986		GLC# 8987		GLC# 8988		GLC# 8989	
	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)
1	0.09667	0.08700	0.10000	0.10000	0.11000	0.09900	0.12100	0.12100	0.10000	0.10000	0.09200	0.04600	0.08500	0.03400	0.07000	0.02800	0.11200	0.11200	0.09000	0.06300
2	0.10000	0.10000	0.09800	0.09800	0.09800	0.09800	0.11000	0.11000	0.08000	0.05600	0.09000	0.01800	0.09167	0.05500	0.07000	0.00700	0.09875	0.07900	0.08667	0.05200
3	0.10200	0.10200	0.11000	0.11000	0.07143	0.05000	0.13571	0.09500	0.11875	0.09500	0.07200	0.03600	0.09333	0.02800	*	0.00000	0.09600	0.09600	0.08875	0.07100
4	0.11200	0.11200	0.13500	0.10800	0.10444	0.09400	0.10667	0.09600	0.10400	0.10400	0.07500	0.03000	0.09000	0.02700	0.09000	0.01800	0.11400	0.11400	0.08875	0.07100
5	0.14200	0.14200	0.13333	0.12000	0.08900	0.08900	0.11900	0.11900	0.14000	0.11200	0.06571	0.04600	0.10500	0.04200	0.10000	0.01000	0.09429	0.06600	0.08375	0.06700
6	0.11000	0.11000	0.11200	0.11200	0.12500	0.12500	0.11700	0.11700	0.16400	0.16400	0.08333	0.02500	0.10000	0.06000	0.08000	0.03200	0.10143	0.07100	0.07667	0.06900
7	0.12000	0.10800	0.12200	0.12200	0.08889	0.08000	0.09700	0.09700	0.16000	0.16000	0.04833	0.02900	0.10500	0.06300	0.07500	0.03000	0.09000	0.07200	0.05167	0.03100
8	0.18500	0.18500	0.13125	0.10500	0.12700	0.12700	0.11900	0.11900	0.08875	0.07100	0.04333	0.02600	0.11000	0.07700	0.10500	0.04200	0.07000	0.07000	0.09143	0.06400
Average[1] Dry Weight (mg)	**0.12096**		**0.11770**		**0.10172**[a]		**0.11567**		**0.11944**		**0.07121**[a]		**0.09750**[a]		**0.08429**[a]		**0.09706**[a]		**0.08221**[a]	
Average Biomass[2] Weight (mg)		**0.11825**		**0.10938**		**0.09525**		**0.10925**		**0.10775**		**0.03200**[a]		**0.04825**[a]		**0.02088**[a]		**0.08500**[a]		**0.06100**[a]
10-Day Percent Survival	**97.5**		**93.8**		**92.5**		**95.0**		**88.8**		**47.5**[a]		**48.8**[a]		**25.0**[a]		**87.5**		**73.8**[a]	

[1] Average Dry Weight is the total dry weight of surviving organisms

[2] Biomass weight is the total Dry Weight of surviving organisms divided by the initial number of organisms

[a] Significantly different ($p < 0.05$) from Emory River Reference Control Sediment (GLC# 8981)

Note: Average Dry Weight of *Hyalella azteca* at test initiation = 0.02663 mg

* Zero percent survival and the average growth was not included in the statistical analysis

TABLE 7. Comparison of the Number of Surviving Organisms per Replicate and Percent Survival Between the Laboratory Control Sediment with Laboratory Control water and the Water Only Control and Laboratory Control Sediment with Emory River Water (ERM 9.0) for the Tennessee Valley Authority (TVA), Emory River, *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted June 07-June 17, 2011.

	Number Test Organisms Surviving per Replicate[r]			
Replicate Number	**Laboratory Control with Laboratory Water (Dechlor)**	**Water Only Control Laboratory Water (Dechlor)**	**Laboratory Control with Emory River Water ERM 9.0**	**Emory River Reference Control GLC# 8981**
1	10	10	9	10
2	9	10	10	10
3	10	10	10	10
4	10	10	10	8
5	10	10	10	9
6	10	9	10	10
7	10	10	9	10
8	10	10	10	8
10-Day Percent Survival	**98.8**	**98.8**	**97.5**	**93.8**

[r] Replicates initiated with 10 organisms each

TABLE 8. **Comparison of Average[1] Dry Weight (mg), Biomass[2] (mg) and Percent Survival Between the Laboratory Control Sediment with Laboratory Control water and the Water Only Control and Laboratory Control Sediment with Emory River Water (ERM 9.0) for the Tennessee Valley Authority (TVA), Emory River, *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted June 07-June 17, 2011.**

REPLICATE #	Laboratory Control with Laboratory Water (Dechlor)		Water Only Control Laboratory Water (Dechlor)		Laboratory Control with Emory River Water ERM 9.0		Emory River Reference Control GLC# 8981	
	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)	Average[1] Weight (mg)	Biomass[2] Weight (mg)
1	0.13400	0.13400	0.10700	0.10700	0.09667	0.08700	0.10000	0.10000
2	0.14222	0.12800	0.11800	0.11800	0.10000	0.10000	0.09800	0.09800
3	0.17100	0.17100	0.12400	0.12400	0.10200	0.10200	0.11000	0.11000
4	0.14600	0.14600	0.12300	0.12300	0.11200	0.11200	0.13500	0.10800
5	0.14700	0.14700	0.11500	0.11500	0.14200	0.14200	0.13333	0.12000
6	0.12100	0.12100	0.09000	0.08100	0.11000	0.11000	0.11200	0.11200
7	0.15600	0.15600	0.12100	0.12100	0.12000	0.10800	0.12200	0.12200
8	0.12500	0.12500	0.14000	0.14000	0.18500	0.18500	0.13125	0.10500
Average[1] Dry Weight (mg)	**0.14278**		**0.11725**[a]		**0.12096**[a]		**0.11770**	
Average Biomass[2] Weight (mg)		**0.14100**		**0.11613**[a]		**0.11825**[a]		**0.10938**
10-Day Percent Survival	**98.8**		**98.8**		**97.5**		**93.8**	

[1] Average Dry Weight is the total dry weight of surviving organisms

[2] Biomass weight is the total Dry Weight of surviving organisms divided by the initial number of organisms

[a] Significantly different means between Laboratory Control Sediment with Laboratory Water

Note: Average Dry Weight of *Hyalella azteca* at test initiation = 0.02663 mg

Table 9. **Summary of Mean Water Quality Parameters of Overlying Water Samples Collected Prior to Renewal for the Tennessee Valley Authority (TVA) Emory *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted June 07- June 17, 2011.**

Sample ID GLC No.	Temperature (°C) (range) n=22	pH (s.u.) (range) n=4	Dissolved Oxygen (mg/L) (range) n=22	Specific Conductivity (µmhos/cm) (range) n=4	Alkalinity (CaCO3 mg/L) (range) n=2 n=3; ERM 0.8 and ERM 3.0	Hardness (CaCO3 mg/L) (range) n=2 n=3; ERM 0.8 and ERM 3.0	Ammonia (mg/L as N) (range) n=2 n=3; ERM 0.5, ERM 0.8, ERM 2.5, ERM 3.0
Emory River Reference Control GLC No.: 8981	**22.9** (22.2-23.3)	**7.13** (7.06-7.17)	**3.2** (2.5-5.2)	**169** (124-217)	**62** (50-74)	**76** (76-76)	**1.24** (0.26-2.21)
ERM 0.5 GLC No.: 8982	**23.0** (22.3-23.3)	**7.24** (7.11-7.35)	**3.8** (2.8-5.8)	**131** (125-137)	**46** (40-52)	**68** (68-68)	**0.53** (0.23-0.70)
ERM 0.8 GLC No.: 8983	**22.9** (22.3-23.3)	**7.24** (7.15-7.33)	**3.4** (2.4-5.4)	**130** (125-134)	**44** (40-50)	**67** (64-68)	**0.27** (0.20-0.39)
ERM 1.0 GLC No.: 8984	**22.9** (22.3-23.1)	**7.24** (7.20-7.28)	**3.4** (2.3-5.5)	**132** (124-142)	**46** (42-50)	**72** (72-72)	**0.30** (0.22-0.38)
ERM 2.5 GLC No.: 8985	**22.8** (22.2-23.1)	**7.64** (7.23-8.04)	**4.6** (3.4-6.7)	**143** (122-163)	**51** (40-62)	**82** (72-92)	**0.30** (0.10-0.40)
ERM 3.0 GLC No.: 8986	**22.8** (22.2-23.1)	**7.27** (7.16-7.35)	**3.5** (2.4-5.9)	**128** (122-134)	**42** (40-46)	**68** (64-72)	**0.20** (0.11-0.38)
ERM 3.5 GLC No.: 8987	**22.8** (22.3-23.1)	**7.53** (7.26-7.81)	**4.5** (3.5-6.5)	**130** (121-140)	**43** (38-48)	**66** (64-68)	**0.14** (0.06-0.22)
ERM 4.0 GLC No.: 8988	**22.8** (22.2-23.1)	**7.07** (7.02-7.13)	**3.9** (3.0-5.6)	**109** (104-115)	**33** (28-38)	**58** (48-68)	**0.17** (0.09-0.25)
ERM 5.5 GLC No.: 8989	**22.8** (22.2-23.0)	**7.09** (7.04-7.14)	**3.7** (2.7-5.3)	**123** (117-130)	**38** (34-42)	**56** (52-60)	**0.65** (0.24-1.05)
LCS & ERW Laboratory Control Sediment with Emory River Water-ERM 9.0	**22.9** (22.6-23.3)	**7.59** (7.50-7.69)	**3.2** (1.9-5.8)	**210** (145-280)	**62** (60-64)	**82** (76-88)	**0.47** (0.28-0.66)
LCS & GLW Laboratory Control Sediment with Laboratory Water	**22.9** (22.3-23.3)	**7.52** (7.47-7.57)	**3.4** (2.1-5.8)	**332** (319-347)	**123** (120-126)	**158** (152-164)	**0.41** (0.24-0.57)
GLW Laboratory Water Only	**22.9** (22.4-23.3)	**7.93** (7.54-8.30)	**5.3** (3.8-8.1)	**305** (300-309)	**106** (106-106)	**150** (148-152)	**0.15** (0.04-0.26)

Table 10. **Summary of Mean Water Quality Parameters of Overlying Water Samples Collected Prior to Renewal for the Tennessee Valley Authority (TVA) Emory *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted June 07- June 17, 2011.**

Sample ID GLC No.	Temperature (°C) (range) n=22	pH (s.u.) (range) n=4	Dissolved Oxygen (mg/L) (range) n=22	Specific Conductivity (µmhos/cm) (range) n=4	Alkalinity (CaCO3 mg/L) (range) n=2 n=3; ERM 0.8 and ERM 3.0	Hardness (CaCO3 mg/L) (range) n=2 n=3; ERM 0.8 and ERM 3.0	Ammonia (mg/L as N) (range) n=2 n=3; ERM 0.5, ERM 0.8, ERM 2.5, ERM 3.0
Emory River Reference Control GLC No.: 8981	**23.1** (22.7-23.5)	**7.39** (7.25-7.54)	**4.6** (3.4-5.2)	**184** (148-224)	**58** (42-74)	**68** (60-76)	**1.27** (0.32-2.21)
ERM 0.5 GLC No.: 8982	**23.2** (22.6-23.6)	**7.40** (7.35-7.50)	**5.2** (4.2-5.9)	**140** (133-145)	**50** (48-52)	**72** (68-76)	**0.47** (0.06-0.70)
ERM 0.8 GLC No.: 8983	**23.2** (22.2-23.5)	**7.53** (7.31-7.76)	**5.1** (4.2-6.2)	**144** (141-151)	**51** (50-52)	**72** (64-76)	**0.15** (0.03-0.39)
ERM 1.0 GLC No.: 8984	**23.2** (22.6-23.5)	**7.48** (7.23-7.69)	**5.1** (4.5-5.8)	**145** (140-147)	**50** (50-50)	**80** (72-88)	**0.22** (0.06-0.38)
ERM 2.5 GLC No.: 8985	**23.3** (22.6-23.6)	**7.76** (7.50-8.04)	**6.1** (4.3-6.5)	**149** (128-173)	**52** (42-62)	**80** (68-92)	**0.28** (0.05-0.40)
ERM 3.0 GLC No.: 8986	**23.2** (22.5-23.6)	**7.52** (7.35-7.72)	**5.4** (4.3-7.2)	**137** (133-143)	**48** (46-50)	**72** (64-80)	**0.15** (0.02-0.38)
ERM 3.5 GLC No.: 8987	**23.2** (22.5-23.6)	**7.67** (7.46-7.84)	**6.1** (4.2-6.7)	**137** (126-149)	**44** (40-48)	**68** (68-68)	**0.12** (0.02-0.22)
ERM 4.0 GLC No.: 8988	**23.2** (22.5-23.6)	**7.31** (7.08-7.57)	**5.5** (4.8-6.0)	**115** (104-128)	**34** (28-40)	**56** (48-64)	**0.14** (0.03-0.25)
ERM 5.5 GLC No.: 8989	**23.2** (22.5-23.6)	**7.31** (7.10-7.51)	**5.4** (4.3-6.2)	**130** (128-131)	**41** (40-42)	**64** (52-76)	**0.54** (0.03-1.05)
LCS & ERW Laboratory Control Sediment with Emory River Water-ERM 9.0	**23.1** (22.6-23.5)	**7.51** (7.39-7.57)	**4.4** (3.8-4.7)	**218** (154-279)	**58** (52-64)	**84** (80-88)	**0.57** (0.48-0.66)
LCS & GLW Laboratory Control Sediment with Laboratory Water	**23.1** (22.6-23.6)	**7.68** (7.58-7.82)	**4.7** (4.1-5.5)	**335** (320-345)	**120** (114-126)	**158** (152-164)	**0.43** (0.28-0.57)
GLW Laboratory Water Only	**23.2** (22.5-23.6)	**7.94** (7.47-8.41)	**6.8** (5.5-7.7)	**303** (297-311)	**106** (106-106)	**152** (148-156)	**0.17** (0.04-0.29)

Table 11. **Summary of Statistically Significant Differences (p< 0.05) Between the Emory River Reference Control Sediment Sample and the Investigative Sediment Samples (ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM, 3.5, ERM 4.0, and ERM 5.5) for the Tennessee Valley Authority (TVA) Emory River *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted June 07-June 17, 2011.**

Sample ID GLC No.	10-Day Survival with Emory River Reference Control Sediment (GLC Number: 8981)	10-Day Growth (AFDW) with Emory River Reference Control Sediment (GLC Number: 8981)	10-Day Biomass (AFDW) with Emory River Reference Control Sediment (GLC Number: 8981)
ERM 0.5 GLC No.: 8982		**a**	**a**
ERM 0.8 GLC No.: 8983		**a**	**a**
ERM 1.0 GLC No.: 8984			
ERM 2.5 GLC No.: 8985	**a**	**a**	**a**
ERM 3.0 GLC No.: 8986		**a**	**a**
ERM 3.5 GLC No.: 8987	**a**	**a**	**a**
ERM 4.0 GLC No.: 8988		**a**	**a**
ERM 5.5 GLC No.: 8989		**a**	**a**

a=Significantly different ($p<0.05$) from Emory River Reference Control Sediment (GLC Number: 8981)
Growth is average Ash-Free-Dry-Weight (AFDW) is the total ash-free-dry weight of surviving organisms
Biomass weight is the total Ash-Free-Dry-Weight of surviving organisms divided by the initial number of organisms

Table 12. **Summary of Statistically Significant Differences (p< 0.05) Between the Emory River Reference Control Sediment Sample and the Investigative Sediment Samples (ERM 0.5, ERM 0.8, ERM 1.0, ERM 2.5, ERM 3.0, ERM, 3.5, ERM 4.0, and ERM 5.5) for the Tennessee Valley Authority (TVA) Emory River *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted June 07-June 17, 2011.**

Sample ID GLC No.	10-Day Survival with Emory River Reference Control Sediment (GLC Number: 8981)	10-Day Growth with Emory River Reference Control Sediment (GLC Number: 8981)	10-Day Biomass with Emory River Reference Control Sediment (GLC Number: 8981)
ERM 0.5 GLC No.: 8982		**a**	
ERM 0.8 GLC No.: 8983			
ERM 1.0 GLC No.: 8984			
ERM 2.5 GLC No.: 8985	**a**	**a**	**a**
ERM 3.0 GLC No.: 8986	**a**	**a**	**a**
ERM 3.5 GLC No.: 8987	**a**	**a**	**a**
ERM 4.0 GLC No.: 8988		**a**	**a**
ERM 5.5 GLC No.: 8989	**a**	**a**	**a**

a=Significantly different (p<0.05) from Emory River Reference Control Sediment (GLC Number: 8981)
Growth is the average dry weight is the total dry weight of surviving organisms

Biomass weight is the total dry weight of surviving organisms divided by the initial number of organisms

Appendix A
Chain of Custodies

BIOMONITORING CHAIN OF CUSTODY RECORD

Page 1 of 1

COC No. BULKSED-052711-GLEC

Client: TVA

Project Name: KIF Ash Toxicity Study

Dates of Sample Collection:
052311, 052411, 052511

Location: Emory River (ERM0.5, ERM0.8, ERM1.0, ERM2.5, ERM3.0, ERM3.5, ERM4.0, ERM5.5, ERM8.0, ERM10.0)

Collected By: R. Josefczyk/RSI, L. Burton/RSI, D. Mathis/RSI, A. Johnson/RSI, T. Walls/RSI, G. Frye/RSI

Great Lakes Environmental Center (GLEC)
739 Hastings Street
Traverse City, MI 49686
Attn: Dennis McCauley
dmccauley@glec.com
231.941.2230
Cell 231.649.3740

Delivered By (Circle One):
FedEx UPS Bus Client (Courier)
Other (specify): Access America

General Comments:
Homogenized sediment from the Emory River.
Samples are in 5 gallon buckets filled with approximately 3 gallons in each bucket.
"EMORYREFERENCE" is a composite sample of ERM8.0 and ERM10.0.
Logbook:TVA-KIF-NTC-TOX-001,002,004

Field Identification / Sample Description	Grab/ Comp	Collection Date/Time		Number of Containers &	Depth (ft)	Rain Event? (Mark as Appropriate)				Laboratory Use (as applicable)				
						Yes	If Yes, Inches	No	Trace	Log #	Arrival Temp. (°C)	By	Time	Appearance
Example: BULKSED-ERM0.0-GLEC-052311	----	Date	Time	----	----									
BULKSED-ERM0.5-GLEC-052311	C	05/23/2011	0950	(2) 3 gallon	0.0-0.5	NA	NA	X	NA	5952	5.7 5.9	DS	1230	Cool
BULKSED-ERM0.8-GLEC-052311	C	05/23/2011	~~1042~~ 1145	(2) 3 gallon	0.0-0.5	NA	NA	X	NA	5953	5.1 5.9	DS	1300	Cool
BULKSED-ERM1.0-GLEC-052311	C	05/23/2011	0850	(2) 3 gallon	0.0-0.5	NA	NA	X	NA	5954	5.6 5.8	DS	1030	Cool
BULKSED-ERM2.5-GLEC-052311	C	05/23/2011	~~1145~~ 1042	(2) 3 gallon	0.0-0.5	NA	NA	X	NA	5955	5.4 5.7	DS	1040	Cool
BULKSED-ERM3.0-GLEC-052411	C	05/24/2011	0813	(2) 3 gallon	0.0-0.5	NA	NA	X	NA	5956	5.2 5.7	DS	1030	Cool
BULKSED-ERM3.5-GLEC-052411	C	05/24/2011	1111	(2) 3 gallon	0.0-0.5	NA	NA	X	NA	5957	5.0 5.1	DS	1210	Cool
BULKSED-ERM4.0-GLEC-052311	C	05/23/2011	1440	(2) 3 gallon	0.0-0.5	NA	NA	X	NA	5958	7.0-7.0	DS	1040	Cool
BULKSED-ERM5.5-GLEC-052411	C	05/24/2011	0955	(2) 3 gallon	0.0-0.5	NA	NA	X	NA	5959	4.3 5.7	DS	1040	Cool
BULKSED-EMORYREFERENCE-GLEC-052511	C	05/25/2011	0855 0905	(5) 3 gallon	0.0-0.5	NA	NA	X	NA	5951	4.8 5.5	DS	1200	Cool

Sample Custody – Fill In From Top Down

Relinquished By (Signature)/Affiliation:	Date/Time	Received By (Signature)/ Affiliation:	Date/Time
Ramona Josefczyk/RSI	05311/0810 ~~0851/0853~~	Jesse Mathis/RSI	05311/0810
Jesse Mathis/RSI	060211/1218		06/03/11 1200

Associated UPS Tracking #s (if applicable):
TVA custody lock: 001778. Intact

Client: TVA

Project Name: KIF Ash Toxicity Study

Date of Sample Collection: 06/02/2011

Location: ERM9.0

Collected By: R. Josefczyk (RSI), G. Schwartz (RSI), M. Greer (RSI), R. Vance (RSI), G. Frye (RSI), E. Arnold (RSI), J. Ross (Jacobs) Amber Stojak (Arcadis) A Johnson (RSI) T Walls (RSI)

Great Lakes Environmental Center (GLEC)
739 Hastings Street
Traverse City, MI 49686
Attn: Dennis McCauley
dmccauley@glec.com
231.941.2230
Cell 231.649.3740

Delivered By (Circle One): FedEx UPS Bus Client **(Courier)** Access America

Other (specify):_

General Comments:

Bulk Emory River reference water for sediment toxicity study collected in 2.5 gallon (10L) cubitainers.

Logbook: Batch A TVA-KIF-NTC-TOX-004

Field Identification / Sample Description	Grab/ Comp.	Collection Date	Collection Time	Number of Containers & Volume Collected	Depth (m)	Rain Event? Yes	If Yes, Inches	No	Trace	Log #	Arrival Temp. (°C)	By	Time	Appearance
BULKSW-ERM9.0-GLEC-060211	G	06/02/2011	0911	(50) 10L cubitainers	9.04	NA	NA	X	NA	5750	4.84	DS	[illegible]	[illegible] Temp outof Range 21-50

rj 060211

Sample Custody – Fill In From Top Down

Relinquished By (Signature)/Affiliation:	Date/Time	Received By (Signature)/Affiliation:	Date/Time
Ramona Josefczyk/RSI	060211/1100	Jesse Morris/RSI	060211/1100
Jesse Morris/RSI	060211/1218	[signature] GLEC	06/03/11 10:00

Associated UPS Tracking #s (if applicable):

TVA custody lock: 0011778 Intact

Sample
CHECK-IN FORM

CLIENT: TVA PROJECT NUMBER: 5069-00

INITIAL SAMPLE CHEMISTRY (UPON RECEIPT)

					INITIALS
DATE RECEIVED	6/3/11	6/3/11	6/3/11	6/3/11	DS
SAMPLE ID	ERM 9.0 Glac 060711	~~ERM 0.5~~ DS ERM Reference	ERM 0.5	ERM 0.8	DS
TYPE (W=water, SED=sediment, M=material)	W	SED	Sed	Sed	DS
COLLECTION (G=grab, C=composite)	G				DS
GLC NUMBER	8980	8981	8982	8983	DS
COLLECTION DATE (Time Interval)	6/2/11 9:11	05/25/11 8:55	05/23/11 9:50	05/23/11 11:45	DS
TEMPERATURE (≤6 degrees Celsius[1])	4.4-8.4 *	4.8-5.5	5.7-5.9	5.1-5.9	DS
SAMPLE DESCRIPTION / OBSERVATIONS (clarity, color, odor)	Clear, odorless *SEE TVA log Book - two 2L cubes out of temp range				DS

[1] If out of range see project manager

SAMPLE CHEMISTRY AT TEST TEMPERATURES

					INITIALS
GLC NUMBER					
TEMPERATURE (°C)					
pH (s.u.)					
DISSOLVED OXYGEN (mg/L)					
CONDUCTIVITY (μmhos/cm)					
HARDNESS (mg/L)					
ALKALINITY (mg/L)					
TOTAL CHLORINE (mg/L)*					
TOTAL AMMONIA (mg/L)* as N					

*Check with project manager to see if necessary.
NM: Not Measured, ND: Non-detect

Hardness: GLC#	Hardness: GLC#	Hardness: GLC#	Alkalinity: GLC#	Alkalinity: GLC#	Alkalinity: GLC#
End mL:	End mL:	End mL:	End mL:	End mL:	End mL:
Start mL:	Start mL:	Start mL:	Start mL:	Start mL:	Start mL:
mL used:	mL used:	mL used:	mL used:	mL used:	mL used:
Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:

Sample
CHECK-IN FORM

CLIENT: TVA PROJECT NUMBER: 5069-00

INITIAL SAMPLE CHEMISTRY (UPON RECEIPT)

DATE RECEIVED	6/3/11	6/3/11	6/3/11	DS	INITIALS
SAMPLE ID	ERM 1.0	2.5 ERM	3.0 ERM		
TYPE (W=water, SED=sediment, M=material)	Sed	Sed	Sed		
COLLECTION (G=grab, C=composite)					
GLC NUMBER	8984	8985	8986		
COLLECTION DATE (Time Interval)	5/23/11 8:50	5/23/11 10:42	5/24/11 8:13		
TEMPERATURE (≤6 degrees Celsius[1])	5.6-5.8	5.4 5.7	5.2 5.7		
SAMPLE DESCRIPTION / OBSERVATIONS (clarity, color, odor)					

[1] If out of range see project manager

SAMPLE CHEMISTRY AT TEST TEMPERATURES

GLC NUMBER					INITIALS
TEMPERATURE (°C)					
pH (s.u.)					
DISSOLVED OXYGEN (mg/L)					
CONDUCTIVITY (μmhos/cm)					
HARDNESS (mg/L)					
ALKALINITY (mg/L)					
TOTAL CHLORINE (mg/L)*					
TOTAL AMMONIA (mg/L)* as N					

*Check with project manager to see if necessary.

NM: Not Measured, ND: Non-detect

Hardness: GLC#	Hardness: GLC#	Hardness: GLC#	Alkalinity: GLC#	Alkalinity: GLC#	Alkalinity: GLC#
End mL:	End mL:	End mL:	End mL:	End mL:	End mL:
Start mL:	Start mL:	Start mL:	Start mL:	Start mL:	Start mL:
mL used:	mL used:	mL used:	mL used:	mL used:	mL used:
Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:

Sample
CHECK-IN FORM

CLIENT: TVA PROJECT NUMBER: 5069-00

INITIAL SAMPLE CHEMISTRY (UPON RECEIPT)

					INITIALS
DATE RECEIVED	6/3/11	6/3/11	6/3/11	DS	
SAMPLE ID	ERM 3.5	ERM 4.0	ERM 5.5		
TYPE (W=water, SED=sediment, M=material)	Sed	Sed	Sed		
COLLECTION (G=grab, C=composite)					
GLC NUMBER	8987	8988	8989		
COLLECTION DATE (Time Interval)	5/24/11 1110	5/23/11 1440	5/24/11 0955		
TEMPERATURE (≤6 degrees Celsius[1])	5.0 - 5.1	*7.0 - 7.0	*6.7 - 6.3		
SAMPLE DESCRIPTION / OBSERVATIONS (clarity, color, odor)		Out of RANGE TVA contacted *See TVA log book	out of RANGE TVA contacts *See TVA log book - nm		

[1] If out of range see project manager

SAMPLE CHEMISTRY AT TEST TEMPERATURES

					INITIALS
GLC NUMBER					
TEMPERATURE (°C)					
pH (s.u.)					
DISSOLVED OXYGEN (mg/L)					
CONDUCTIVITY (μmhos/cm)					
HARDNESS (mg/L)					
ALKALINITY (mg/L)					
TOTAL CHLORINE (mg/L)*					
TOTAL AMMONIA (mg/L)* as N					

*Check with project manager to see if necessary.
NM: Not Measured, ND: Non-detect

Hardness: GLC#	Hardness: GLC#	Hardness: GLC#	Alkalinity: GLC#	Alkalinity: GLC#	Alkalinity: GLC#
End mL:	End mL:	End mL:	End mL:	End mL:	End mL:
Start mL:	Start mL:	Start mL:	Start mL:	Start mL:	Start mL:
mL used:	mL used:	mL used:	mL used:	mL used:	mL used:
Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:

Sample Check-In Discrepancy/Comment Form

Project Name: TVA Emory River
Project Number: 5069-00 GLC Number: 8980
Date: 06/03/11 Date Sampled: 06/02/11
Technician Initials DS
Project Manager: Mw

Discrepancy: Please mark one or more of the following in the box below. Anomalies other than what is listed below can be described in the Comment Section.

Any questions associated with the samples (i.e., damaged containers, improper preservation, unlabeled/illegible sample labels, document discrepancies, insufficient sample volume) must be corrected prior to analysis by contacting the project manager, client and/or state authority. All correspondence shall be documented and discrepancies will be solved as quickly as possible.

Cooler Condition:

- ☐ Samples were not received on wet ice
- ☐ No temperature blank submitted
- ☒ Temperature of samples outside of acceptable range, or samples show evidence of freezing.

Container Label Condition:

- ☐ Not the same ID/info. as on COC
- ☐ Incomplete or missing information: sample ID, collection date/time
- ☐ Other: label smeared, torn, or otherwise illegible

Chain of Custody Discrepancies:

- ☐ No custody seal
- ☐ Custody seal not intact
- ☐ No relinquish signature or name
- ☐ No date/time relinquished
- ☐ No signature
- ☐ Incomplete information

Container Condition:

- ☐ Leaking
- ☐ Broken
- ☐ Loose caps, or without labels

Sample Documentation Discrepancies:

- ☐ Samples not received, but listed on COC
- ☐ Samples received, but not listed on COC
- ☐ Mislabeled toxicology tests, preservatives, etc.
- ☐ Holding time expired
- ☐ Insufficient quantity for analysis

Comments:

201 of 50 2.5 gal containers outside 0-6°C Range
Outside rang 6.1 - 8.4°C - See TVA logbook - mw

Corrective Actions: (*please use include dates and names when documenting*)

Emailed Rick Sherrard/TVA all samples are being held in the refrigerator. - all cubes out of temp are clearly labeled and kept separate. - will wait for further instruction from Rick. - mw 6/3/11 E-mail from Rick were approved use of the samples with the deviations in report. - mw 6/3/11

Laboratory Technician Signature: Date: 6/03/11

Project Manager/Laboratory Supervisor Signature: Date: 6/3/11

Sample Check-In Discrepancy/Comment Form

Project Name: TVA
Project Number: 5069-00 GLC Number: 8989, 8988
Date: 6/03/11 Date Sampled: 5/23/11 5/24/11
Technician Initials DS
Project Manager: [illegible]

Discrepancy: Please mark one or more of the following in the box below. Anomalies other than what is listed below can be described in the Comment Section.

Any questions associated with the samples (i.e., damaged containers, improper preservation, unlabeled/illegible sample labels, document discrepancies, insufficient sample volume) must be corrected prior to analysis by contacting the project manager, client and/or state authority. All correspondence shall be documented and discrepancies will be solved as quickly as possible.

Cooler Condition:

- ☐ Samples were not received on wet ice
- ☐ No temperature blank submitted
- ☒ Temperature of samples outside of acceptable range, or samples show evidence of freezing.

Container Label Condition:

- ☐ Not the same ID/info. as on COC
- ☐ Incomplete or missing information: sample ID, collection date/time
- ☐ Other: label smeared, torn, or otherwise illegible

Chain of Custody Discrepancies:

- ☐ No custody seal
- ☐ Custody seal not intact
- ☐ No relinquish signature or name
- ☐ No date/time relinquished
- ☐ No signature
- ☐ Incomplete information

Container Condition:

- ☐ Leaking
- ☐ Broken
- ☐ Loose caps, or without labels

Sample Documentation Discrepancies:

- ☐ Samples not received, but listed on COC
- ☐ Samples received, but not listed on COC
- ☐ Mislabeled toxicology tests, preservatives, etc.
- ☐ Holding time expired
- ☐ Insufficient quantity for analysis

Comments:
Both Buckets of 8988, & 8989 (ERM 4.0 & ERMS.5) were out of range 0-6°C
See TVA logbook - mw

Corrective Actions: *(please use include dates and names when documenting)*
Emailed Rick Sherrad @ TVA - all samples are being held in refrigeration until further instruction. 6/3/2011 - mw
Email from Rick; were approved use of samples; will note the durations in report - mw 6/3/11

Laboratory Technician Signature: [signature] Date: 06/03/11
Project Manager/Laboratory Supervisor Signature: [signature] Date: 06/03/11

COURIER TRANSPORT DOCUMENTATION

DATE: 06/02/2011

COURIER COMPANY:

Access America Transport

From:	To:
TVA c/o Jesse Morris 189 Lakeshore Drive Harriman, TN 37748 865-685-8364	Dennis McCauley dmccauley@glec.com Great Lakes Environmental Center (GLEC) 739 Hastings St. Traverse City, MI 49686 231.941.2230 Cell 231.649.3740

No. of Items:	Description:
71	50- 2.5-gal cubes of water (in 25 crates) 21- 5-gal buckets of sediment

Shippers Name/Company: Jesse Morris/RSI

Date / Time: 060211/1327

Courier Signature/Company: Robert Hulland Express 1

Date / Time: 6/2/11 13:27

Receipt Signature/Company:

Date / Time: 6/3/11 10:00

Corresponding Chains of Custody:

BULKSED-052711-GLEC page 1 of 1	
BULKSW-060211-GLEC page 1 of 1	

TVA custody lock: 00117778

Logbook TVA-KIF-NTC-TOX-004

CHAIN OF CUSTODY RECORD Page 1 of 1 COC No. BULKSW-ERM9.0-GLEC

Client: TVA

Project Name: KIF Ash Toxicity Study

Date of Sample Collection: 06/06/2011

Location: ERM9.0

Collected By: R. Josefczyk (RSI), E. Burton (RSI), G. Schwartz (RSI), A. Stojak (Arcadis), E. Arnold (RSI), R. Vance (RSI), T. Walls (RSI), E. Hickey (RSI), J. Ross (Jacobs), A. Johnson (RSI)

Great Lakes Environmental Center (GLEC)
739 Hastings Street
Traverse City, MI 49686
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dmccauley@glec.com
231.941.2230
Cell 231.649.3740

Delivered By (Circle One):
FedEx UPS Bus Client (Courier) Access America
Other (specify):_

General Comments:

Bulk Emory River reference water for sediment toxicity study collected in 2.5 gallon (10L) cubitainers.

Turbidity: 4.1-7.7 NTU 4m060711

Batch B

Field Identification / Sample Description	Grab/ Comp.	Collection Date/Time		Number of Containers & Volume Collected	Depth (m)	Rain Event? (Mark as Appropriate)				Laboratory Use (as applicable)				
		Date	Time			Yes	If Yes, Inches	No	Trace	Log #	Arrival Temp. (°C)	By	Time	Appearance
	----													
BULKSW-ERM9.0-GLEC-060611	G	06/06/2011	1349	(40) 10L cubitainers	9.50	—	—	X	—	8990	5.0-7.2 See TVA Log Book	DS	14:10	Good. Source Rain

45
060611

Sample Custody – Fill In From Top Down

Relinquished By (Signature)/Affiliation:	Date/Time	Received By (Signature)/Affiliation:	Date/Time
RSI	060611 / 1522	RSI	060611/1522
RSI	060711/0745	GLEC	06/08/11/14:10

Associated UPS Tracking #s (if applicable): NA

TVA Custody Lock: 0011452 Intact

Sample
CHECK-IN FORM

CLIENT: TVA PROJECT NUMBER: 5069-02

INITIAL SAMPLE CHEMISTRY (UPON RECEIPT)

					INITIALS
DATE RECEIVED	6/8/11			DJ	
SAMPLE ID	ERM 4.0				
TYPE (W=water, SED=sediment, M=material)	W				
COLLECTION (G=grab, C=composite)	G				
GLC NUMBER	8990				
COLLECTION DATE (Time Interval)	6/6/11 1349				
TEMPERATURE (≤6 degrees Celsius[1])	see TVA Log Book 5.0-7.2				
SAMPLE DESCRIPTION / OBSERVATIONS (clarity, color, odor)	Clear 8 out of RANGE				

[1] If out of range see project manager

SAMPLE CHEMISTRY AT TEST TEMPERATURES

					INITIALS
GLC NUMBER					
TEMPERATURE (°C)					
pH (s.u.)					
DISSOLVED OXYGEN (mg/L)					
CONDUCTIVITY (μmhos/cm)					
HARDNESS (mg/L)					
ALKALINITY (mg/L)					
TOTAL CHLORINE (mg/L)*					
TOTAL AMMONIA (mg/L)* as N					

*Check with project manager to see if necessary.
NM: Not Measured, ND: Non-detect

Hardness: GLC#	Hardness: GLC#	Hardness: GLC#	Alkalinity: GLC#	Alkalinity: GLC#	Alkalinity: GLC#
End mL:	End mL:	End mL:	End mL:	End mL:	End mL:
Start mL:	Start mL:	Start mL:	Start mL:	Start mL:	Start mL:
mL used:	mL used:	mL used:	mL used:	mL used:	mL used:
Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:

COURIER TRANSPORT DOCUMENTATION

DATE: 06/07/2011

COURIER COMPANY:

Access America Transport

From:	To:
TVA c/o Jesse Morris 189 Lakeshore Drive Harriman, TN 37748 865-685-8364	Dennis McCauley dmccauley@glec.com Great Lakes Environmental Center (GLEC) 739 Hastings St. Traverse City, MI 49686 231.941.2230 Cell 231.649.3740

No. of Items:	Description:
40	2.5-gal cubes of water (in 20 crates)

Shippers Name/Company: Jesse Morris/RSI

Date / Time: 060711/0818

Courier Signature/Company: Barbara Kiel EXPRESS-1

Date / Time: 6/7/11 0818

→ Receipt Signature/Company: [signature] Glec

Date / Time: 6/8/11 14:10

Corresponding Chains of Custody:

BULKSW-060611-GLEC page 1 of 1	

TVA Custody Lock: 001452

Sample Check-In Discrepancy/Comment Form

Project Name: TVA
Project Number: 5069-02 GLC Number: 8990
Date: 6/8/11 Date Sampled: 6/6/11 13:49
Technician Initials DS
Project Manager: Mailee W Ferrer

Discrepancy: Please mark one or more of the following in the box below. Anomalies other than what is listed below can be described in the Comment Section.

Any questions associated with the samples (i.e., damaged containers, improper preservation, unlabeled/illegible sample labels, document discrepancies, insufficient sample volume) must be corrected prior to analysis by contacting the project manager, client and/or state authority. All correspondence shall be documented and discrepancies will be solved as quickly as possible.

Cooler Condition:

- ☐ Samples were not received on wet ice
- ☐ No temperature blank submitted
- ☒ Temperature of samples outside of acceptable range, or samples show evidence of freezing.

Container Label Condition:

- ☐ Not the same ID/info. as on COC
- ☐ Incomplete or missing information: sample ID, collection date/time
- ☐ Other: label smeared, torn, or otherwise illegible

Chain of Custody Discrepancies:

- ☐ No custody seal
- ☐ Custody seal not intact
- ☐ No relinquish signature or name
- ☐ No date/time relinquished
- ☐ No signature
- ☐ Incomplete information

Container Condition:

- ☐ Leaking
- ☐ Broken
- ☐ Loose caps, or without labels

Sample Documentation Discrepancies:

- ☐ Samples not received, but listed on COC
- ☐ Samples received, but not listed on COC
- ☐ Mislabeled toxicology tests, preservatives, etc.
- ☐ Holding time expired
- ☐ Insufficient quantity for analysis

Comments: Temps of 8 cubes were above six degrees. 6.1 – 7.2°C ~~on~~ Made Mailee aware who called or emailed TVA.

– See TVA log book – MWG

Corrective Actions: (*please use include dates and names when documenting*)

Emailed Rick Sherrard @ TVA 6/8/11 concerning the temperature exceedance. Rick – email Reply ~~with~~ on 6/8/11 proceed w/use of samples and note deviation in Report.

Also note: temperature probe was checked against another probe and recorded in temp log book.

Laboratory Technician Signature: Date: 06/08/11

Project Manager/Laboratory Supervisor Signature: Mailee W Ferrer Date: 6/8/11

Appendix B
Overlying Water Quality Summaries

- Emory River Water
- *Chironomus dilutus*
- *Hyalella azteca*

Appendix B 1
Overlying Water Quality Summaries

- Emory River Water

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: Emory River Water (ERM 9.0)-Overlying water

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus and Hyalella azteca*
Data recorded in log book.

Chemisty Data for Emory River Water

Water ID	Date	Time	Temperature (°C)	D.O (s.u.)	pH (mg/L)	Spc (mmos)	Hardness (mg/L)	Alkalinity (mg/L)	Ammonia (mg/L)	Batch - GLC Number
Site	6/6/2011		22.9	8.4	7.38	110.1				8980
Site	6/7/2011	8:20	23.0	8.5	7.74	110.6	52	36	0.09J	8980
Site	6/8/2011	6:45	22.8	8.1	7.65	117.1				8980
Site	6/8/2011	20:15	22.7	8.4	7.74	112.4				8980
Site	6/9/2011	7:00	22.6	8.1	7.68	112.4				8980
Site	6/9/2011	15:00	23.0	8.8						8980
Site	6/9/2011	18:30	22.7	8.3						8980
Site	6/9/2011	23:15	22.8	8.3						8980
Site	6/10/2011	6:30	23.0	8.2	7.75	117.0				8980
Site	6/10/2011	18:30	22.9	8.0						8980
Site	6/11/2011	6:15	23.1	8.0	7.90	111.0				8980
Site	6/11/2011	15:30	23.3	8.3						8980
Site	6/11/2011	18:00	23.5	8.5						8980
Site	6/11/2011	23:15	23.5	8.3						8980
Site	6/12/2011	6:10	23.3	8.1	7.89	112.6				8980
Site	6/12/2011	12:00	22.8	8.0						8980
Site	6/12/2011	18:00	23.2	8.1						8980
Site	6/12/2011	23:30	23.2	8.2						8980
Site	6/13/2011	6:45	23.1	8.1	7.96	117.4	80	48	.06J	8980
Site	6/13/2011	23:59	23.3	7.5	7.98	111	48	34	.05J	8990
Site	6/14/2011	6:30	23.1	8.2	7.87	11.4				8990
Site	6/14/2011	14:00	23.1	8.7						8990
Site	6/14/2011	22:00	23.5	8.3						8990
Site	6/15/2011	6:45	23.2	8.3	7.63	111.8				8990
Site	6/15/2011	12:00	23.1							8990
Site	6/15/2011	18:15	23.3	8.2						8990
Site	6/15/2011	23:59	23.0	8.1						8990
Site	6/16/2011	6:40	23.1	8.2	7.7	114.2				8990
Site	6/16/2011	12:00	23.7							8990
Site	6/16/2011	19:00	22.7	7.9						8990
Site	6/16/2011	23:45	23.0	7.8						8990
Site	6/17/2011	8:15	23.1	8.2	7.47	114.8	56	38	.06J	8990
Site	6/17/2011	11:30	23.1	8.2						8990
Average:			23.1	8.2	7.74	106	59	39	0.07	

Appendix B 2
Overlying Water Quality Summaries

- *Chironomus dilutus*

Project Name: Tennessee Valley Authority
Project Number: 5069-02

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Data Entry

Date	Initials	Data Entry
15-Jun-11	DS	day 0-6
16-Jun-11	DS	day 7-9
6/20/2011	DS	Day 10 and survival
22-Jun-11	MWG	Day 10 Weight

QC

15-Jun-11	MLL		day 0-6
16-Jun-11	MLL		day 7-8
17-Jun-11	KN	10.0%	day 0-8
22-Jun-11	MWG		Day 9-10; Day 10 survival
22-Jun-11	DS		Day 10 Weight

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: Laboratory Water (Dechlor) Only Control

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	8.26	8.0	301.0	106	148	0.04	J	
		22.8	8.30	8.1	300.0					
8-Jun-11	1	22.8		4.9						
		22.8		4.8						
9-Jun-11	2	22.4		4.0						initiate 3rd renewal
		22.4		4.3						
10-Jun-11	3	22.9		4.1						disc. 3rd renewal
		22.9		4.1						
11-Jun-11	4	23.2		3.8						initiate 3rd renewal
		23.3		4.0						
12-Jun-11	5	23.1		5.1						initiate 4th renewal
		23.0		5.1						
13-Jun-11	6	23.1		6.2						4th renewal
		23.1		6.6						
14-Jun-11	7	23.0		6.5						3rd renewal
		22.8		6.6						
15-Jun-11	8	22.8		5.0						4th renewal
		22.8		4.7						
16-Jun-11	9	23.0		5.3						4th renewal
		23.1		5.1						
17-Jun-11	10	23.1	7.54	5.0	309.0	106	152	0.26		
		23.1	7.60	5.5	308.0					
Mean		**22.9**	**7.93**	**5.3**	**305**	**106**	**150**	**0.15**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.3**	**8.30**	**8.1**	**309**	**106**	**152**	**0.26**		
Min#		**22.4**	**7.54**	**3.8**	**300**	**106**	**148**	**0.04**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	9	10	10	10	10
Weight-AFDW (mg)	1.24800	0.98300	0.92500	0.91556	0.92800	0.84200	0.87000	0.77900
Biomass-AFDW (mg)	1.24800	0.98300	0.92500	0.82400	0.92800	0.84200	0.87000	0.77900

10-Day Percent Survival 98.8%
Avg. Weight-AFDW (mg) 0.93632
Avg. Biomass-AFDW (mg) 0.92488

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: Laboratory Sediment (Bd) w/Laboratory water (Dechlor) Control

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.7	7.57	5.8	340.0	126	164	0.57		
		22.8	7.56	5.6	347.0					
8-Jun-11	1	22.8		3.8						
		22.8		4.3						
9-Jun-11	2	22.3		2.6						initiate 3rd renewal
		22.4		2.4						
10-Jun-11	3	23.0		3.6						disc. 3rd renewal
		23.0		3.1						
11-Jun-11	4	23.3		2.3						initiate 3rd renewal
		23.3		3.4						
12-Jun-11	5	23.1		2.5						initiate 4th renewal
		23.0		2.7						
13-Jun-11	6	23.1		3.0						4th renewal
		23.1		4.8						
14-Jun-11	7	22.8		4.0						3rd renewal
		22.9		4.1						
15-Jun-11	8	22.8		2.1						4th renewal
		22.9		2.1						
16-Jun-11	9	23.1		2.6						4th renewal
		23.1		4.3						
17-Jun-11	10	23.1	7.49	2.7	319.0	120	152	0.24		
		23.0	7.47	2.7	320.0					
Mean		**22.9**	**7.52**	**3.4**	**332**	**123**	**158**	**0.41**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.3**	**7.57**	**5.8**	**347**	**126**	**164**	**0.57**		
Min#		**22.3**	**7.47**	**2.1**	**319**	**120**	**152**	**0.24**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	9	9	8	10	10	10
Weight-AFDW (mg)	1.22600	0.95300	0.90778	1.18667	0.77250	1.12900	1.22100	1.16700
Biomass-AFDW (mg)	1.22600	0.95300	0.81700	1.06800	0.61800	1.12900	1.22100	1.16700

10-Day Percent Survival 95.0%
Avg. Weight-AFDW (mg) 1.07037
Avg. Biomass-AFDW (mg) 1.02488

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: Laboratory Sediment(Bd) w/Site Emory River Water-ERM 9.0

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	7.50	5.5	279.9	64	88	0.66		
		22.7	7.51	5.8	268.2					
8-Jun-11	1	22.9		3.6						
		22.9		3.4						
9-Jun-11	2	22.6		4.0						initiate 3rd renewal
		22.6		3.0						
10-Jun-11	3	22.8		4.0						disc. 3rd renewal
		22.9		3.4						
11-Jun-11	4	23.3		2.7						initiate 3rd renewal
		23.3		1.9						
12-Jun-11	5	23.1		2.0						initiate 4th renewal
		23.1		2.3						
13-Jun-11	6	22.8		2.8						4th renewal
		23.1		2.3						DO at 1630: 2.6 mg/L
14-Jun-11	7	22.6		3.9						3rd renewal
		22.8		3.7						
15-Jun-11	8	23.0		2.0						4th renewal
		23.0		2.4						
16-Jun-11	9	23.0		2.9						4th renewal
		23.0		2.6						
17-Jun-11	10	23.2	7.66	2.8	145.1	60	76	0.28		
		23.2	7.69	3.1	145.0					
Mean		**22.9**	**7.59**	**3.2**	**210**	**62**	**82**	**0.47**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.3**	**7.69**	**5.8**	**280**	**64**	**88**	**0.66**		
Min#		**22.6**	**7.50**	**1.9**	**145**	**60**	**76**	**0.28**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	9	10	9	10	10	10	10
Weight-AFDW (mg)	1.03300	1.32556	1.16300	1.01000	1.16400	1.33700	1.01300	1.40100
Biomass-AFDW (mg)	1.03300	1.19300	1.16300	0.90900	1.16400	1.33700	1.01300	1.40100

10-Day Percent Survival 97.5%
Avg. Weight-AFDW (mg) 1.18082
Avg. Biomass-AFDW (mg) 1.15163

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: Emory Reference Sediment (GLC#8981)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.7	7.14	5.2	210.4	74	76	2.21		
		22.8	7.13	5.1	216.5					
8-Jun-11	1	22.9		3.5						
		22.9		3.9						
9-Jun-11	2	22.2		2.6						initiate 3rd renewal
		22.3		2.5						
10-Jun-11	3	23.0		3.7						disc. 3rd renewal
		22.9		3.5						
11-Jun-11	4	23.3		2.7						initiate 3rd renewal
		23.3		2.7						
12-Jun-11	5	23.0		2.7						initiate 4th renewal
		23.1		2.5						
13-Jun-11	6	22.9		2.9						4th renewal
		23.2		3.3						
14-Jun-11	7	22.8		3.7						3rd renewal
		22.9		4.1						
15-Jun-11	8	23.1		2.6						4th renewal
		23.0		2.5						
16-Jun-11	9	23.0		2.5						4th renewal
		23.0		2.5						
17-Jun-11	10	23.2	7.17	2.5	126.3	50	76	0.26		
		23.2	7.06	2.5	124.0					
Mean		**22.9**	**7.13**	**3.2**	**169**	**62**	**76**	**1.24**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.3**	**7.17**	**5.2**	**217**	**74**	**76**	**2.21**		
Min#		**22.2**	**7.06**	**2.5**	**124**	**50**	**76**	**0.26**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	9	10	10
Weight-AFDW (mg)	1.57500	1.17400	1.25500	1.49400	1.31400	1.34444	1.33800	1.24800
Biomass-AFDW (mg)	1.57500	1.17400	1.25500	1.49400	1.31400	1.21000	1.33800	1.24800

10-Day Percent Survival 98.8%
Avg. Weight-AFDW (mg) 1.34281
Avg. Biomass-AFDW (mg) 1.32600

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 0.5 (GLC#8982)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	7.31	5.8	136.5	52	68	0.65		
		22.8	7.35	5.8	136.4			0.70		
8-Jun-11	1	23.0		4.7						
		23.0		4.3						
9-Jun-11	2	22.3		2.8						initiate 3rd renewal
		22.3		2.9						
10-Jun-11	3	22.9		3.9						disc. 3rd renewal
		22.9		4.1						
11-Jun-11	4	23.3		3.5						initiate 3rd renewal
		23.3		2.8						
12-Jun-11	5	23.0		3.4						initiate 4th renewal
		23.1		3.3						
13-Jun-11	6	23.0		4.2						4th renewal
		23.1		4.5						
14-Jun-11	7	23.0		4.4						3rd renewal
		22.9		4.1						
15-Jun-11	8	23.0		3.1						4th renewal
		23.0		3.5						
16-Jun-11	9	23.2		3.3						4th renewal
		23.2		3.0						
17-Jun-11	10	23.1	7.11	3.2	124.5	40	68	0.23		
		23.0	7.18	3.4	125.4					
Mean		**23.0**	**7.24**	**3.8**	**131**	**46**	**68**	**0.53**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**3**		
Max #		**23.3**	**7.35**	**5.8**	**137**	**52**	**68**	**0.70**		
Min#		**22.3**	**7.11**	**2.8**	**125**	**40**	**68**	**0.23**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	10	10
Weight-AFDW (mg)	0.98600	0.95400	0.97300	1.09700	0.96900	0.95800	0.96300	1.03100
Biomass-AFDW (mg)	0.98600	0.95400	0.97300	1.09700	0.96900	0.95800	0.96300	1.03100

10-Day Percent Survival 100.0%
Avg. Weight-AFDW (mg) 0.99138
Avg. Biomass-AFDW (mg) 0.99138

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 0.8 (GLC#8983)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.7	7.33	5.4	134.3	50	64	0.39		
		22.8	7.31	5.4	133.1					
8-Jun-11	1	22.8		4.1						
		22.8		4.0						
9-Jun-11	2	22.3		3.1						initiate 3rd renewal
		22.3		2.5						
10-Jun-11	3	22.9		3.4						disc. 3rd renewal
		22.9		3.4						
11-Jun-11	4	23.3		3.3						initiate 3rd renewal
		23.3		2.4						
12-Jun-11	5	23.0		2.8						initiate 4th renewal
		23.0		2.5						
13-Jun-11	6	23.1		3.5						4th renewal
		23.1		3.1						
14-Jun-11	7	22.8		4.1						3rd renewal
		22.8		4.1						
15-Jun-11	8	23.0		3.1						4th renewal
		23.0		2.8						
16-Jun-11	9	23.1		2.6						4th renewal
		23.2		2.7						
17-Jun-11	10	23.1	7.15	3.2	126.2	40	68	0.21		
		23.0	7.18	2.9	124.6	42	68	0.20		
Mean		**22.9**	**7.24**	**3.4**	**130**	**44**	**67**	**0.27**		
Number		**22**	**4**	**22**	**4**	**3**	**3**	**3**		
Max #		**23.3**	**7.33**	**5.4**	**134**	**50**	**68**	**0.39**		
Min#		**22.3**	**7.15**	**2.4**	**125**	**40**	**64**	**0.20**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	7	9	10	10	10	10	10	10
Weight-AFDW (mg)	1.34714	1.19333	1.46300	1.17500	0.99400	1.09600	1.16667	0.98200
Biomass-AFDW (mg)	0.94300	1.07400	1.46300	1.17500	0.99400	1.09600	1.16667	0.98200

10-Day Percent Survival 95.0%
Avg. Weight-AFDW (mg) 1.17714
Avg. Biomass-AFDW (mg) 1.11171

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 1.0 (GLC#8984)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	7.24	5.5	141.7	50	72	0.38		
		22.8	7.28	5.5	134.1					
8-Jun-11	1	22.8		4.2						
		22.8		4.2						
9-Jun-11	2	22.3		2.8						initiate 3rd renewal
		22.3		3.0						
10-Jun-11	3	22.8		3.0						disc. 3rd renewal
		22.8		3.1						
11-Jun-11	4	23.1		2.3						initiate 3rd renewal
		23.1		2.8						
12-Jun-11	5	23.1		2.8						initiate 4th renewal
		23.0		2.8						
13-Jun-11	6	23.0		3.9						4th renewal
		22.9		3.5						
14-Jun-11	7	23.0		4.2						3rd renewal
		22.9		4.1						
15-Jun-11	8	23.0		2.9						4th renewal
		23.0		2.8						
16-Jun-11	9	23.0		2.8						4th renewal
		23.0		2.7						
17-Jun-11	10	23.0	7.22	2.7	129.5	42	72	0.22		
		23.0	7.20	3.1	123.8					
Mean		**22.9**	**7.24**	**3.4**	**132**	**46**	**72**	**0.30**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.1**	**7.28**	**5.5**	**142**	**50**	**72**	**0.38**		
Min#		**22.3**	**7.20**	**2.3**	**124**	**42**	**72**	**0.22**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	9	9	10	10
Weight-AFDW (mg)	1.50400	1.33700	1.13700	1.13600	1.29222	1.41889	1.22200	1.30100
Biomass-AFDW (mg)	1.50400	1.33700	1.13700	1.13600	1.16300	1.27700	1.22200	1.30100

10-Day Percent Survival 97.5%
Avg. Weight-AFDW (mg) 1.29351
Avg. Biomass-AFDW (mg) 1.25963

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 2.5 (GLC#8985)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	8.04	6.7	163.3	62	92	0.39		
		22.8	8.04	6.7	160.8			0.40		
8-Jun-11	1	22.8		5.3						
		22.9		5.1						
9-Jun-11	2	22.2		3.6						initiate 3rd renewal
		22.2		3.4						
10-Jun-11	3	22.7		4.2						disc. 3rd renewal
		22.7		4.1						
11-Jun-11	4	23.0		4.0						initiate 3rd renewal
		23.1		3.5						
12-Jun-11	5	23.0		4.1						initiate 4th renewal
		23.0		4.1						
13-Jun-11	6	22.9		5.2						4th renewal
		23.0		4.6						
14-Jun-11	7	22.8		5.1						3rd renewal
		22.8		4.9						
15-Jun-11	8	22.8		4.0						4th renewal
		22.8		3.9						
16-Jun-11	9	23.0		4.3						4th renewal
		23.0		4.6						
17-Jun-11	10	23.0	7.24	4.4	122.3	40	72	0.10		
		23.0	7.23	4.3	123.7					
Mean		**22.8**	**7.64**	**4.6**	**143**	**51**	**82**	**0.30**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**3**		
Max #		**23.1**	**8.04**	**6.7**	**163**	**62**	**92**	**0.40**		
Min#		**22.2**	**7.23**	**3.4**	**122**	**40**	**72**	**0.10**		

Replicate	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
# Surviving	4	8	8	7	8	6	7	8
Weight-AFDW (mg)	1.02750	0.65375	0.51625	0.88000	0.84000	1.16167	0.73571	0.81750
Biomass-AFDW (mg)	0.41100	0.52300	0.41300	0.61600	0.67200	0.69700	0.51500	0.65400

10-Day Percent Survival 70.0%
Avg. Weight-AFDW (mg) 0.82905
Avg. Biomass-AFDW (mg) 0.56263

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 3.0 (GLC#8986)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	7.35	5.9	134.0	46	64	0.38		
		22.8	7.34	5.9	131.8					
8-Jun-11	1	22.8		4.2						
		22.8		4.3						
9-Jun-11	2	22.2		2.4						initiate 3rd renewal
		22.2		2.6						
10-Jun-11	3	22.8		3.6						disc. 3rd renewal
		22.8		3.7						
11-Jun-11	4	23.1		2.7						initiate 3rd renewal
		23.0		2.5						
12-Jun-11	5	23.0		3.2						initiate 4th renewal
		23.0		3.0						
13-Jun-11	6	23.0		3.6						4th renewal
		23.0		3.4						
14-Jun-11	7	22.8		3.9						3rd renewal
		22.8		4.0						
15-Jun-11	8	22.7		3.3						4th renewal
		22.8		3.0						
16-Jun-11	9	22.8		3.1						4th renewal
		22.9		2.8						
17-Jun-11	10	22.8	7.16	3.1	124.5	40	72	0.11		
		22.8	7.23	3.6	121.7	40	68	0.12		
Mean		**22.8**	**7.27**	**3.5**	**128**	**42**	**68**	**0.20**		
Number		**22**	**4**	**22**	**4**	**3**	**3**	**3**		
Max #		**23.1**	**7.35**	**5.9**	**134**	**46**	**72**	**0.38**		
Min#		**22.2**	**7.16**	**2.4**	**122**	**40**	**64**	**0.11**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	10	10
Weight-AFDW (mg)	0.87000	1.05200	1.02500	1.01700	1.16900	1.18500	1.06800	1.20600
Biomass-AFDW (mg)	0.87000	1.05200	1.02500	1.01700	1.16900	1.18500	1.06800	1.20600

10-Day Percent Survival 100.0%
Avg. Weight-AFDW (mg) 1.07400
Avg. Biomass-AFDW (mg) 1.07400

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 3.5 (GLC#8987)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	7.79	6.3	140.1	48	68	0.22		
		22.8	7.81	6.5	140.2					
8-Jun-11	1	22.8		5.5						
		22.8		5.6						
9-Jun-11	2	22.3		3.9						initiate 3rd renewal
		22.3		3.6						
10-Jun-11	3	22.8		4.0						disc. 3rd renewal
		22.8		3.5						
11-Jun-11	4	23.0		3.5						initiate 3rd renewal
		23.0		3.5						
12-Jun-11	5	23.0		4.0						initiate 4th renewal
		23.0		4.3						
13-Jun-11	6	22.8		4.7						4th renewal
		22.9		5.3						
14-Jun-11	7	22.8		4.0						3rd renewal
		22.8		4.2						
15-Jun-11	8	22.7		4.2						4th renewal
		22.8		4.3						
16-Jun-11	9	23.1		4.3						4th renewal
		23.1		4.5						
17-Jun-11	10	22.9	7.27	4.8	120.8	38	64	0.06	J	
		22.8	7.26	4.8	120.6					
Mean		**22.8**	**7.53**	**4.5**	**130**	**43**	**66**	**0.14**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.1**	**7.81**	**6.5**	**140**	**48**	**68**	**0.22**		
Min#		**22.3**	**7.26**	**3.5**	**121**	**38**	**64**	**0.06**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	8	8	8	8	10	10	8
Weight-AFDW (mg)	1.02667	0.92750	0.86625	0.80000	1.02500	0.92500	0.92000	0.91000
Biomass-AFDW (mg)	1.02667	0.74200	0.69300	0.64000	0.82000	0.92500	0.92000	0.72800

10-Day Percent Survival 87.5%
Avg. Weight-AFDW (mg) 0.92505
Avg. Biomass-AFDW (mg) 0.81183

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 4.0 (GLC#8988)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	7.13	5.6	103.9	28	48	0.25		
		22.8	7.06	5.4	105.5					
8-Jun-11	1	22.7		4.5						
		22.7		4.2						
9-Jun-11	2	22.2		3.5						initiate 3rd renewal
		22.2		3.0						
10-Jun-11	3	22.8		3.3						disc. 3rd renewal
		22.9		4.0						
11-Jun-11	4	23.1		3.5						initiate 3rd renewal
		23.1		3.5						
12-Jun-11	5	23.0		3.4						initiate 4th renewal
		23.0		3.2						
13-Jun-11	6	23.0		4.8						4th renewal
		23.0		4.2						
14-Jun-11	7	22.8		4.7						3rd renewal
		22.8		4.7						
15-Jun-11	8	22.7		3.1						4th renewal
		22.8		3.0						
16-Jun-11	9	23.0		3.7						4th renewal
		23.0		3.6						
17-Jun-11	10	22.8	7.02	3.8	113.3	38	68	0.09	J	
		22.8	7.05	3.9	114.6					
Mean		**22.8**	**7.07**	**3.9**	**109**	**33**	**58**	**0.17**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.1**	**7.13**	**5.6**	**115**	**38**	**68**	**0.25**		
Min#		**22.2**	**7.02**	**3.0**	**104**	**28**	**48**	**0.09**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	10	10
Weight-AFDW (mg)	1.02400	0.95800	1.02600	0.81700	1.19400	1.11000	1.06900	0.97300
Biomass-AFDW (mg)	1.02400	0.95800	1.02600	0.81700	1.19400	1.11000	1.06900	0.97300

10-Day Percent Survival 100.0%
Avg. Weight-AFDW (mg) 1.02138
Avg. Biomass-AFDW (mg) 1.02138

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 5.5 (GLC#8989)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.7	7.13	5.3	129.8	42	52	1.05		
		22.8	7.14	5.3	127.4					
8-Jun-11	1	22.7		4.7						
		22.7		4.5						
9-Jun-11	2	22.2		3.5						initiate 3rd renewal
		22.2		3.6						
10-Jun-11	3	22.9		3.6						disc. 3rd renewal
		23.0		3.6						
11-Jun-11	4	23.0		3.3						initiate 3rd renewal
		23.0		3.1						
12-Jun-11	5	22.9		3.7						initiate 4th renewal
		23.0		3.5						
13-Jun-11	6	22.9		3.3						4th renewal
		22.8		3.9						
14-Jun-11	7	22.8		3.7						3rd renewal
		22.8		3.7						
15-Jun-11	8	22.7		3.4						4th renewal
		22.7		3.5						
16-Jun-11	9	22.9		2.8						4th renewal
		22.9		2.7						
17-Jun-11	10	22.8	7.04	3.3	118.3	34	60	0.24		
		22.8	7.06	3.8	116.9					
Mean		**22.8**	**7.09**	**3.7**	**123**	**38**	**56**	**0.65**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.0**	**7.14**	**5.3**	**130**	**42**	**60**	**1.05**		
Min#		**22.2**	**7.04**	**2.7**	**117**	**34**	**52**	**0.24**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	10	10
Weight-AFDW (mg)	1.21500	1.16000	1.02900	1.01300	1.18200	1.14200	1.13600	1.21000
Biomass-AFDW (mg)	1.21500	1.16000	1.02900	1.01300	1.18200	1.14200	1.13600	1.21000

10-Day Percent Survival 100.0%
Avg. Weight-AFDW (mg) 1.13588
Avg. Biomass-AFDW (mg) 1.13588

80 organisms weighed at test initiation
Avg. weight (mg) 0.19963

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Appendix B 3
Overlying Water Quality Summaries

- *Hyalella azteca*

Project Name: Tennessee Valley Authority
Project Number: 5069-02

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Data Entry

Date	Initials	Data Entry
15-Jun-11	DS	day 0-6
16-Jun-11	DS	day 7-9
6/20/2011	DS	Day 10 survival
22-Jun-11	MWG	Day 10 Weight

QC

15-Jun-11	MLL	100%	day 0-6
16-Jun-11	MLL	100%	day 7-8
17-Jun-11	KN	10.0%	day 0-8
22-Jun-11	MWG	100%	day 9-10; Day 10 Survival
22-Jun-11	DS	100.0%	day 10 weight

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: Laboratory Water (Dechlor) Only Control

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.7	8.34	7.4	296.7	106	148	0.04	J	
		22.7	8.41	7.3	296.5					
8-Jun-11	1	22.8		5.5						
		22.9		5.9						
9-Jun-11	2	22.5		6.4						
		22.7		6.5						
10-Jun-11	3	23.3		6.8						
		23.2		6.8						
11-Jun-11	4	23.6		7.0						
		23.6		7.0						
12-Jun-11	5	23.5		6.9						
		23.5		6.9						
13-Jun-11	6	23.3		6.8						
		23.3		7.1						
14-Jun-11	7	23.5		7.7						
		23.6		7.7						
15-Jun-11	8	23.1		6.5						
		23.2		6.6						
16-Jun-11	9	23.3		6.4						
		23.3		6.5						
17-Jun-11	10	22.8	7.47	7.0	311.0	106	156	0.29		
		23.0	7.52	6.9	308.0					
Mean		**23.2**	**7.94**	**6.8**	**303**	**106**	**152**	**0.17**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.6**	**8.41**	**7.7**	**311**	**106**	**156**	**0.29**		
Min#		**22.5**	**7.47**	**5.5**	**297**	**106**	**148**	**0.04**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	9	10	10
Weight-AFDW (mg)	0.10700	0.11800	0.12400	0.12300	0.11500	0.09000	0.12100	0.14000
Biomass-AFDW (mg)	0.10700	0.11800	0.12400	0.12300	0.11500	0.08100	0.12100	0.14000

10-Day Percent Survival 98.8%
Avg. Weight-AFDW (mg) 0.11725
Avg. Biomass-AFDW (mg) 0.11613

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: Laboratory Sediment (Bd) w/Laboratory water (Dechlor) Control

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.7	7.58	4.5	345.0	126	164	0.57		
		22.7	7.62	4.5	340.0					
8-Jun-11	1	22.8		4.4						
		22.9		4.1						
9-Jun-11	2	22.6		4.8						
		22.6		4.3						
10-Jun-11	3	23.2		4.1						
		23.2		5.1						
11-Jun-11	4	23.6		5.0						
		23.6		4.2						
12-Jun-11	5	23.5		5.1						
		23.5		5.1						
13-Jun-11	6	23.5		4.1						
		23.3		4.8						
14-Jun-11	7	23.2		4.9						
		23.3		4.5						
15-Jun-11	8	23.1		4.8						
		23.2		5.3						
16-Jun-11	9	23.2		5.0						
		23.2		4.7						
17-Jun-11	10	23.0	7.82	5.5	334.0	114	152	0.28		
		23.0	7.70	5.0	320.0					
Mean		**23.1**	**7.68**	**4.7**	**335**	**120**	**158**	**0.43**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.6**	**7.82**	**5.5**	**345**	**126**	**164**	**0.57**		
Min#		**22.6**	**7.58**	**4.1**	**320**	**114**	**152**	**0.28**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	9	10	10	10	10	10	10
Weight-AFDW (mg)	0.13400	0.14222	0.17100	0.14600	0.14700	0.12100	0.15600	0.12500
Biomass-AFDW (mg)	0.13400	0.12800	0.17100	0.14600	0.14700	0.12100	0.15600	0.12500

10-Day Percent Survival 98.8%
Avg. Weight-AFDW (mg) 0.14278
Avg. Biomass-AFDW (mg) 0.14100

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: Laboratory Sediment(Bd) w/Site Emory River Water-ERM 9.0

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.7	7.57	4.5	278.6	64	88	0.66		
		22.7	7.52	4.7	278.8					
8-Jun-11	1	22.8		4.5						
		22.8		4.7						
9-Jun-11	2	22.6		4.3						
		22.7		4.2						
10-Jun-11	3	23.3		4.3						
		23.2		3.9						
11-Jun-11	4	23.5		4.2						
		23.5		4.5						
12-Jun-11	5	23.5		4.2						
		23.5		4.0						
13-Jun-11	6	23.3		4.3						
		23.2		4.6						
14-Jun-11	7	23.1		4.4						
		23.3		4.6						
15-Jun-11	8	23.2		4.5						
		23.2		4.6						
16-Jun-11	9	23.1		3.8						
		23.1		4.1						
17-Jun-11	10	22.9	7.39	4.4	153.7	52	80	0.48		
		22.9	7.57	4.7	159.4					
Mean		**23.1**	**7.51**	**4.4**	**218**	**58**	**84**	**0.57**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.5**	**7.57**	**4.7**	**279**	**64**	**88**	**0.66**		
Min#		**22.6**	**7.39**	**3.8**	**154**	**52**	**80**	**0.48**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	9	10	10	10	10	10	9	10
Weight-AFDW (mg)	0.09667	0.10000	0.10200	0.11200	0.14200	0.11000	0.12000	0.18500
Biomass-AFDW (mg)	0.08700	0.10000	0.10200	0.11200	0.14200	0.11000	0.10800	0.18500

10-Day Percent Survival 97.5%
Avg. Weight-AFDW (mg) 0.12096
Avg. Biomass-AFDW (mg) 0.11825

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: Emory Reference Sediment (GLC#8981)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.7	7.28	5.2	224.1	74	76	2.21		
		22.7	7.25	5.1	211.4					
8-Jun-11	1	22.8		4.4						
		22.8		4.3						
9-Jun-11	2	22.7		4.3						
		22.7		4.1						
10-Jun-11	3	23.3		4.9						
		23.3		4.8						
11-Jun-11	4	23.5		5.1						
		23.5		4.9						
12-Jun-11	5	23.5		5.0						
		23.5		4.9						
13-Jun-11	6	23.3		4.8						
		23.2		4.9						
14-Jun-11	7	23.3		4.9						
		23.5		5.0						
15-Jun-11	8	23.2		4.5						
		23.3		4.4						
16-Jun-11	9	23.2		3.4						
		23.2		4.2						
17-Jun-11	10	22.9	7.49	3.7	152.1	42	60	0.32		
		22.9	7.54	3.4	147.7					
Mean		**23.1**	**7.39**	**4.6**	**184**	**58**	**68**	**1.27**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.5**	**7.54**	**5.2**	**224**	**74**	**76**	**2.21**		
Min#		**22.7**	**7.25**	**3.4**	**148**	**42**	**60**	**0.32**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	8	9	10	10	8
Weight-AFDW (mg)	0.10000	0.09800	0.11000	0.13500	0.13333	0.11200	0.12200	0.13125
Biomass-AFDW (mg)	0.10000	0.09800	0.11000	0.10800	0.12000	0.11200	0.12200	0.10500

10-Day Percent Survival 93.8%
Avg. Weight-AFDW (mg) 0.11770
Avg. Biomass-AFDW (mg) 0.10938

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 0.5 (GLC#8982)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	7.37	5.4	144.4	52	68	0.65		
		22.8	7.35	5.5	139.1			0.70		
8-Jun-11	1	22.8		4.3						
		22.8		4.2						
9-Jun-11	2	22.6		5.4						
		22.6		5.3						
10-Jun-11	3	23.3		5.4						
		23.3		5.4						
11-Jun-11	4	23.6		5.5						
		23.6		5.1						
12-Jun-11	5	23.5		5.2						
		23.5		5.3						
13-Jun-11	6	23.5		5.2						
		23.3		5.0						
14-Jun-11	7	23.3		5.9						
		23.5		5.7						
15-Jun-11	8	23.3		5.3						
		23.5		5.5						
16-Jun-11	9	23.3		5.3						
		23.3		4.8						
17-Jun-11	10	23.5	7.50	5.0	133.2	48	76	0.06	J	
		23.5	7.38	5.0	144.8					
Mean		**23.2**	**7.40**	**5.2**	**140**	**50**	**72**	**0.47**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**3**		
Max #		**23.6**	**7.50**	**5.9**	**145**	**52**	**76**	**0.70**		
Min#		**22.6**	**7.35**	**4.2**	**133**	**48**	**68**	**0.06**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	9	10	7	9	10	10	9	10
Weight-AFDW (mg)	0.11000	0.09800	0.07143	0.10444	0.08900	0.12500	0.08889	0.12700
Biomass-AFDW (mg)	0.09900	0.09800	0.05000	0.09400	0.08900	0.12500	0.08000	0.12700

10-Day Percent Survival 92.5%
Avg. Weight-AFDW (mg) 0.10172
Avg. Biomass-AFDW (mg) 0.09525

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 0.8 (GLC#8983)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	7.31	5.4	141.8	50	64	0.39		
		22.9	7.31	5.3	150.7					
8-Jun-11	1	22.9		4.8						
		23.0		5.1						
9-Jun-11	2	22.2		4.5						
		22.5		5.7						
10-Jun-11	3	23.3		5.0						
		23.3		4.2						
11-Jun-11	4	23.5		5.1						
		23.5		5.4						
12-Jun-11	5	23.5		4.8						
		23.5		4.7						
13-Jun-11	6	23.3		5.2						
		23.2		5.5						
14-Jun-11	7	23.3		4.9						
		23.3		5.3						
15-Jun-11	8	23.1		4.8						
		23.3		5.5						
16-Jun-11	9	23.2		4.7						
		23.2		6.2						
17-Jun-11	10	23.3	7.75	5.2	141.6	50	76	0.04	J	
		23.3	7.76	5.2	141.1	52	76	0.03	U	
Mean		**23.2**	**7.53**	**5.1**	**144**	**51**	**72**	**0.15**		
Number		**22**	**4**	**22**	**4**	**3**	**3**	**3**		
Max #		**23.5**	**7.76**	**6.2**	**151**	**52**	**76**	**0.39**		
Min#		**22.2**	**7.31**	**4.2**	**141**	**50**	**64**	**0.03**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	7	9	10	10	10	10
Weight-AFDW (mg)	0.12100	0.11000	0.13571	0.10667	0.11900	0.11700	0.09700	0.11900
Biomass-AFDW (mg)	0.12100	0.11000	0.09500	0.09600	0.11900	0.11700	0.09700	0.11900

10-Day Percent Survival 95.0%
Avg. Weight-AFDW (mg) 0.11567
Avg. Biomass-AFDW (mg) 0.10925

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 1.0 (GLC#8984)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.7	7.23	5.4	145.4	50	72	0.38		
		22.8	7.31	5.6	145.7					
8-Jun-11	1	23.0		5.1						
		23.0		4.9						
9-Jun-11	2	22.7		4.9						
		22.6		4.5						
10-Jun-11	3	23.2		4.8						
		23.2		5.0						
11-Jun-11	4	23.5		5.2						
		23.5		5.1						
12-Jun-11	5	23.5		5.2						
		23.5		5.0						
13-Jun-11	6	23.3		4.8						
		23.3		5.2						
14-Jun-11	7	23.3		5.3						
		23.5		5.3						
15-Jun-11	8	23.3		5.4						
		23.3		5.1						
16-Jun-11	9	23.2		5.1						
		23.3		5.8						
17-Jun-11	10	23.5	7.67	4.7	139.9	50	88	0.06	J	
		23.5	7.69	4.5	147.4					
Mean		**23.2**	**7.48**	**5.1**	**145**	**50**	**80**	**0.22**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.5**	**7.69**	**5.8**	**147**	**50**	**88**	**0.38**		
Min#		**22.6**	**7.23**	**4.5**	**140**	**50**	**72**	**0.06**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	7	8	10	8	10	10	8
Weight-AFDW (mg)	0.10000	0.08000	0.11875	0.10400	0.14000	0.16400	0.16000	0.08875
Biomass-AFDW (mg)	0.10000	0.05600	0.09500	0.10400	0.11200	0.16400	0.16000	0.07100

10-Day Percent Survival 88.8%
Avg. Weight-AFDW (mg) 0.11944
Avg. Biomass-AFDW (mg) 0.10775

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 2.5 (GLC#8985)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.9	8.00	6.5	166.0	62	92	0.39		
		22.8	8.04	6.3	172.8			0.40		
8-Jun-11	1	23.0		5.5						
		22.9		4.3						
9-Jun-11	2	22.6		6.1						
		22.6		5.9						
10-Jun-11	3	23.2		6.2						
		23.2		6.1						
11-Jun-11	4	23.5		6.3						
		23.6		6.3						
12-Jun-11	5	23.5		6.2						
		23.5		6.2						
13-Jun-11	6	23.5		6.4						
		23.5		6.1						
14-Jun-11	7	23.5		6.4						
		23.5		6.5						
15-Jun-11	8	23.3		6.4						
		23.5		6.5						
16-Jun-11	9	23.5		5.9						
		23.3		6.2						
17-Jun-11	10	23.3	7.51	6.3	127.6	42	68	0.05	J	
		23.3	7.50	6.2	128.7					
Mean		**23.3**	**7.76**	**6.1**	**149**	**52**	**80**	**0.28**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**3**		
Max #		**23.6**	**8.04**	**6.5**	**173**	**62**	**92**	**0.40**		
Min#		**22.6**	**7.50**	**4.3**	**128**	**42**	**68**	**0.05**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	5	2	5	4	7	3	6	6
Weight-AFDW (mg)	0.09200	0.09000	0.07200	0.07500	0.06571	0.08333	0.04833	0.04333
Biomass-AFDW (mg)	0.04600	0.01800	0.03600	0.03000	0.04600	0.02500	0.02900	0.02600

10-Day Percent Survival 47.5%
Avg. Weight-AFDW (mg) 0.07121
Avg. Biomass-AFDW (mg) 0.03200

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 3.0 (GLC#8986)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	7.35	5.5	135.2	46	64	0.38		
		22.8	7.36	6.0	132.7					
8-Jun-11	1	22.7		4.3						
		22.7		4.8						
9-Jun-11	2	22.5		5.0						
		22.6		5.0						
10-Jun-11	3	23.1		5.5						
		23.1		5.2						
11-Jun-11	4	23.6		5.4						
		23.6		5.4						
12-Jun-11	5	23.5		7.2						
		23.5		5.4						
13-Jun-11	6	23.3		5.7						
		23.3		5.6						
14-Jun-11	7	23.5		5.7						
		23.5		6.0						
15-Jun-11	8	23.2		5.5						
		23.2		5.6						
16-Jun-11	9	23.2		5.3						
		23.3		4.7						
17-Jun-11	10	23.3	7.65	5.1	142.5	48	80	0.04	J	
		23.3	7.72	4.9	137.8	50	72	0.02	U	
Mean		**23.2**	**7.52**	**5.4**	**137**	**48**	**72**	**0.15**		
Number		**22**	**4**	**22**	**4**	**3**	**3**	**3**		
Max #		**23.6**	**7.72**	**7.2**	**143**	**50**	**80**	**0.38**		
Min#		**22.5**	**7.35**	**4.3**	**133**	**46**	**64**	**0.02**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	4	6	3	3	4	6	6	7
Weight-AFDW (mg)	0.08500	0.09167	0.09333	0.09000	0.10500	0.10000	0.10500	0.11000
Biomass-AFDW (mg)	0.03400	0.05500	0.02800	0.02700	0.04200	0.06000	0.06300	0.07700

10-Day Percent Survival 48.8%
Avg. Weight-AFDW (mg) 0.09750
Avg. Biomass-AFDW (mg) 0.04825

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 3.5 (GLC#8987)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.7	7.80	6.7	142.6	48	68	0.22		
		22.7	7.84	6.6	148.9					
8-Jun-11	1	22.6		4.2						
		22.7		4.6						
9-Jun-11	2	22.5		6.1						
		22.5		6.1						
10-Jun-11	3	23.2		6.1						
		23.2		6.4						
11-Jun-11	4	23.5		6.2						
		23.5		6.0						
12-Jun-11	5	23.6		6.4						
		23.6		5.9						
13-Jun-11	6	23.3		6.4						
		23.5		6.4						
14-Jun-11	7	23.2		6.2						
		23.3		6.0						
15-Jun-11	8	23.3		6.6						
		23.5		6.4						
16-Jun-11	9	23.1		6.3						
		23.2		6.2						
17-Jun-11	10	23.5	7.56	6.5	128.5	40	68	0.02	U	
		23.5	7.46	5.8	126.3					
Mean		**23.2**	**7.67**	**6.1**	**137**	**44**	**68**	**0.12**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.6**	**7.84**	**6.7**	**149**	**48**	**68**	**0.22**		
Min#		**22.5**	**7.46**	**4.2**	**126**	**40**	**68**	**0.02**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	4	1	0	2	1	4	4	4
Weight-AFDW (mg)	0.07000	0.07000	*	0.09000	0.10000	0.08000	0.07500	0.10500
Biomass-AFDW (mg)	0.02800	0.00700	0.00000	0.01800	0.01000	0.03200	0.03000	0.04200

*** not used in statistical analysis, due to zero percent survival**

10-Day Percent Survival 25.0%
Avg. Weight-AFDW (mg) 0.08429
Avg. Biomass-AFDW (mg) 0.02088

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 4.0 (GLC#8988)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.7	7.11	5.6	103.5	28	48	0.25		
		22.7	7.08	5.7	104.8					
8-Jun-11	1	22.7		5.9						
		22.8		5.3						
9-Jun-11	2	22.5		4.9						
		22.5		5.0						
10-Jun-11	3	23.2		5.6						
		23.2		5.5						
11-Jun-11	4	23.6		5.5						
		23.6		5.3						
12-Jun-11	5	23.6		5.0						
		23.6		5.5						
13-Jun-11	6	23.5		5.4						
		23.5		5.5						
14-Jun-11	7	23.2		6.0						
		23.3		6.0						
15-Jun-11	8	23.5		5.8						
		23.6		5.8						
16-Jun-11	9	23.1		5.2						
		23.2		4.8						
17-Jun-11	10	23.0	7.49	5.5	124.2	40	64	0.03	U	
		23.1	7.57	5.9	128.4					
Mean		**23.2**	**7.31**	**5.5**	**115**	**34**	**56**	**0.14**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.6**	**7.57**	**6.0**	**128**	**40**	**64**	**0.25**		
Min#		**22.5**	**7.08**	**4.8**	**104**	**28**	**48**	**0.03**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	8	10	10	7	7	8	10
Weight-AFDW (mg)	0.11200	0.09875	0.09600	0.11400	0.09429	0.10143	0.09000	0.07000
Biomass-AFDW (mg)	0.11200	0.07900	0.09600	0.11400	0.06600	0.07100	0.07200	0.07000

10-Day Percent Survival 87.5%
Avg. Weight-AFDW (mg) 0.09706
Avg. Biomass-AFDW (mg) 0.08500

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Project Name: Tennessee Valley Authority
Project Number: 5069-02
Sample ID: ERM 5.5 (GLC#8989)

Test Dates: June 7-17, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (mmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
7-Jun-11	0	22.8	7.10	5.3	131.0	42	52	1.05		
		22.7	7.13	5.2	130.5					
8-Jun-11	1	22.7		5.7						
		22.8		5.3						
9-Jun-11	2	22.5		4.7						
		22.5		4.3						
10-Jun-11	3	23.2		5.7						
		23.2		5.8						
11-Jun-11	4	23.5		5.2						
		23.6		5.1						
12-Jun-11	5	23.6		5.1						
		23.6		5.3						
13-Jun-11	6	23.5		5.4						
		23.3		5.9						
14-Jun-11	7	23.3		6.2						
		23.3		6.0						
15-Jun-11	8	23.6		5.1						
		23.6		5.2						
16-Jun-11	9	23.1		5.2						
		23.1		5.1						
17-Jun-11	10	23.2	7.51	5.3	129.5	40	76	0.03	U	
		23.1	7.50	5.6	128.1					
Mean		**23.2**	**7.31**	**5.4**	**130**	**41**	**64**	**0.54**		
Number		**22**	**4**	**22**	**4**	**2**	**2**	**2**		
Max #		**23.6**	**7.51**	**6.2**	**131**	**42**	**76**	**1.05**		
Min#		**22.5**	**7.10**	**4.3**	**128**	**40**	**52**	**0.03**		

Replicate	1	2	3	4	5	6	7	8
# Surviving	7	6	8	8	8	9	6	7
Weight-AFDW (mg)	0.09000	0.08667	0.08875	0.08875	0.08375	0.07667	0.05167	0.09143
Biomass-AFDW (mg)	0.06300	0.05200	0.07100	0.07100	0.06700	0.06900	0.03100	0.06400

10-Day Percent Survival 73.8%
Avg. Weight-AFDW (mg) 0.08221
Avg. Biomass-AFDW (mg) 0.06100

80 organisms weighed at test initiation
Avg. weight (mg 0.02663

Ammonia Key:
MDL = 0.04
RL = Reporting Limit (lowest standard, 0.1)
J = Between MDL and RL
U = Below MDL (non detect)
NA = Not Applicable

Appendix C
Chironomus dilutus
10-Day Statistical Data

- Survival
- Weight

QC'd by: Nww

TVA 5069-02

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: Dechlor water (GLW) with Silica Sand	Test Photoperiod: 16:8
Sample ID: GLW-Water only exposure	Test System: 175mL Manual Delivery
Test Species: *Chironomus dilutus*	Test Temperature: 23± 1°C
Date Addition of Sediment: 6/6/11	Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)
Test Initiation Date: 6/7/11	Test Termination Date: 6/17/2011

Test Day: Day 10	Number Daily Renewals: 9/7/a
Date: 6/17/11	☒ D3 8:00 renewal time/Initials ☐ renewal time/Initials
Overlying Water: Dechlor	☐ renewal time/Initials ☐ renewal time/Initials
Overlying Water Batch ID (GLC Number): NA	Food: TFS# (4g/L) ☐ Feed 1.5 ml/replicate
	Screens Cleaned: ☐ yes ☒ no ☐ n/a

& 1400 Nww chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	— — Nww 1015
1					152	106	0.26	10 /10
2					end: 31.8	end: 8.6		10 /10
3					start: 28.0	start: 3.3		10 /10
4					Titrant used (mL): 3.8	Titrant used (mL): 5.3		9 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		10 /10
6								10 /10
7	23.1	7.54	5.0	309				10 /10
8	23.1	7.60	5.5	308				10 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 98.8%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

TVA 5069-02

QC'd by: MW

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: Dechlor water (GLW) with Boardman Sediment Lab Control (LCS)	Test Photoperiod: 16:8
Sample ID: LCS + GLW--Sediment Lab Control	Test System: 175mL Manual Delivery
Test Species: *Chironomus dilutus*	Test Temperature: 23± 1°C
Date Addition of Sediment: 6/6/11	Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)
Test Initiation Date: 6/7/11	Test Termination Date: 6/17/2011

Test Day: Day 10	Number Daily Renewals: 1
Date: 6/17/11	~~6/15~~ 8:00 renewal time/Initials ☐ ——— renewal time/Initials
Overlying Water: Dechlor	☐ ——— renewal time/Initials ☐ ——— renewal time/Initials
Overlying Water Batch ID (GLC Number): NA	Food: TFS# (4g/L) ——— ☐ Feed 1.5 ml/replicate
	Screens Cleaned: ☐ yes ☒ no ☐ n/a

~~X~~ 1000 MW chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	4.0	4	6	113	—	4	8	— MW 1035
1					152	120	0.24	10 /10
2					end: 35.6	end: 14.6		10 /10
3					start: 31.8	start: 8.6		9 /10
4					Titrant used (mL): 3.8	Titrant used (mL): 6.0		9 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		8 /10
6								10 /10
7	23.1	7.49	2.7	319				10 /10
8	23.0	7.47	2.7	320				10 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(S_1 - S_2)}{(S_1 + S_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 95.0%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

QC'd by: NWS

TVA 5069-02

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: Site water (ERW 9.0) with Boardman Sediment Lab Control (LCS)	Test Photoperiod: 16:8
Sample ID: LCS + ERW	Test System: 175mL Manual Delivery
Test Species: *Chironomus dilutus*	Test Temperature: 23± 1°C
Date Addition of Sediment: 6/6/11	Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)
Test Initiation Date: 6/7/11	Test Termination Date: 6/17/2011

Test Day: Day 10

Date: 6/17/11 NWS 9/7/11

Overlying Water: ~~Dechlor~~ K Site Water ERW 9.0 (ERW)

Overlying Water Batch ID (GLC Number): 8990 NWS 9/7/11

Number Daily Renewals: 1

XDS 8:00 renewal time/Initials ☐ — renewal time/Initials

☐ — renewal time/Initials ☐ — renewal time/Initials

Food: TFS# (4g/L) — ☐ Feed 1.5 ml/replicate

Screens Cleaned: ☐ yes ☒ no ☐ n/a

600 NWS chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	— NWS 1110
1					76	60	0.28	10 /10
2					end: 37.5	end: 17.6		9 /10
3					start: 35.6	start: 14.6		10 /10
4					Titrant used (mL): 1.9	Titrant used (mL): 3.0		9 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		10 /10
6								10 /10
7	23.2	7.66	2.8	145.1				10 /10
8	23.2	7.69	3.1	145.0				10 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 97.5%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

QC'd by: [illegible]

TVA 5069-02

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8981 (ERS + ERW)
Sample ID: ERS + ERW 9.0 (Emory Reference)
Test Species: *Chironomus dilutus*
Date Addition of Sediment: 6/6/11
Test Initiation Date: 6/7/11

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)
Test Termination Date: 6/17/2011

Test Day: Day 10
Date: 6/17/11
Overlying Water: ERM 9.0 Site Water (ERW)
Overlying Water Batch ID (GLC Number): 8990

Number Daily Renewals: [illegible] 9/7/11 2 [illegible] 6/13/11
RDS 8:00 renewal time/Initials ☐ [illegible] renewal time/Initials
☐ [illegible] renewal time/Initials ☐ [illegible] renewal time/Initials
Food: TFS# (4g/L) [illegible] ☐ Feed 1.5 ml/replicate
Screens Cleaned: ☐ yes ☒ no ☐ n/a

☒ 0600 mw chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$ ☒	Alkalinity mg/L $CaCO_3$ ☒	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	— mw 1/14/5
1					76	50	0.26	10/10
2					end: 39.4	end: 20.1		10/10
3					start: 37.5	start: 17.6		10/10
4					Titrant used (mL): 1.9	Titrant used (mL): 2.5		10/10
5					Sample volume (mL): 25	Sample volume (mL): 50		10/10
6								9/10
7	23.2	7.17	2.5	126.3				10/10
8	23.2	7.06	2.5	124.0				10/10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:
RL = Reporting Limit (0.10 mg/L).
MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.
J = ≥ MDL and < RL.
U = Below MDL.

% Survival: ~~100~~ 98.8% mw 6/23/11

KEY:
AV: Animals Visible
NAV: No Animals Visible
FOV: Foreign Organism Visible

QC'd by: MW

TVA 5069-02

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

[redacted]

GLC#: 8982
Sample ID: ERM 0.5
Test Species: *Chironomus dilutus*
Date Addition of Sediment: 6/6/11
Test Initiation Date: 6/7/11

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)
Test Termination Date: 6/17/2011

Test Day: Day 10
Date: 6/17/11
Overlying Water: ERM 9.0 Site Water (ERW)
Overlying Water Batch ID (GLC Number): 8990

Number Daily Renewals: 2 9/7/11
X DS 8:00 renewal time/Initials X DS 1:30 renewal time/Initials
□ ——— renewal time/Initials □ ——— renewal time/Initials
Food: TFS# (4g/L) ——— □ Feed 1.5 ml/replicate
Screens Cleaned: □ yes X no □ n/a

X Ps 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	— 1210
1					68	40	0.23	10 /10
2					end: 41.1	end: 24.4		10 /10
3					start: 39.4	start: ~~20.1~~ 22.4		10 /10
4					Titrant used (mL): 1.7	Titrant used (mL): 2.0		10 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		10 /10
6								10 /10
7	23.1	7.11	3.2	124.5				10 /10
8	23.0	7.18	3.4	125.4				10 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(S_1 - S_2)}{(S_1 + S_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:
RL = Reporting Limit (0.10 mg/L).
MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.
J = ≥ MDL and < RL.
U = Below MDL.

% Survival: 100%

KEY:
AV: Animals Visible
NAV: No Animals Visible
FOV: Foreign Organism Visible

QC'd by: MW

TVA 5069-02

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

[redacted]

GLC#: 8983	Test Photoperiod: 16:8
Sample ID: ERM 0.8	Test System: 175mL Manual Delivery
Test Species: *Chironomus dilutus*	Test Temperature: 23± 1°C
Date Addition of Sediment: 6/6/11	Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)
Test Initiation Date: 6/7/11	Test Termination Date: 6/17/2011

Test Day: Day 10	Number Daily Renewals: 4 DS 5/18/11 2
Date: 6/17/11	✗ DS 8:00 renewal time/Initials ✗ DS 11:30 renewal time/Initials
Overlying Water: ERM 9.0 Site Water (ERW)	☐ ——— renewal time/Initials ☐ ——— renewal time/Initials
Overlying Water Batch ID (GLC Number): 8990	Food: TFS# (4g/L) ——— ☐ Feed 1.5 ml/replicate
	Screens Cleaned: ☐ yes ✗ no ☐ n/a

✗ DS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	———	4	8	———
1					68	40	0.21	7 /10
2					end: 42.8	end: 26.4	0.20	9 /10
3					start: 41.1	start: 24.4		tm 10 /10
4					Titrant used (mL): 1.7	Titrant used (mL): 2.0		10 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		10 /10
6								10 /10
7	23.1	7.15	3.2	126.2				1 pupa + 9 /10
8	23.0	7.18	2.9	124.6				10 /10

MW 1225

Duplicate

Hard	Alk
68	42
36.5	23.3
34.8	21.2
1.7	2.1

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 95%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

QC'd by: NWR

TVA 5069-02

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8984
Sample ID: ERM 1.0
Test Species: *Chironomus dilutus*
Date Addition of Sediment: 6/6/11
Test Initiation Date: 6/7/11

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)
Test Termination Date: 6/17/2011

Test Day: Day 10
Date: 6/17/11
Overlying Water: ERM 9.0 Site Water (ERW)
Overlying Water Batch ID (GLC Number): 8990

Number Daily Renewals: 4 DS 9/20/11 2
DS 8:00 renewal time/Initials — DS 11:30 renewal time/Initials
□ ____ renewal time/Initials — □ ____ renewal time/Initials
Food: TFS# (4g/L) ____ □ Feed 1.5 ml/replicate
Screens Cleaned: □ yes ☒ no □ n/a

DS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	—
1					72	42	0.22	10 /10
2					end: 44.6	end: 28.6		10 /10
3					start: 42.8	start: 26.5		10 /10
4					Titrant used (mL): 1.8	Titrant used (mL): 2.1		10 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		9 /10
6								9 /10
7	23.0	7.22	2.7	129.5				10 /10
8	23.0	7.20	DS 9/21/11 3.1	123.8				10 /10

NWR 1245

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:
RL = Reporting Limit (0.10 mg/L).
MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.
J = ≥ MDL and < RL.
U = Below MDL.

% Survival: 97.5%

KEY:
AV: Animals Visible
NAV: No Animals Visible
FOV: Foreign Organism Visible

QC'd by: Mut

TVA 5069-02

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8985	Test Photoperiod: 16:8
Sample ID: ERM 2.5	Test System: 175mL Manual Delivery
Test Species: *Chironomus dilutus*	Test Temperature: 23± 1°C
Date Addition of Sediment: 6/6/11	Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)
Test Initiation Date: 6/7/11	Test Termination Date: 6/17/2011

Test Day: Day 10	Number Daily Renewals: 2
Date: 6/17/11	~~DS~~ 8:00 renewal time/Initials ~~1900~~ DS 11:30 renewal time/Initials
Overlying Water: ERM 9.0 Site Water (ERW)	□ renewal time/Initials □ renewal time/Initials
Overlying Water Batch ID (GLC Number): 8990	Food: TFS# (4g/L) □ Feed 1.5 ml/replicate
	Screens Cleaned: □ yes ☒ no □ n/a

~~DS~~ 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	—
1					72	40	0.10	4 /10
2					end: 46.4	end: 30.7		8 /10
3					start: 44.6	start: 28.7		8 /10
4					Titrant used (mL): 1.8	Titrant used (mL): 2.0		7 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		8 /10
6								6 /10
7	23.0	7.24	4.4	122.3				7 /10
8	23.0	7.23	4.3	123.7				8 /10

Meter 1305

all on top of sediment layer did not Burrow, wrapped in thin sediment cocoon.

Relative % Difference: RPD ≤15%

$$RPD = \left| \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \right| \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 70.0%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

QC'd by: Nwk

TVA 5069-02

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

[redacted]

GLC#: 8986 Nwk 9/9/11

Sample ID: ERM 3.0

Test Species: *Chironomus dilutus*

Date Addition of Sediment: 6/6/11

Test Initiation Date: 6/7/11

Test Photoperiod: 16:8

Test System: 175mL Manual Delivery

Test Temperature: 23± 1°C

Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)

Test Termination Date: 6/17/2011

Test Day: Day 10

Date: 6/17/11

Overlying Water: ERM 9.0 Site Water (ERW)

Overlying Water Batch ID (GLC Number): 8990

Number Daily Renewals: 2

☒ DS 9:00 renewal time/Initials ☒ DS 11:30 renewal time/Initials

☐ ——— renewal time/Initials ☐ ——— renewal time/Initials

Food: TFS# (4g/L) ——— ☐ Feed 1.5 ml/replicate

Screens Cleaned: ☐ yes ☒ no ☐ n/a

☒ DS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	TFS MW
1					72	40	0.11	10/10
2					end: 48.2	end: 32.7	0.12	10/10
3					start: 46.4	start: 30.7		10/10
4					Titrant used (mL): 1.8	Titrant used (mL): 2.0		10/10
5					Sample volume (mL): 25	Sample volume (mL): 50		10/10
6								10/10
7	22.8	7.16	3.1	124.5				MW 11/11 10/10
8	22.8	7.23	3.6	121.1				10/10

Duplicate	Hard	Alk
1	68	40
2	38.2	34.8
3	36.5	32.8
4	1.7	2.0

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 100%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

TVA 5069-02

QC'd by: MW

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

[redacted]

GLC#: 8987	Test Photoperiod: 16:8
Sample ID: ERM 3.5	Test System: 175mL Manual Delivery
Test Species: *Chironomus dilutus*	Test Temperature: 23± 1°C
Date Addition of Sediment: 6/6/11	Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)
Test Initiation Date: 6/7/11	Test Termination Date: 6/17/2011

Test Day: Day 10	Number Daily Renewals: 2
Date: 6/17/11	☒ DS 8:00 renewal time/Initials ☒ DS 11:30 renewal time/Initials
Overlying Water: ERM 9.0 Site Water (EW)	☐ — renewal time/Initials ☐ — renewal time/Initials
Overlying Water Batch ID (GLC Number): 8990	Food: TFS# (4g/L) — ☐ Feed 1.5 ml/replicate
	Screens Cleaned: ☐ yes ☐ no ☐ n/a

☒ MW 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	— MW
1					64	38	0.062	9+1 pupae /10
2					end: 1.8	end: 34.7		8 /10
3					start: 0.2	start: 32.8		8 /10
4					Titrant used (mL): 1.6	Titrant used (mL): 1.9		8 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		8 /10
6								10 /10
7	22.9	7.27	4.8	120.8				10 /10
8	22.8	7.26	4.8	120.6				8 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 87.5%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

QC'd by: MW

TVA 5069-02

[redacted]

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8988	Test Photoperiod: 16:8
Sample ID: ERM 4.0	Test System: 175mL Manual Delivery
Test Species: *Chironomus dilutus*	Test Temperature: 23± 1°C
Date Addition of Sediment: 6/6/11	Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)
Test Initiation Date: 6/7/11	Test Termination Date: 6/17/2011

Test Day: Day 10	Number Daily Renewals: 2
Date: 6/17/11	☒ DS 8:00 renewal time/Initials ☒ DS 11:30 renewal time/Initials
Overlying Water: ERM 9.0 Site Water (ERW)	☐ ——— renewal time/Initials ☐ ——— renewal time/Initials
Overlying Water Batch ID (GLC Number): 8990	Food: TFS# (4g/L) ——— Feed 1.5 ml/replicate
	Screens Cleaned: ☐ yes ☒ no ☐ n/a

☒ DS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	4.0	4	6	113	—	4	8	— 1400
1					68	38	0.09	10 /10
2					end: 3.5	end: 40.1		10 /10
3					start: 1.8	start: ~~34.8~~ 38.2 KB 6/8/11		10 /10
4					Titrant used (mL): 1.7	Titrant used (mL): 1.9		10 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		10 /10
6								10 /10
7	22.8	7.02	3.8	113.3				10 /10
8	22.8	7.09	3.9	114.6				10 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 100%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

QC'd by: DMS

TVA 5069-02

Chironomus dilutus 10-Day Survival and Growth Whole Sediment Toxicity Test

[redacted]

GLC#: 8989	Test Photoperiod: 16:8
Sample ID: ERM 5.5	Test System: 175mL Manual Delivery
Test Species: *Chironomus dilutus*	Test Temperature: 23± 1°C
Date Addition of Sediment: 6/6/11	Test Organism Source/Age: ABS - 12 days old (hatch 5/26/11)
Test Initiation Date: 6/7/11	Test Termination Date: 6/17/2011

Test Day: Day 10	Number Daily Renewals: 2
Date: 6/17/11	☒ DS 8:00 renewal time/Initials ☒ DS 11:30 renewal time/Initials
Overlying Water: ERM 9.0 Site Water (ELW)	☐ ——— renewal time/Initials ☐ ——— renewal time/Initials
Overlying Water Batch ID (GLC Number): 8990	Food: TFS# (4g/L) ——— ☐ Feed 1.5 ml/replicate
	Screens Cleaned: ☐ yes ☑ no ☐ n/a

☒ DS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$ ☒	Alkalinity mg/L $CaCO_3$ ☒	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	4.0	4	DS 6 9/8/11	113	—	4	8	— mur 1475
1					60	34	0.24	10 /10
2					end: 5.0	end: 41.8		10 /10
3					start: 3.5	start: 40.1		10 /10
4					Titrant used (mL): 1.5	Titrant used (mL): 1.7		10 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		10 /10
6								10 /10
7	22.8	7.04	3.3	118.3				10 /10
8	22.8	7.06	3.8	116.9				10 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 100%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

GLEC

TVA Emory

10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: Test day 8

Test Species: *C. dilutus*

Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: 5069-082 new

Weigh Date: 6/10 & 6/11/2011

Balance AE240

Technician's Initials: MWS

Test Date: 6/7/2011 - 6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/8/2011 1400
Date/Time out: 6/9/2011 1400

Dessicator
Date/Time in: 6/9/2011 1400
Date/Time out: 6/10/2011 1200

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/10/11 1400
Date/Time out: 6/10/11 1800

Dessicator
Date/Time in: 6/10/11 1800
Date/Time out: 6/11/11 1200

QC'd by:

Sample ID	Replicate Number	**A** Number of Organisms at Test Initiation	**B** Dry Weight of Pan and Organisms (g)	**C** Ashed Weight of Pan and Organisms (g)	**B-C** Total Ash-Free Dry Weight (g)	**D** Number of Organisms Weighed	**B-C/D** Average Ash-Free Dry Weight (mg)	**B-C/A** Biomass Weight (mg)
Sample ID:	—	—	0.862261	0.846664	0.01597	80	0.19963	—
GLEC Number:								
day 8 test Org.								
						AVERAGE:		

GLEC
Great Lakes Environmental Center

10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: GLW | Test Species: *C. dilutus* | Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02 | Weigh Date: 6/19/2011 | 6/20/11

Technician's Initials: MWS | Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~ 24 hrs
Date/Time in: 6/17/11 1560
Date/Time out: 6/18/11 1505

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out: 6/19/11 0730

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 1945 6/20/11

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A Biomass * Weight (mg)
Sample ID: GLW	1	10	0.83900	0.82652	0.01248	10	1.24800	1.24800
	2	10	0.86387	0.85404	0.00983	10	0.98300	0.98300
GLEC Number: N/A	3	10	0.83007	0.82082	0.00925	10	0.92500	0.92500
	4	10	0.82748	0.81924	0.00824	9	0.91556	0.82400
	5	10	0.84043	0.83114	0.00928	10	0.92800	0.92800
	6	10	0.83066	0.82224	0.00842	10	0.84200	0.84200
	7	10	0.84512	0.83642	0.00870	10	0.87000	0.87000
	8	10	0.83759	0.82980	0.00779	10	0.77900	0.77900
						AVERAGE:	0.93633	0.92487

* There were no pupae or midges observed on Day 10. Therefore, there was no change in biomass weight.

GLEC
Great Lakes Environmental Center

10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: LCS + GLW
Test Species: *C. dilutus*
Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02
Weigh Date: 6/19/2011 & 6/20/11

Technician's Initials: MWG
Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~ 24 hrs
Date/Time in: 6/17/11 1500
Date/Time out: 6/18/11 1505 MWG 9/1/11

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out: 6/19/11 0740

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 6/20/11 1450

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A Biomass* Weight (mg)
Sample ID: LCS + GLW	1	10	0.83303	0.82076	0.01226	10	1.22600	1.22600
	2	10	0.83189	0.82236	0.00953	10	0.95300	0.95300
GLEC Number: N/A	3	10	0.83777	0.82960	0.00817	9	0.90778	0.81700
	4	10	0.83406	0.82338	0.01068	9	1.18667	1.06800
	5	10	0.82896	0.82278	0.00618	8	0.77250	0.61800
	6	10	0.83295	0.82166	0.01129	10	1.12900	1.12900
	7	10	0.82233 (4 MWG 9/1/11)	0.83012	0.01221	10	1.22100	1.22100
	8	10	0.83812	0.82645	0.01167	10	1.16700	1.16700
						AVERAGE:	1.07037	1.02488

* There were no pupae or midges observed on Day 10. Therefore, there was no change in Biomass Weight.

GLEC
Great Lakes Environmental Center

10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: LCS + ERW Test Species: *C. dilutus* Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02 Weigh Date: 6/19/2011 & 6/20/11

Technician's Initials: RWW Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 1500
Date/Time out: 6/18/11 1505

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out: 6/19/11 0745

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 6/20/11 1455
RWW 9/7/11

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A Biomass * Weight (mg)
Sample ID: LCS + ERW	1	10	0.83823	0.82790	0.01033	10	1.03300	1.03300
	2	10	0.84065	0.82872	0.01193	9	1.32556	1.19300
GLEC Number: N/A	3	10	0.83750	0.82587	0.01163	10	1.16300	1.16300
	4	10	0.83535	0.82626	0.00909	9	1.01000	0.90900
	5	10	0.82435	0.81271	0.01183	10	1.18300	1.16400
	6	10	0.83138	0.81801	0.01337	10	1.33700	1.33700
	7	10	0.83360	0.82347	0.01013	10	1.01300	1.01300
	8	10	0.83776	0.82375	0.01401	10	1.40100	1.40100
						AVERAGE:	1.18082	1.15163

* There were no pupae or midges observed on Day 10. Therefore, there was no change in biomass weight.

GLEC
Great Lakes Environmental Center

10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: ERS + ERW Test Species: *C. dilutus* Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02 Weigh Date: 6/19/2011 & 6/20/11

Technician's Initials: NWS Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 1500
Date/Time out: 6/28/11 1505

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out: 6/19/11 0750

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 6/20/11 1500

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A * Biomass Weight (mg)
Sample ID: ERS + ERW	1	10	0.84263	0.82688	0.01575	10	1.57500	1.57500
	2	10	0.83519	0.82345	0.01174	10	1.17400	1.17400
GLEC Number: 8981	3	10	0.84510	0.83255	0.01255	10	1.25500	1.25500
	4	10	0.84428	0.82934	0.01494	10	1.49400	1.49400
	5	10	0.85294	0.83980	0.01314	10	1.31400	1.31400
	6	10	0.84743	0.83533	0.01210	9	1.34444	1.21000
	7	10	0.84407	0.83069	0.01338	10	1.33800	1.33800
	8	10	0.83961	0.82713	0.01248	10	1.24800	1.24800
						AVERAGE:	1.34281	1.32600

* Biomass - There were no pupae or midges observed on Day 10. Therefore, there was no change in biomass weight

9/7/11 NWS

1.32600 - NWS 9/23/11

Great Lakes Environmental Center

10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: Elm 0.5 Test Species: *C. dilutus* Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02 Weigh Date: 6/19/2011 & 6/20/11

Technician's Initials: MW Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~ 24 hrs
Date/Time in: 6/17/11 1500
Date/Time out: 6/18/11 1505

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out: 6/19/11 0753

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 6/20/11 1504

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A Biomass * Weight (mg)
Sample ID: Elm 0.5 GLEC Number: 8982	1	10	0.84266	0.83280	0.00986	10	0.98600	0.98600
	2	10	0.84431	0.83477	0.00954	10	0.95400	0.95400
	3	10	0.84503	0.83530	0.00973	10	0.97300	0.97300
	4	10	0.84305	0.83208	0.01097	10	NW 9/11/14 01.09700	1.09700
	5	10	0.83570	0.82601	0.00969	10	0.96900	0.96900
	6	10	0.84276	0.83318	0.00958	10	0.95800	0.95800
	7	10	0.83835	0.82872	0.00963	10	0.96300	0.96300
	8	10	0.84346	0.83315	0.01031	10	NW 9/11/14 01.03100	1.03100
						AVERAGE:	0.99137	0.99137

* There were no pupae or midges observed on Day 10. Therefore, there was no change in biomass weight.

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10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: ERM 0.8 Test Species: *C. dilutus* Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02 Weigh Date: 6/19/2011 & 6/20/11

Technician's Initials: DWS Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~ 24 hrs
Date/Time in: 6/17/11 1500
Date/Time out: 6/18/11 1505

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out: 6/19/11 0755

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 6/20/11 1509

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A Biomass Weight (mg)	E Number of pupae and midges @ day 10	(B-C)/(A-E) * Biomass Weight (mg)
Sample ID: ERM 0.8 GLEC Number: 8983	1	10	0.84263	0.83320	0.00943	7	1.34714	0.94300	0	0.94300
	2	10	0.84742	0.83668	0.01074	9	1.19333	1.07400	0	1.07400
	3	10	0.84783	0.83320	0.01463	10	1.46300	1.46300	0	1.46300
	4	10	0.84518	0.83343	0.01175	10	1.17500	1.17500	0	1.17500
	5	10	0.84458	0.83464	0.00994	10	0.99400	0.99400	0	0.99400
	6	10	0.84518	0.83422	0.01096	10	1.09600	1.09600	0	1.09600
	7	10	0.84605	0.83555	0.01050	9	1.16667	1.05000	1	1.16667
	8	10	0.84374	0.83392	0.00982	10	0.98200	0.98200	0	0.98200
						AVERAGE:	1.17714	1.09713		

* Biomass Weight (mg) - defined as the total Ash free-Dry-Weight of surviving organisms divided by the initial number of organisms minus pupae and midges - as per Rick Sherrard.

GLEC
Great Lakes Environmental Center

10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: ERM 1.0 Test Species: *C. dilutus* Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02 Weigh Date: 6/19/2011 & 6/20/11

Technician's Initials: MW Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~ 24 hrs
Date/Time in: 6/17/11 1500
Date/Time out: 6/18/11 1505

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out: 6/19/11 0800

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 6/20/11 1513

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID: ERM 1.0	1	10	0.85580	0.84076	0.01504	10	1.50400	1.50400
	2	10	0.84526	0.83189	0.01337	10	1.33700	1.33700
GLEC Number: 8984	3	10	0.84417	0.83280	0.01137	10	1.13700	1.13700
	4	10	0.84837	0.83696	0.01136 mw 9/7/11	10	1.13600	1.13600
	5	10	0.84430	0.83267	0.01163	9	1.29222	1.16300
	6	10	0.84989	0.83712	0.01277	9	1.41889	1.27700
	7	10	0.85470	0.84248	0.01222	10	1.22200	1.22200
	8	10	0.84738	0.83437	0.01301	10	1.30100	1.30100
						AVERAGE:	1.29351	1.25963

* There were no pupae or midges observed on Day 10. Therefore, there was no change in biomass weight.

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Great Lakes Environmental Center

10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: ERM 2.5 Test Species: *C. dilutus* Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02 Weigh Date: 6/19/2011 & 6/20/11

Technician's Initials: MWS Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 1500
Date/Time out: 6/18/11 1505

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out 6/19/11 0805

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 6/20/11 1516

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A Biomass * Weight (mg)
Sample ID: ERM 2.5 GLEC Number: 8985	1	10	0.82738	0.82327	0.00411	4	1.02750 MWS wrong column 9/7/11	0.41100
	2	10	0.82922	0.82399	0.00523	8	0.65375 *	0.52300
	3	10	0.83500	0.83087	0.00413	8	0.51625 *	0.41300
	4	10	0.83217	0.82601	0.00616	7	0.88000 *	0.61600
	5	10	0.83230	0.82558	0.00672	8	0.84000 *	0.67200
	6	10	0.84147	0.83450	0.00697	6	1.16167 *	0.69700
	7	10	0.83868	0.83353	0.00515 MWS 9/7/11	7	0.73571 *	0.51500
	8	10	0.84359	0.83705	0.00654	8	0.81750 *	0.65400
						AVERAGE:	0.82905	0.51263

* there were no pupae or midges observed on Daylo. Therefore, there was no change in biomass weight.

* MWS - wrong column. 9/7/11

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Great Lakes Environmental Center

10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: ERM 3.0 Test Species: *C. dilutus* Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02 Weigh Date: 6/19/2011 i, 6/20/11

Technician's Initials: MW Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 1500
Date/Time out: 6/18/11 1505

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out: 6/19/11 810

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 6/20/11 1520

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A Biomass* Weight (mg)
Sample ID: ERM 3.0 GLEC Number: 8986	1	10	0.84730	0.83860	0.00870	10	0.87000	0.87000
	2	10	0.84350	0.83298	0.01052	10	9/7/11 1.05200	1.05200
	3	10	0.84647	0.83622	0.01025	10	1.02500	1.02500
	4	10	0.85417	0.84400	0.01017	10	1.01700	1.01700
	5	10	0.85338	0.84169	0.01169	10	1.16900	1.16900
	6	10	0.86750	0.85565	0.01185	10	1.18500	1.18500
	7	10	0.85849	0.84781	0.01068	10	1.06800	1.06800
	8	10	0.85157	0.83951	0.01206	10	1.20600	1.20600
						AVERAGE:	1.07400	1.07400

* There were no pupae or midges observed on Day 10. Therefore, there was no change in biomass weight.

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Great Lakes Environmental Center

10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: ERM 3.5 Test Species: *C. dilutus* Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02 Weigh Date: 6/19/2011 & 6/20/11

Technician's Initials: NWS Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~ 24 hrs
Date/Time in: 6/17/11 1500
Date/Time out: 6/18/11 1505

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out: 6/19/11 0815

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 6/20/11 1524

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A Biomass Weight (mg)	E Number of pupae and midges (days)	(B-C)/(A-E) *Biomass weight (mg)
Sample ID: ERM 3.5 GLEC Number: 8987	1	10	0.83727	0.82803	0.00924	9	1.02667	0.92400	1	1.02667
	2	10	0.84562	0.83820	0.00742	8	0.92750	0.74200	0	~~0.92750~~ 0.74200
	3	10	0.84800	0.84107	0.00693	8	0.86625	0.69300	0	~~0.86625~~ 0.69300
	4	10	0.84164	0.83524	0.00640	8	0.80000	0.64000	0	~~0.80000~~ 0.64000
	5	10	0.83920	0.83100	0.00820	8	1.02500	0.82000	0	~~1.02500~~ 0.82000
	6	10	0.83670	0.82695	0.00925	10	0.92500	0.92500	0	0.92500
	7	10	0.84317	0.83397	0.00920	10	0.92000	0.92000	0	0.92000
	8	10	0.83440	0.82712	0.00728	8	0.91000	0.72800	0	0.72800
						AVERAGE:	0.92505	0.79900		

* Biomass weight (mg) = defined as the total Ash Free Dry Weight of surviving divided by the initial number of organisms minus pupae and midges - as per Rick Sterrard.

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10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: EPm 4.0 Test Species: *C. dilutus* Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02 Weigh Date: 6/19/2011 & 6/20/11

Technician's Initials: hwr Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~ 24 hrs
Date/Time in: 6/17/11 1500
Date/Time out: 6/18/11 1505

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out: 6/19/11 0818

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 6/20/11 1527

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A Biomass * Weight (mg)
Sample ID: EPm 4.0	1	10	0.83657	0.82633	0.01024	10	1.02400	1.02400
	2	10	0.83984	0.83026	0.00958	10	0.95800	0.95800
GLEC Number: 8988	3	10	0.84502	0.83476	0.01026	10	1.02600	1.02600
	4	10	0.83570	0.82753	0.00817	10	0.81700	0.81700
	5	10	0.84973	0.83779	0.01194	10	1.19400	1.19400
	6	10	0.85040	0.83930	0.01110	10	1.11000	1.11000
	7	10	0.85569	0.84500	0.01069	10	1.06900	1.06900
	8	10	0.84515	0.83542	0.00973	10	0.97300	0.97300
						AVERAGE:	1.02138	1.02138

* there were no pupae or midges observed on Day 10. Therefore, there was no change in biomass weight.

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Great Lakes Environmental Center

10-Day *Chironomous dilutus* WEIGHT DATA

Sample ID: ERM 5-5 Test Species: *C. dilutus* Type/Model of Drying Oven: Blue M/ Muffle Furnance

Project Name: TVA Emory River 5069-02 Weigh Date: 6/19/2011 & 6/20/11

Technician's Initials: MWR Test Date: 6/7/2011-6/17/2011

Oven Temperature: 60 °C
Drying Duration (Hours): ~ 24 hrs
Date/Time in: 6/17/11 1500
Date/Time out: 6/18/11 1505

Dessicator
Date/Time in: 6/18/11 1505
Date/Time out: 6/19/11 822

Oven Temperature: 550 °C
Drying Duration (Hours): 2 hrs
Date/Time in: 6/20/11 1100
Date/Time out: 6/20/11 1300

Dessicator
Date/Time in: 6/20/11 1345
Date/Time out: 6/20/11 1530

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Ashed Weight of Pan and Organisms (g)	B-C Total Ash-Free Dry Weight (g)	D Number of Organisms Weighed	B-C/D Average Ash-Free Dry Weight (mg)	B-C/A Biomass * Weight (mg)
Sample ID: ERM 5-5	1	10	0.84057	0.82842	0.01215	10	1.21500	1.21500
	2	10	0.84314	0.83154	0.01160	10	1.16000	1.16000
GLEC Number: 8989	3	10	0.84203	0.83174	0.01029	10	1.02900	1.02900
	4	10	0.85287	0.84274	0.01013	10	1.01300	1.01300
	5	10	0.84755	0.83573	0.01182	10	1.18200	1.18200
	6	10	0.83748	0.82606	0.01142	10	1.14200	1.14200
	7	10	0.83467	0.82331	0.01136	10	1.13600	1.13600
	8	10	0.84533	0.83323 3hrs 9/14	0.01210	10	1.21000	1.21000
						AVERAGE:	1.13588	1.13588

* there were no pupae or midges observed on Day 10. Therefore, there was no change in biomass weight.

Chironomus dilutus 10d Survival and Growth Test-10-Day Survival

Start Date:	6/7/2011	Test ID:	emconcd	Sample ID:	-LCS
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:		Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus

Comments: LCS=Lab Control Sediment; ERW=Emory River Water; GLW=GLEC Lab Water

Conc-	1	2	3	4	5	6	7	8
GLW	1.0000	1.0000	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000
LCS + GLW	1.0000	1.0000	0.9000	0.9000	0.8000	1.0000	1.0000	1.0000
LCS + ERW	1.0000	0.9000	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
GLW	0.9875	1.0395	1.3916	1.2490	1.4120	4.140	8		
LCS + GLW	0.9500	1.0000	1.3332	1.1071	1.4120	8.799	8	*	
LCS + ERW	0.9750	1.0263	1.3713	1.2490	1.4120	5.501	8	73.00	51.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.78132	0.887	-1.192	0.36101
F-Test indicates equal variances (p = 0.27)	2.41781	8.88539		
The control means are not significantly different (p = 0.23)	1.26562	2.14479		
Hypothesis Test (1-tail, 0.05)				
Wilcoxon Two-Sample Test indicates no significant differences				
Treatments vs LCS + GLW				

Chironomus dilutus 10d Survival and Growth Test-10-Day Growth (AFDW)

Start Date:	6/7/2011	Test ID:	emconcd	Sample ID:	-LCS
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:		Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus

Comments: LCS=Lab Control Sediment; ERW=Emory River Water; GLW=GLEC Lab Water

Conc-	1	2	3	4	5	6	7	8
GLW	1.2480	0.9830	0.9250	0.9156	0.9280	0.8420	0.8700	0.7790
LCS + GLW	1.2260	0.9530	0.9078	1.1867	0.7725	1.1290	1.2210	1.1670
LCS + ERW	1.0330	1.3256	1.1630	1.0100	1.1640	1.3370	1.0130	1.4010

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
GLW	0.9363	0.8748	0.9363	0.7790	1.2480	14.995	8			
LCS + GLW	1.0704	1.0000	1.0704	0.7725	1.2260	15.876	8	*		
LCS + ERW	1.1808	1.1032	1.1808	1.0100	1.4010	13.337	8	-1.348	1.761	0.1443

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.91345		0.887		-0.3442	-1.224
F-Test indicates equal variances (p = 0.85)	1.16435		8.88539			
The control means are not significantly different (p = 0.11)	1.71998		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates no significant differences Treatments vs LCS + GLW	0.14428	0.13479	0.0488	0.02684	0.19895	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Biomass (AFDW)

Start Date:	6/7/2011	Test ID: emconcd	Sample ID: -LCS
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:		Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: LCS=Lab Control Sediment; ERW=Emory River Water; GLW=GLEC Lab Water

Conc-	1	2	3	4	5	6	7	8
GLW	1.2480	0.9830	0.9250	0.8240	0.9280	0.8420	0.8700	0.7790
LCS + GLW	1.2260	0.9530	0.8170	1.0680	0.6180	1.1290	1.2210	1.1670
LCS + ERW	1.0330	1.1930	1.1630	0.9090	1.1640	1.3370	1.0130	1.4010

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
GLW	0.9249	0.9024	0.9249	0.7790	1.2480	15.782	8			
LCS + GLW	1.0249	1.0000	1.0249	0.6180	1.2260	21.048	8	*		
LCS + ERW	1.1516	1.1237	1.1516	0.9090	1.4010	14.332	8	-1.320	1.761	0.1691

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9497		0.887		-0.6394	-0.1763
F-Test indicates equal variances (p = 0.50)	1.70813		8.88539			
The control means are not significantly different (p = 0.30)	1.08594		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates no significant differences Treatments vs LCS + GLW	0.16914	0.16504	0.06426	0.03689	0.20806	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Survival

Start Date:	6/7/2011	Test ID: em0.5cd TVA Emory	Sample ID: -ERM 0.5
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0000	0.9000	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000
ERS +ERW	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000	1.0000
ERM 0.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	0.9873	1.3713	1.2490	1.4120	5.501	8			
ERS +ERW	0.9875	1.0000	1.3916	1.2490	1.4120	4.140	8	*		
ERM 0.5	1.0000	1.0127	1.4120	1.4120	1.4120	0.000	8	-1.000	1.895	0.0386

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.4689	0.887	-3.5489	13.5047
Equality of variance cannot be confirmed				
The control means are not significantly different (p = 0.55)	0.60698	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Heteroscedastic t Test indicates no significant differences	0.01492	0.0154	0.00166	0.00166	0.33428	1, 14
Treatments vs ERS +ERW						

Chironomus dilutus 10d Survival and Growth Test-10-Day Growth (AFDW)

Start Date:	6/7/2011	Test ID:	em0.5cd TVA Emory
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064
Comments:	ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water		

Sample ID:	-ERM 0.5							
Sample Type:	-WHOLE SEDIMENT							
Test Species:	CDIL-Chironomus dilutus							

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.3256	1.1630	1.0100	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.3444	1.3380	1.2480
ERM 0.5	0.9860	0.9540	0.9730	1.0970	0.9690	0.9580	0.9630	1.0310

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1808	0.8794	1.1808	1.0100	1.4010	13.337	8			
ERS +ERW	1.3428	1.0000	1.3428	1.1740	1.5750	9.865	8	*		
*ERM 0.5	0.9914	0.7383	0.9914	0.9540	1.0970	4.958	8	7.035	1.761	0.0880

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.90849	0.887	0.90862	1.47315
F-Test indicates equal variances (p = 0.02)	7.26338	8.88539		
The control means are significantly different (p = 0.04)	2.22641	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.08798	0.06552	0.49401	0.00998	5.9E-06	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Biomass (AFDW)

Start Date:	6/7/2011	Test ID:	em0.5cd TVA Emory
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064
Comments:	ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water		

Sample ID:	-ERM 0.5							
Sample Type:	-WHOLE SEDIMENT							
Test Species:	CDIL-Chironomus dilutus							

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.1930	1.1630	0.9090	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.2100	1.3380	1.2480
ERM 0.5	0.9860	0.9540	0.9730	1.0970	0.9690	0.9580	0.9630	1.0310

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1516	0.8685	1.1516	0.9090	1.4010	14.332	8			
ERS +ERW	1.3260	1.0000	1.3260	1.1740	1.5750	10.596	8	*		
*ERM 0.5	0.9914	0.7476	0.9914	0.9540	1.0970	4.958	8	6.358	1.761	0.0927

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9063	0.887	1.11481	1.46192
F-Test indicates equal variances (p = 0.01)	8.17262	8.88539		
The control means are significantly different (p = 0.04)	2.27534	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.0927	0.06991	0.4479	0.01108	1.8E-05	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Survival

Start Date:	6/7/2011	Test ID: em0.8cd TVA Emory	Sample ID: -ERM 0.8
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refernce Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0000	0.9000	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000
ERS +ERW	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000	1.0000
ERM 0.8	0.7000	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

			Transform: Arcsin Square Root					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	0.9873	1.3713	1.2490	1.4120	5.501	8			
ERS +ERW	0.9875	1.0000	1.3916	1.2490	1.4120	4.140	8	*		
ERM 0.8	0.9500	0.9620	1.3390	0.9912	1.4120	11.328	8	0.917	1.761	0.1010

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.65666	0.887	-2.4242	6.38524
F-Test indicates equal variances (p = 0.02)	6.93111	8.88539		
The control means are not significantly different (p = 0.55)	0.60698	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs ERS +ERW	0.04472	0.04619	0.01107	0.01317	0.37468	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Growth (AFDW)

Start Date:	6/7/2011	Test ID: em0.8cd TVA Emory	Sample ID: -ERM 0.8
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refernce Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.3256	1.1630	1.0100	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.3444	1.3380	1.2480
ERM 0.8	1.3471	1.1933	1.4630	1.1750	0.9940	1.0960	1.1667	0.9820

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1808	0.8794	1.1808	1.0100	1.4010	13.337	8			
ERS +ERW	1.3428	1.0000	1.3428	1.1740	1.5750	9.865	8	*		
*ERM 0.8	1.1771	0.8766	1.1771	0.9820	1.4630	13.966	8	2.219	1.761	0.1315

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.92769	0.887	0.60387	-0.3669
F-Test indicates equal variances (p = 0.58)	1.54041	8.88539		
The control means are significantly different (p = 0.04)	2.22641	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.13147	0.09791	0.10978	0.02229	0.04349	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Biomass (AFDW)

Start Date:	6/7/2011	Test ID: em0.8cd	Sample ID: -ERM 0.8
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Ref Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.1930	1.1630	0.9090	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.2100	1.3380	1.2480
ERM 0.8	0.9430	1.0740	1.4630	1.1750	0.9940	1.0960	1.1667	0.9820

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1516	0.8685	1.1516	0.9090	1.4010	14.332	8			
ERS +ERW	1.3260	1.0000	1.3260	1.1740	1.5750	10.596	8	*		
*ERM 0.8	1.1117	0.8384	1.1117	0.9430	1.4630	14.868	8	2.794	1.761	0.1351

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.89402	0.887	1.15575	0.82702
F-Test indicates equal variances (p = 0.68)	1.38383	8.88539		
The control means are significantly different (p = 0.04)	2.27534	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.13509	0.10188	0.18368	0.02353	0.01435	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Survival

Start Date:	6/7/2011	Test ID: em1.0cd TVA Emory	Sample ID: -ERM 1.0
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0000	0.9000	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000
ERS +ERW	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000	1.0000
ERM 1.0	1.0000	1.0000	1.0000	1.0000	0.9000	0.9000	1.0000	1.0000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	0.9873	1.3713	1.2490	1.4120	5.501	8			
ERS +ERW	0.9875	1.0000	1.3916	1.2490	1.4120	4.140	8	*		
ERM 1.0	0.9750	0.9873	1.3713	1.2490	1.4120	5.501	8	0.607	1.761	0.0591

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.61116	0.887	-1.7006	1.23581
F-Test indicates equal variances (p = 0.49)	1.71429	8.88539		
The control means are not significantly different (p = 0.55)	0.60698	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs ERS +ERW	0.02395	0.02474	0.00166	0.00451	0.55358	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Growth (AFDW)

Start Date:	6/7/2011	Test ID: em1.0cd TVA Emory	Sample ID: -ERM 1.0
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.3256	1.1630	1.0100	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.3444	1.3380	1.2480
ERM 1.0	1.5040	1.3370	1.1370	1.1360	1.2922	1.4189	1.2220	1.3010

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1808	0.8794	1.1808	1.0100	1.4010	13.337	8			
ERS +ERW	1.3428	1.0000	1.3428	1.1740	1.5750	9.865	8	*		
ERM 1.0	1.2935	0.9633	1.2935	1.1360	1.5040	9.969	8	0.754	1.761	0.1151

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.93485		0.887		0.48737	-0.6384
F-Test indicates equal variances (p = 0.95)	1.05524		8.88539			
The control means are significantly different (p = 0.04)	2.22641		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates no significant differences	0.11512	0.08573	0.00972	0.01709	0.46324	1, 14
Treatments vs ERS +ERW						

Chironomus dilutus 10d Survival and Growth Test-10-Day Biomass (AFDW)

Start Date:	6/7/2011	Test ID: em1.0cd TVA Emory	Sample ID: -ERM 1.0
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.1930	1.1630	0.9090	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.2100	1.3380	1.2480
ERM 1.0	1.5040	1.3370	1.1370	1.1360	1.1630	1.2770	1.2220	1.3010

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1516	0.8685	1.1516	0.9090	1.4010	14.332	8			
ERS +ERW	1.3260	1.0000	1.3260	1.1740	1.5750	10.596	8	*		
ERM 1.0	1.2596	0.9499	1.2596	1.1360	1.5040	9.897	8	0.999	1.761	0.1170

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.89269	0.887	0.89136	-0.1912
F-Test indicates equal variances (p = 0.76)	1.2703	8.88539		
The control means are significantly different (p = 0.04)	2.27534	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs ERS +ERW	0.11697	0.08821	0.01762	0.01764	0.33454	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Survival

Start Date:	6/7/2011	Test ID: em2.5cd TVA Emory	Sample ID: -ERM 2.5
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0000	0.9000	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000
ERS +ERW	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000	1.0000
ERM 2.5	0.4000	0.8000	0.8000	0.7000	0.8000	0.6000	0.7000	0.8000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	0.9873	1.3713	1.2490	1.4120	5.501	8			
ERS +ERW	0.9875	1.0000	1.3916	1.2490	1.4120	4.140	8	*		
*ERM 2.5	0.7000	0.7089	0.9977	0.6847	1.1071	15.078	8	6.917	1.761	0.1003

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.78914		0.887		-1.6952	3.58782
F-Test indicates equal variances (p = 0.02)	6.8168		8.88539			
The control means are not significantly different (p = 0.55)	0.60698		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.04434	0.04579	0.62073	0.01298	7.1E-06	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Growth (AFDW)

Start Date:	6/7/2011	Test ID: em2.5cd TVA Emory	Sample ID: -ERM 2.5
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.3256	1.1630	1.0100	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.3444	1.3380	1.2480
ERM 2.5	1.0275	0.6537	0.5162	0.8800	0.8400	1.1617	0.7357	0.8175

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1808	0.8794	1.1808	1.0100	1.4010	13.337	8			
ERS +ERW	1.3428	1.0000	1.3428	1.1740	1.5750	9.865	8	*		
*ERM 2.5	0.8290	0.6174	0.8290	0.5162	1.1617	24.557	8	5.983	1.761	0.1513

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.97152	0.887	0.29278	0.07334
F-Test indicates equal variances (p = 0.28)	2.36235	8.88539		
The control means are significantly different (p = 0.04)	2.22641	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.15125	0.11264	1.05579	0.0295	3.4E-05	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Biomass (AFDW)

Start Date:	6/7/2011	Test ID: em2.5cd TVA Emory	Sample ID: -ERM 2.5
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.1930	1.1630	0.9090	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.2100	1.3380	1.2480
ERM 2.5	0.4110	0.5230	0.4130	0.6160	0.6720	0.6970	0.5150	0.6540

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1516	0.8685	1.1516	0.9090	1.4010	14.332	8			
ERS +ERW	1.3260	1.0000	1.3260	1.1740	1.5750	10.596	8	*		
*ERM 2.5	0.5626	0.4243	0.5626	0.4110	0.6970	20.202	8	11.947	1.761	0.1125

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.94283	0.887	0.48257	-0.7057
F-Test indicates equal variances (p = 0.59)	1.52817	8.88539		
The control means are significantly different (p = 0.04)	2.27534	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.11254	0.08487	2.33097	0.01633	9.9E-09	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Survival

Start Date:	6/7/2011	Test ID: em3.0cd TVA Emory	Sample ID: -ERM 3.0
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0000	0.9000	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000
ERS +ERW	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000	1.0000
ERM 3.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	0.9873	1.3713	1.2490	1.4120	5.501	8			
ERS +ERW	0.9875	1.0000	1.3916	1.2490	1.4120	4.140	8	*		
ERM 3.0	1.0000	1.0127	1.4120	1.4120	1.4120	0.000	8	-1.000	1.895	0.0386

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.4689		0.887		-3.5489	13.5047
Equality of variance cannot be confirmed						
The control means are not significantly different (p = 0.55)	0.60698		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Heteroscedastic t Test indicates no significant differences	0.01492	0.0154	0.00166	0.00166	0.33428	1, 14
Treatments vs ERS +ERW						

Chironomus dilutus 10d Survival and Growth Test-10-Day Biomass (AFDW)

Start Date:	6/7/2011	Test ID:	em3.0cd TVA Emory	Sample ID:	-ERM 3.0
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.1930	1.1630	0.9090	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.2100	1.3380	1.2480
ERM 3.0	0.8700	1.0520	1.0250	1.0170	1.1690	1.1850	1.0680	1.2060

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1516	0.8685	1.1516	0.9090	1.4010	14.332	8			
ERS +ERW	1.3260	1.0000	1.3260	1.1740	1.5750	10.596	8	*		
*ERM 3.0	1.0740	0.8100	1.0740	0.8700	1.2060	10.354	8	3.978	1.761	0.1116

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.97112	0.887	0.41526	-0.2902
F-Test indicates equal variances (p = 0.55)	1.59663	8.88539		
The control means are significantly different (p = 0.04)	2.27534	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.11158	0.08415	0.25402	0.01605	0.00137	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Growth (AFDW)

Start Date:	6/7/2011	Test ID: em3.0cd TVA Emory	Sample ID: -ERM 3.0
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus
Comments:	ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water		

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.3256	1.1630	1.0100	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.3444	1.3380	1.2480
ERM 3.0	0.8700	1.0520	1.0250	1.0170	1.1690	1.1850	1.0680	1.2060

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1808	0.8794	1.1808	1.0100	1.4010	13.337	8			
ERS +ERW	1.3428	1.0000	1.3428	1.1740	1.5750	9.865	8	*		
*ERM 3.0	1.0740	0.7998	1.0740	0.8700	1.2060	10.354	8	4.396	1.761	0.1077

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96872		0.887		0.24639	-0.2993
F-Test indicates equal variances (p = 0.66)	1.419		8.88539			
The control means are significantly different (p = 0.04)	2.22641		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.1077	0.0802	0.28903	0.01496	6.1E-04	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Survival

Start Date:	6/7/2011	Test ID: em3.5cd TVA Emory	Sample ID: -ERM 3.5
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0000	0.9000	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000
ERS +ERW	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000	1.0000
ERM 3.5	1.0000	0.8000	0.8000	0.8000	0.8000	1.0000	1.0000	0.8000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	0.9873	1.3713	1.2490	1.4120	5.501	8			
ERS +ERW	0.9875	1.0000	1.3916	1.2490	1.4120	4.140	8	*		
*ERM 3.5	0.8750	0.8861	1.2215	1.1071	1.4120	12.917	8	2.865	1.761	0.1046

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.8294	0.887	0.52654	-0.7072
F-Test indicates equal variances (p = 0.02)	7.49891	8.88539		
The control means are not significantly different (p = 0.55)	0.60698	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.04662	0.04815	0.11583	0.01411	0.01247	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Growth (AFDW)

Start Date:	6/7/2011	Test ID:	em3.5cd TVA Emory	Sample ID:	-ERM 3.5
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.3256	1.1630	1.0100	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.3444	1.3380	1.2480
ERM 3.5	1.0267	0.9275	0.8662	0.8000	1.0250	0.9250	0.9200	0.9100

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1808	0.8794	1.1808	1.0100	1.4010	13.337	8			
ERS +ERW	1.3428	1.0000	1.3428	1.1740	1.5750	9.865	8	*		
*ERM 3.5	0.9251	0.6889	0.9251	0.8000	1.0267	8.138	8	7.755	1.761	0.0949

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.94746	0.887	0.64176	0.40494
F-Test indicates equal variances (p = 0.16)	3.0962	8.88539		
The control means are significantly different (p = 0.04)	2.22641	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.09488	0.07066	0.69807	0.01161	2.0E-06	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Biomass (AFDW)

Start Date:	6/7/2011	Test ID: em3.5cd	Sample ID: -ERM 3.5
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Ref

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.1930	1.1630	0.9090	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.2100	1.3380	1.2480
ERM 3.5	1.0267	0.7420	0.6930	0.6400	0.8200	0.9250	0.9200	0.7280

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1516	0.8685	1.1516	0.9090	1.4010	14.332	8			
ERS +ERW	1.3260	1.0000	1.3260	1.1740	1.5750	10.596	8	*		
*ERM 3.5	0.8118	0.6122	0.8118	0.6400	1.0267	16.544	8	7.482	1.761	0.1210

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.91847	0.887	0.6256	-0.8265
F-Test indicates equal variances (p = 0.91)	1.09438	8.88539		
The control means are significantly different (p = 0.04)	2.27534	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.12104	0.09128	1.05747	0.01889	3.0E-06	1, 14

Reviewed by:

Chironomus dilutus 10d Survival and Growth Test-10-Day Survival

Start Date:	6/7/2011	Test ID: em4.0cd TVA Emory	Sample ID: -ERM 4.0
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0000	0.9000	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000
ERS +ERW	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000	1.0000
ERM 4.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	0.9873	1.3713	1.2490	1.4120	5.501	8			
ERS +ERW	0.9875	1.0000	1.3916	1.2490	1.4120	4.140	8	*		
ERM 4.0	1.0000	1.0127	1.4120	1.4120	1.4120	0.000	8	-1.000	1.895	0.0386

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.4689		0.887		-3.5489	13.5047
Equality of variance cannot be confirmed						
The control means are not significantly different (p = 0.55)	0.60698		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Heteroscedastic t Test indicates no significant differences	0.01492	0.0154	0.00166	0.00166	0.33428	1, 14
Treatments vs ERS +ERW						

Chironomus dilutus 10d Survival and Growth Test-10-Day Growth (AFDW)

Start Date:	6/7/2011	Test ID:	em4.0cd TVA Emory
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064
Comments:	ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water		

Sample ID:	-ERM 4.0							
Sample Type:	-WHOLE SEDIMENT							
Test Species:	CDIL-Chironomus dilutus							

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.3256	1.1630	1.0100	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.3444	1.3380	1.2480
ERM 4.0	1.0240	0.9580	1.0260	0.8170	1.1940	1.1100	1.0690	0.9730

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1808	0.8794	1.1808	1.0100	1.4010	13.337	8			
ERS +ERW	1.3428	1.0000	1.3428	1.1740	1.5750	9.865	8	*		
*ERM 4.0	1.0214	0.7606	1.0214	0.8170	1.1940	10.982	8	5.238	1.761	0.1081

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.97158	0.887	0.30417	-0.1286
F-Test indicates equal variances (p = 0.67)	1.39451	8.88539		
The control means are significantly different (p = 0.04)	2.22641	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.10809	0.08049	0.41327	0.01506	1.3E-04	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Biomass (AFDW)

Start Date:	6/7/2011	Test ID:	em4.0cd TVA Emory
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064
Sample ID:	-ERM 4.0		
Sample Type:	-WHOLE SEDIMENT		
Test Species:	CDIL-Chironomus dilutus		

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.1930	1.1630	0.9090	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.2100	1.3380	1.2480
ERM 4.0	1.0240	0.9580	1.0260	0.8170	1.1940	1.1100	1.0690	0.9730

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1516	0.8685	1.1516	0.9090	1.4010	14.332	8			
ERS +ERW	1.3260	1.0000	1.3260	1.1740	1.5750	10.596	8	*		
*ERM 4.0	1.0214	0.7703	1.0214	0.8170	1.1940	10.982	8	4.792	1.761	0.1120

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96838	0.887	0.46546	-0.1451
F-Test indicates equal variances (p = 0.57)	1.56908	8.88539		
The control means are significantly different (p = 0.04)	2.27534	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.11196	0.08443	0.37119	0.01616	2.9E-04	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Survival

Start Date:	6/7/2011	Test ID: em5.5cd TVA Emory	Sample ID: -ERM 5.5
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol: EPA 600/R-99/064	Test Species: CDIL-Chironomus dilutus
Comments:	ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water		

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0000	0.9000	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000
ERS +ERW	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000	1.0000
ERM 5.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	0.9873	1.3713	1.2490	1.4120	5.501	8			
ERS +ERW	0.9875	1.0000	1.3916	1.2490	1.4120	4.140	8	*		
ERM 5.5	1.0000	1.0127	1.4120	1.4120	1.4120	0.000	8	-1.000	1.895	0.0386

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.4689		0.887		-3.5489	13.5047
Equality of variance cannot be confirmed						
The control means are not significantly different (p = 0.55)	0.60698		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Heteroscedastic t Test indicates no significant differences	0.01492	0.0154	0.00166	0.00166	0.33428	1, 14
Treatments vs ERS +ERW						

Chironomus dilutus 10d Survival and Growth Test-10-Day Growth (AFDW)

Start Date:	6/7/2011	Test ID:	em5.5cd TVA Emory
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM
Sample Date:	5/24/2011	Protocol:	EPA 600/R-99/064
Comments:	ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water		

Sample ID:	-ERM 5.5
Sample Type:	-WHOLE SEDIMENT
Test Species:	CDIL-Chironomus dilutus

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.3256	1.1630	1.0100	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.3444	1.3380	1.2480
ERM 5.5	1.2150	1.1600	1.0290	1.0130	1.1820	1.1420	1.1360	1.2100

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1808	0.8794	1.1808	1.0100	1.4010	13.337	8			
ERS +ERW	1.3428	1.0000	1.3428	1.1740	1.5750	9.865	8	*		
*ERM 5.5	1.1359	0.8459	1.1359	1.0130	1.2150	6.740	8	3.826	1.761	0.0953

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96649		0.887		0.50393	0.31195
F-Test indicates equal variances (p = 0.17)	2.99401		8.88539			
The control means are significantly different (p = 0.04)	2.22641		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.09527	0.07095	0.17128	0.0117	0.00185	1, 14

Chironomus dilutus 10d Survival and Growth Test-10-Day Biomass (AFDW)

Start Date:	6/7/2011	Test ID:	em5.5cd TVA Emory
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM
Sample Date:	5/24/2011	Protocol:	EPA 600/R-99/064
Comments:	ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Refence Sediment; ERW=Emory River Water		

Sample ID:	-ERM 5.5
Sample Type:	-WHOLE SEDIMENT
Test Species:	CDIL-Chironomus dilutus

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	1.0330	1.1930	1.1630	0.9090	1.1640	1.3370	1.0130	1.4010
ERS +ERW	1.5750	1.1740	1.2550	1.4940	1.3140	1.2100	1.3380	1.2480
ERM 5.5	1.2150	1.1600	1.0290	1.0130	1.1820	1.1420	1.1360	1.2100

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	1.1516	0.8685	1.1516	0.9090	1.4010	14.332	8			
ERS +ERW	1.3260	1.0000	1.3260	1.1740	1.5750	10.596	8	*		
*ERM 5.5	1.1359	0.8566	1.1359	1.0130	1.2150	6.740	8	3.361	1.761	0.0996

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.94617	0.887	0.71254	0.3746
F-Test indicates equal variances (p = 0.13)	3.3688	8.88539		
The control means are significantly different (p = 0.04)	2.27534	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS +ERW	0.09964	0.07514	0.14459	0.0128	0.00466	1, 14

Appendix D
Hyalella azteca
10-Day Statistical Data

- Survival
- Weight

TVA 5069-02

QC'd by: [redacted]

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: Dechlor water (GLW) ~~with Boardman Sediment Lab Control (LCS)~~ NW 9/8/11	Test Photoperiod: 16:8
Sample ID: ~~LCB - GLW--Sediment Lab Control~~ 0.1%	Test System: 175mL Manual Delivery
Test Species: *Hyalella azteca*	Test Temperature: 23± 1°C
Date Addition of Sediment: 6/6/11	Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range
Test Initiation Date: 6/7/11	Test Termination Date: 6/17/2011

Test Day: Day 10	Number Daily Renewals: —
Date: 6/17/11	□ — renewal time/Initials □ — renewal time/Initials
Overlying Water: Dechlor	□ — renewal time/Initials □ — renewal time/Initials
Overlying Water Batch ID (GLC Number): NA B925 NW 9/8/11	Food: YTC# — □ Feed 1.0 ml/replicate
	Screens Cleaned: □ yes ☑ no □ n/a

0600 NW chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	— NW 7w
1					156	106	0.29	10 /10
2					end: 8.9	end: 47.1		10 /10
3	22.8	7.47	7.0	311	start: 5.0	start: 41.8		10 /10
4					Titrant used (mL): 3.9	Titrant used (mL): 5.3		10 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		10 /10
6	23.0	7.52	6.9	308				9 /10
7								10 /10
8								10 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 98.8%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

QC'd by: [redacted]

TVA 5069-02

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: ~~Dechlor water (GLW) with Silica Sand~~ NWS 9/8/11 NWS 9/7/11

Sample ID: ~~GLW Water only exposure~~ LCS+GLW Sediment lab control

Test Species: *Hyalella azteca*

Date Addition of Sediment: 6/6/11

Test Initiation Date: 6/7/11

Test Photoperiod: 16:8

Test System: 175mL Manual Delivery

Test Temperature: 23± 1°C

Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range

Test Termination Date: 6/17/2011

Test Day: Day 10

Date: 6/17/11

Overlying Water: Dechlor

Overlying Water Batch ID (GLC Number): [illegible] NWS 9/8/11

Number Daily Renewals: —

□ — renewal time/Initials □ — renewal time/Initials

□ — renewal time/Initials □ — renewal time/Initials

Food: YTC# — □ Feed 1.0 ml/replicate

Screens Cleaned: □ yes ☑ no □ n/a

¥ 0600 NWS chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	2	— NWS 7/5
1					152	114	0.28	10 /10
2					end: 12.7	end: 8.9		9 /10
3	23.0	7.82	5.5	334	start: 8.9	start: 3.2		10 /10
4					Titrant used (mL): 3.8	Titrant used (mL): 5.7		10 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		10 /10
6	23.0	7.76	5.0	320				10 /10
7								10 /10
8								10 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 98.82

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

TVA 5069-02

QC'd by: Nwr

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: Site water (ERW 9.0) with Boardman Sediment Lab Control (LCS)	Test Photoperiod: 16:8
Sample ID: LCS + ERW	Test System: 175mL Manual Delivery
Test Species: *Hyalella azteca*	Test Temperature: 23± 1°C
Date Addition of Sediment: 6/6/11	Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range
Test Initiation Date: 6/7/11	Test Termination Date: 6/17/2011

Test Day: Day 10

Date: 6/17/11 DWS 9/7/11

Overlying Water: ~~Dechlor~~ ERM 9.0 Sitewater (ERW)

Overlying Water Batch ID (GLC Number): 8990

Number Daily Renewals: —

□ — renewal time/Initials □ — renewal time/Initials

□ — renewal time/Initials □ — renewal time/Initials

Food: YTC# — Feed 1.0 ml/replicate

Screens Cleaned: □ yes ☒ no □ n/a

KD Dawson chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	— — new 730
1					80	52	0.48	9 /10
2					end: 14.7	end: 11.5		10 /10
3	22.9	7.39	4.4	153.7	start: 12.7	start: 8.9		10 /10
4					Titrant used (mL): 2.0	Titrant used (mL): 2.6		10 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		10 /10
6	22.9	7.57	4.7	159.4				10 /10
7								9 /10
8								10 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 97.5%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

QC'd by: [illegible]

TVA 5069-02

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8981 (ERS + ERW)
Sample ID: ERS + ERW 9.0 (Emory Reference)
Test Species: *Hyalella azteca*
Date Addition of Sediment: 6/6/11
Test Initiation Date: 6/7/11

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range
Test Termination Date: 6/17/2011

Test Day: Day 10
Date: 6/17/11
Overlying Water: ERM 9.0 Site Water (ERW)
Overlying Water Batch ID (GLC Number): 8990

Number Daily Renewals: —
□ — renewal time/Initials □ — renewal time/Initials
□ — renewal time/Initials □ — renewal time/Initials
Food: YTC# — □ Feed 1.0 ml/replicate
Screens Cleaned: □ yes □ no □ n/a

[illegible] chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	— [illegible] 745
1					60	42	0.32	10 /10
2					end: 16.7	end: 16.1		10 /10
3	22.9	7.49	3.7	152.1	start: 14.7	6/14/11 start: 14.0 ~~14.6~~		10 /10
4					Titrant used (mL): 1.5	Titrant used (mL): 2.1		8 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		9 /10
6	22.9	7.54	3.4	147.7				10 /10
7								10 /10
8								8 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:
RL = Reporting Limit (0.10 mg/L).
MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.
J = ≥ MDL and < RL.
U = Below MDL.

% Survival: 93.8%

KEY:
AV: Animals Visible
NAV: No Animals Visible
FOV: Foreign Organism Visible

TVA 5069-02

QC'd by: NWW

[redacted]

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8982
Sample ID: ERM 0.5
Test Species: *Hyalella azteca*
Date Addition of Sediment: 6/6/11
Test Initiation Date: 6/7/11

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range
Test Termination Date: 6/17/2011

Test Day: Day 10
Date: 6/17/11
Overlying Water: ERM 9.0 Site Water (EW)
Overlying Water Batch ID (GLC Number): 8940

Number Daily Renewals: —
□ — renewal time/Initials □ — renewal time/Initials
□ — renewal time/Initials □ — renewal time/Initials
Food: YTC# — □ Feed 1.0 ml/replicate
Screens Cleaned: □ yes ☑ no □ n/a

✕ DS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	AS —	4	8	— new SW
1					76	48	0.06J	9 /10
2					end: 18.1	end: 14.0		10 /10
3	23.5	7.50	5.0	133.2	start: 16.2	start: 11.6		7 /10
4					Titrant used (mL): 1.9	Titrant used (mL): 2.4		9 /10
5		7.38 DS 9/8/11			Sample volume (mL): 25	Sample volume (mL): 50		10 /10
6	23.5	~~7.36~~	5.0	144.8				10 /10
7								9 /10
8								10 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:
RL = Reporting Limit (0.10 mg/L).
MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.
J = ≥ MDL and < RL.
U = Below MDL.

% Survival: 92.5%

KEY:
AV: Animals Visible
NAV: No Animals Visible
FOV: Foreign Organism Visible

QC'd by MW

TVA 5069-02

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8983
Sample ID: ERM 0.8
Test Species: *Hyalella azteca*
Date Addition of Sediment: 6/6/11
Test Initiation Date: 6/7/11

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range
Test Termination Date: 6/17/2011

Test Day: Day 10
Date: 6/17/11
Overlying Water: ERM 9.0 Site Water (ERW)
Overlying Water Batch ID (GLC Number): 8990

Number Daily Renewals: —
□ — renewal time/Initials □ — renewal time/Initials
□ — renewal time/Initials □ — renewal time/Initials
Food: YTC# — □ Feed 1.0 ml/replicate
Screens Cleaned: □ yes ☑ no □ n/a

DO 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	—
1					76	50	0.04J	10 /10
2					end: 20.0	end: 18.6	0.03J	10 /10
3	23.3	7.75	5.2	141.6	start: 14.1	start: 16.1		7 /10
4					Titrant used (mL): 1.9	Titrant used (mL): 2.5		9 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		10 /10
6	23.3	7.76	5.2	141.1				10 /10
7								10 /10
8								10 /10

Meter pH	Hard	Alk
	76	52
	33.0	21.2
	31.1	18.6
	1.9	2.6

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:
RL = Reporting Limit (0.10 mg/L).
MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.
J = ≥ MDL and < RL.
U = Below MDL.

% Survival: 95.0%

KEY:
AV: Animals Visible
NAV: No Animals Visible
FOV: Foreign Organism Visible

QC'd by: NWR

TVA 5069-02

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8984
Sample ID: ERM 1.0
Test Species: *Hyalella azteca*
Date Addition of Sediment: 6/6/11
Test Initiation Date: 6/7/11

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range
Test Termination Date: 6/17/2011

Test Day: Day 10
Date: 6/17/11
Overlying Water: ERM 9.0 Site Water (ERW)
Overlying Water Batch ID (GLC Number): 8990

Number Daily Renewals: 1
DS 8:00 renewal time/Initials ☐ ——— renewal time/Initials
——— renewal time/Initials ☐ ——— renewal time/Initials
Food: YTC# ——— ☐ Feed 1.0 ml/replicate
Screens Cleaned: ☐ yes ☑ no ☐ n/a

DS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	4.0	4	6	113	—	4	8	— NWR 8/30
1					88	50	0.06J	10 /10
2					end: 22.2	end: 25.8		7 /10
3	23.5	7.67	4.7	139.9	start: 20.0	start: 23.3		8 /10
4					Titrant used (mL): 2.2	Titrant used (mL): 2.5		10 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		8 /10
6	23.5	7.69	4.5	147.4				10 /10
7								10 /10
8								8 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:
RL = Reporting Limit (0.10 mg/L).
MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.
J = ≥ MDL and < RL.
U = Below MDL.

% Survival: 88.8%

KEY:
AV: Animals Visible
NAV: No Animals Visible
FOV: Foreign Organism Visible

TVA 5069-02

QC'd by: NW

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8985
Sample ID: ERM 2.5
Test Species: *Hyalella azteca*
Date Addition of Sediment: 6/6/11
Test Initiation Date: 6/7/11

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range
Test Termination Date: 6/17/2011

Test Day: Day 10
Date: 6/17/11
Overlying Water: ERM 9.0 Site Water (ERW)
Overlying Water Batch ID (GLC Number): 8990

Number Daily Renewals: 1
DS 8:00 renewal time/Initials ☐ ——— renewal time/Initials
☐ ——— renewal time/Initials ☐ ——— renewal time/Initials
Food: YTC# ——— ☐ Feed 1.0 ml/replicate
Screens Cleaned: ☐ yes ☒ no ☐ n/a

DS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	—
1					68	42	0.05J	5 /10
2					end: 23.9	end: 27.9		2 /10
3	23.3	7.51	6.3	127.6	start: 22.2	start: 25.8		5 /10
4					Titrant used (mL): 1.7	Titrant used (mL): 2.1		4 /10
5	23.3				Sample volume (mL): 25	Sample volume (mL): 50		7 /10
6		7.56	6.2	128.1				3 /10
7								6 /10
8								6 /10

NW-845

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:
RL = Reporting Limit (0.10 mg/L).
MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.
J = ≥ MDL and < RL.
U = Below MDL.

% Survival: 47.5

KEY:
AV: Animals Visible
NAV: No Animals Visible
FOV: Foreign Organism Visible

QC'd by: NWK

TVA 5069-02

[redacted]

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8986 Awo 9/7/11
Sample ID: ERM 3.5 3.0
Test Species: *Hyalella azteca*
Date Addition of Sediment: 6/6/11
Test Initiation Date: 6/7/11

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range
Test Termination Date: 6/17/2011

Test Day: Day 10
Date: 6/17/11
Overlying Water: ERM 9.0 Site Water (ERW)
Overlying Water Batch ID (GLC Number): 8990

Number Daily Renewals: 1
DS 8:00 renewal time/Initials ☐ — renewal time/Initials
☐ — renewal time/Initials ☐ — renewal time/Initials
Food: YTC# — ☐ Feed 1.0 ml/replicate
Screens Cleaned: ☐ yes ☒ no ☐ n/a

DS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$ AS	Alkalinity mg/L $CaCO_3$ AB	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	4.0	4	6	113	—	4	8	—
1					80	48	0.04J	4 /10
2					end: 25.9	end: 30.3	0.02U	6 /10
3	23.3	7.65	5.1	142.5	start: 23.9	start: 27.9		3 /10
4					Titrant used (mL): 2.0	Titrant used (mL): 2.4		3 /10
5	~~DS 9/8/11~~				Sample volume (mL): 25	Sample volume (mL): 50		4 /10
6	23.3	7.72	4.9	137.8				6 /10
7								6 /10
8								7 /10

Duplicate

Hard	Alk
72	50
34.8	32.8
33.0	30.3
1.8	2.5

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:
RL = Reporting Limit (0.10 mg/L).
MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.
J = ≥ MDL and < RL.
U = Below MDL.

% Survival: 48.8%

KEY:
AV: Animals Visible
NAV: No Animals Visible
FOV: Foreign Organism Visible

QC'd by: [redacted]

TVA 5069-02

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8987
Sample ID: ERM 3.5
Test Species: *Hyalella azteca*
Date Addition of Sediment: 6/6/11
Test Initiation Date: 6/7/11

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range
Test Termination Date: 6/17/2011

Test Day: Day 10
Date: 6/17/11
Overlying Water: ERM 9.0 Site Water (ERW)
Overlying Water Batch ID (GLC Number): 8490

Number Daily Renewals: 1
☒ DS 8100 renewal time/Initials ☐ ——— renewal time/Initials
☐ ——— renewal time/Initials ☐ ——— renewal time/Initials
Food: YTC# ——— ☐ Feed 1.0 ml/replicate
Screens Cleaned: ☐ yes ☐ no ☐ n/a

☒ DS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	AS —	4 AS	8	—
1					68	40	0.02U	4 /10
2					end: 27.6	end: 36.8		1 /10
3	23.5	7.56	6.5	128.5	start: 25.9	start: ~~36.3~~ 34.8 AS 6/17/11		0 /10
4					Titrant used (mL): 1.7	Titrant used (mL): 2.0		2 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		1 /10
6	23.5	7.46	5.8	126.3				4 /10
7								4 /10
8								4 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:
RL = Reporting Limit (0.10 mg/L).
MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.
J = ≥ MDL and < RL.
U = Below MDL.

% Survival: ~~28.8%~~ 25.0% NAV 6/20/11

KEY:
AV: Animals Visible
NAV: No Animals Visible
FOV: Foreign Organism Visible

QC'd by: NWC

TVA 5069-02

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8988	Test Photoperiod: 16:8
Sample ID: ERM 4.0	Test System: 175mL Manual Delivery
Test Species: *Hyalella azteca*	Test Temperature: 23± 1°C
Date Addition of Sediment: 6/6/11	Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range
Test Initiation Date: 6/7/11	Test Termination Date: 6/17/2011

Test Day: Day 10	Number Daily Renewals: 1
Date: 6/17/11	☒ DS 8:00 renewal time/Initials ☐ ——— renewal time/Initials
Overlying Water: ERM 9.0 Site Water (EW)	☐ ——— renewal time/Initials ☐ ——— renewal time/Initials
Overlying Water Batch ID (GLC Number): 8990	Food: YTC# ——— ☐ Feed 1.0 ml/replicate
	Screens Cleaned: ☐ yes ☑ no ☐ n/a

☒ DS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	———	4	8	——— Meter 0930
1					64	40	0.03 U	10/10
2					end: 29.2	end: 38.9		8/10
3	23.0	7.49	5.5	124.2	start: 27.6	start: 36.9		10/10
4					Titrant used (mL): 1.6	Titrant used (mL): 2.0		10/10
5					Sample volume (mL): 25	Sample volume (mL): 50		7/10
6	23.1	7.57	5.9	126.4				7/10
7								8/10
8								10/10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:

RL = Reporting Limit (0.10 mg/L).

MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.

J = ≥ MDL and < RL.

U = Below MDL.

% Survival: 87.5%

KEY:

AV: Animals Visible

NAV: No Animals Visible

FOV: Foreign Organism Visible

TVA 5069-02

QC'd by: MWS

Hyalella azteca 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#: 8989
Sample ID: ERM 5.5
Test Species: *Hyalella azteca*
Date Addition of Sediment: 6/6/11
Test Initiation Date: 6/7/11

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: In House - 5/27/11, 12-13days old; 1-2 day range
Test Termination Date: 6/17/2011

Test Day: Day 10
Date: 6/17/11
Overlying Water: ERM 9.0 Site Water (ERW)
Overlying Water Batch ID (GLC Number): 8990

Number Daily Renewals: 1
RDS 8100 renewal time/Initials ☐ — renewal time/Initials
☐ — renewal time/Initials ☐ — renewal time/Initials
Food: YTC# — ☐ Feed 1.0 ml/replicate
Screens Cleaned: ☐ yes ☑ no ☐ n/a

RDS 6:15 chemistries time/Initial

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$	Ammonia (as N)	Observations/ 10 organisms per replicate
Meter ID	40	4	6	113	—	4	8	— Mw-950
1					76	40	0.03U	7 /10
2					end: 31.1	end: 40.9		6 /10
3	23.2	7.51	5.3	129.5	start: 29.2	start: 38.9		8 /10
4					Titrant used (mL): 1.9	Titrant used (mL): 2.0		8 /10
5					Sample volume (mL): 25	Sample volume (mL): 50		8 /10
6	23.1	7.50	5.6	126.1				9 /10
7								6 /10
8								7 /10

Relative % Difference: RPD ≤15%

$$RPD = \frac{(s_1 - s_2)}{(s_1 + s_2)/2} \times 100 =$$

* Contact Laboratory Coordinator if Dissoved Oxygen level is < 2.5 mg/L or Temperature is out of range.

Ammonia Reporting Limits:
RL = Reporting Limit (0.10 mg/L).
MDL = Minimum Detection Limit (0.04 mg/L) - last updated 11/15/10.
J = ≥ MDL and < RL.
U = Below MDL.

% Survival: 73.8%

KEY:
AV: Animals Visible
NAV: No Animals Visible
FOV: Foreign Organism Visible

GLEC
Great Lakes Environmental Center

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: GLW
Project Name: MMW 9/7/11 EC TVA 5069-02
Technician's Initials: DS/MMW

Test Species: *H. azteca*
Weigh Date: 6/18/11
Test Date: 6/7-17/11

Type/Model of Drying Oven: Blue M

Oven Temperature: 60 °C
Drying Duration (Hours): ~ 24 hrs
Date/Time in: 6/17/11 10:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 6/18/11 10:15
Date/Time out: 6/18/11 11:00

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID: GLW	1	10	0.82122	0.82015	0.00107	10	0.10700	0.10700
	2	10	0.81733	0.81615	0.00118	10	0.11800	0.11800
GLEC Number: NA	3	10	0.81626	0.81502	0.00124	10	0.12400	0.12400
	4	10	0.80485	0.80362	0.00123	10	0.12300	0.12300
	5	10	0.81852	0.81737	0.00115	10	0.11500	0.11500
	6	10	0.81491	0.81410	0.00081	9	0.09000	0.08100
	7	10	0.82411	0.82290	0.00121	10	0.12100	0.12100
	8	10	0.83473	0.83333	0.00140	10	0.14000	0.14000
						AVERAGE:	0.11725	0.11613

GLEC
Great Lakes Environmental Center

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: LCS + GLW
Project Name: TVA 5069-02
Technician's Initials: DS/MW

Test Species: *H. azteca*
Weigh Date: 6/18/11
Test Date: 6/7-17/11

Type/Model of Drying Oven: Blue M

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 10:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 10:15 6/18/11
Date/Time out: 6/18/11 11:10

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID: LCS + GLW	1	10	0.81362	0.81228	0.00134	10	0.13400	0.13400
	2	10	0.81543	0.81415	0.00128	9	0.14222	0.12800
GLEC Number:	3	10	0.81737	0.81566	0.00171	10	0.17100	0.17100
N/A	4	10	0.82685	0.82539	0.00146	10	0.14600	0.14600
	5	10	0.82493	0.82346	0.00147	10	0.14700	0.14700
	6	10	0.81063	0.80942	0.00121	10	0.12100	0.12100
	7	10	0.81222	0.81066	0.00156	10	0.15600	0.15600
	8	10	0.81237	0.81112	0.00125	10	0.12500	0.12500
						AVERAGE:	0.14278	0.14100

GLEC
Great Lakes Environmental Center

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: LCS + ERW
Test Species: *H. azteca*
Type/Model of Drying Oven: Blue M

Project Name: TVA 5069-02
Weigh Date: 6/18/11

Technician's Initials: DS/MWH
Test Date: 6/7-17/11

Oven Temperature: 60 °C
Drying Duration (Hours): ~ 24 hrs
Date/Time in: 6/17/11 10:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 6/18/11 10:15
Date/Time out: 6/18/11 11:15

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID: LCS+ERW	1	10	0.82677	0.82590	0.00087	9	0.09667 ~~0.96667~~	0.08700
	2	10	0.82490	0.82390	0.00100	10	0.10000	0.10000
GLEC Number: NA	3	10	0.82346	0.82244	0.00102	10	0.10200	0.10200
	4	10	0.82940	0.82828	0.00112	10	0.11200	0.11200
	5	10	0.82847	0.82705	0.00142	10	0.14200	0.14200
	6	10	0.82620	0.82510	0.00110	10	0.11000	0.11000
	7	10	0.82125	0.82017	0.00108	9	0.12000	0.10800
	8	10	0.82655	0.82470	0.00185	10	0.18500	0.18500
						AVERAGE:	0.12096	0.11825

MWH 9/7/11

GLEC
Great Lakes Environmental Center

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: ERS + ERW
Test Species: *H. azteca*
Type/Model of Drying Oven: Blue M

Project Name: TVA 5069-02
Weigh Date: 6/18/11

Technician's Initials: DS/MWK
Test Date: 6/7-17/11

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 10:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 6/18/11 10:15
Date/Time out: 6/18/11 11:35

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID:	1	10	0.82406	0.82306	0.00100	10	0.10000	0.10000
ERS+ERW	2	10	0.82750	0.82652	0.00098	10	0.09800	0.09800
GLEC Number:	3	10	0.81263	0.81153	0.00110	10	0.11000	0.11000
8981	4	10	0.80703	0.80595	0.00108	8	0.13500	0.10800
	5	10	0.80943	0.80823	0.00120	9	0.13333	0.12000
	6	10	0.80963	0.80851	0.00112	10	0.11200	0.11200
	7	10	0.82455	0.82333	0.00122	10	0.12200	0.12200
	8	10	0.82369	0.82264	0.00105	8	0.13125	0.10500
						AVERAGE:	0.11770	0.10937

GLEC
Great Lakes Environmental Center

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: ERM 0.5
Test Species: *H. azteca*
Type/Model of Drying Oven: Blue M

Project Name: TVA
Weigh Date: 6/18/11

Technician's Initials: DS / mw
Test Date: 6/7-9/11

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 10:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 6/18/11 10:15
Date/Time out: 6/18/11 11:45

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID:	1	10	0.80966	0.80867	0.00099	9	0.11000	0.09900
ERM0.5	2	10	0.81193	0.81095	0.00098	10	0.09800	0.09800
GLEC Number:	3	10	0.81491	0.81441	0.00050	7	0.07143	0.05000
8982	4	10	0.82022	0.81928	0.00094	9	0.10444	0.09400
	5	10	0.81323	0.81234	0.00089	10	0.08900	0.08900
	6	10	0.82775	0.82650	0.00125 mw	10	0.12500	0.12500
	7	10	0.81696	0.81616	0.00080	9	~~0.08889~~ 0.08889 KN mw for KN 9/7/11	0.08000
	8	10	0.81143	0.81016	0.00127	10	0.12700	0.12700
						AVERAGE:	0.10172	0.09525

GLEC
Great Lakes Environmental Center

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: ERM 0.8
Test Species: *H. azteca*
Type/Model of Drying Oven: Blue M

Project Name: TVA 5069-02
Weigh Date: 6/18/11

Technician's Initials: DS/MWH
Test Date: 6/7-17/11

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 10:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 6/18/11 10:15
Date/Time out: 6/18/11 11:50

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID:	1	10	0.81304	0.81183	0.00121	10	0.12100	0.12100
ERM 0.8	2	10	0.80823	0.80713	0.00110	10	0.11000	0.11000
GLEC Number:	3	10	0.81804	0.81709	0.00095	7	0.13571	0.09500
8983	4	10	0.80983	0.80887	0.00096	9	0.10667	0.09600
	5	10	0.80716	0.80597	0.00119	10	0.11900	0.11900
	6	10	0.81513	0.81396	0.00117	10	0.11700	0.11700
	7	10	0.81594	0.81497	0.00097	10	0.09700	0.09700
	8	10	0.82206	0.82087	0.00119	10	0.11900	0.11900
						AVERAGE:	0.11567	0.10925

GLEC
Great Lakes Environmental Center

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: ERM 1.0
Project Name: TVA 5069-02
Technician's Initials: DS/MW

Test Species: *H. azteca*
Weigh Date: 6/18/11
Test Date: 6/7-17/11

Type/Model of Drying Oven: Blue M

Oven Temperature: 60 °C
Drying Duration (Hours): ~ 24 hrs
Date/Time in: 6/17/11 10:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 6/18/11 10:15
Date/Time out: 6/18/11 13:25

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID:	1	10	0.82420	0.82320	0.00100	10	0.10000	0.10000
ERM1.0	2	10	0.81881	0.81825	0.00056	7	0.08000	0.05600
GLEC Number:	3	10	0.82107	0.82012	0.00095	8	0.11875	0.09500
8984	4	10	0.81654	0.81550	0.00104	10	0.10400	0.10400
	5	10	0.81712	0.81600	0.00112	8	0.14000	0.11200
	6	10	0.80831	0.80667	0.00164	10	0.16400	0.16400
	7	10	0.81678	0.81518	0.00160	10	0.16000	0.16000
	8	10	0.81447	0.81376	0.00071	8	0.08875	0.07100
						AVERAGE:	0.11944	0.10775

GLEC
Great Lakes Environmental Center

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: ERM 2.5
Project Name: TVA 5069-02
Technician's Initials: DS/mw

Test Species: *H. azteca*
Weigh Date: 6/18/11
Test Date: 6/7-17/11

Type/Model of Drying Oven: Blue M

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/13/11 10:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 6/18/11 10:15
Date/Time out: 6/18/11 13:30

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID:	1	10	0.81215	0.81169	0.00046	5	0.09200	0.04600
ERM2.5	2	10	0.82141	0.82123	0.00018	2	0.09000	0.01800
GLEC Number:	3	10	0.82636	0.82600	0.00036	5	0.07200	0.03600
8985	4	10	0.81604	0.81574	0.00030	4	0.07500	0.03000
	5	10	0.82606	0.82560	0.00046	7	0.06571	0.04600
	6	10	0.82377	0.82352	0.00025	3	0.08333	0.02500
	7	10	0.82596	0.82567	0.00029	6	0.04833	0.02900
	8	10	0.82571	0.82545	0.00026	6	0.04333	0.02600
						AVERAGE:	0.07121	0.03200

GLEC
Great Lakes Environmental Center

DS 9/8/11

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: ERM 3.0

Test Species: *H. azteca*

Type/Model of Drying Oven: Blue M

Project Name: TVA 5069-02

Weigh Date: 6/18/11

Technician's Initials: DS/mw

Test Date: 6/7-17/11

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 10:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 6/18/11 10:15
Date/Time out: 6/18/11 13:35

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID: ERM 3.0 DS 9/8/11	1	10	0.82022	0.81988	0.00034	4	0.08500	0.03400
	2	10	0.81672	0.81617	0.00055	6	0.09167	0.05500
GLEC Number: 8986	3	10	0.81349	0.81321	0.00028	3	0.09333	0.02800
	4	10	0.82670	0.82643	0.00027	3	0.09000	0.02700
	5	10	0.82463	0.82421	0.00042	4	0.10500	0.04200
	6	10	0.81945	0.81885	0.00060	6	0.10000	0.06000
	7	10	0.81994	0.81931	0.00063	6	0.10500	0.06300
	8	10	0.82100	0.82023	0.00077	7	0.11000	0.07700
						AVERAGE:	0.09750	0.04825

GLEC
Great Lakes Environmental Center

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: ERM 3.5
Test Species: *H. azteca*
Type/Model of Drying Oven: Blue M

Project Name: TVA 5069-02
Weigh Date: 6/18/11

Technician's Initials: DS/AWK
Test Date: 6/7-7/11

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 12:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 6/18/11 10:15
Date/Time out: 6/18/11 between 13:35 - 13:45 DS

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID:	1	10	0.81407	0.81379	0.00028	4	0.07000	0.02800
ERM 3.5	2	10	0.82409	0.82402	0.00007	1	0.07000	0.00700
GLEC Number:	3	10	—	—	—	0	— 0.00000	— 0.00000
8907	4	10	0.81659	0.81641	0.00018	2	0.09000	0.01800
	5	10	0.81764	0.81754	0.00010	1	0.10000	0.01000
	6	10	0.82841	0.82809	0.00032	4	0.08000	0.03200
	7	10	0.82120	0.82090	0.00030	4	0.07500	0.03000
	8	10	0.82025	0.81983	0.00042	4	0.10500	0.04200
						AVERAGE:	0.07375	0.02088

GLEC
Great Lakes Environmental Center

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: ERM 4.0
Project Name: TVA 5069-02
Technician's Initials: DS/MW

Test Species: *H. azteca*
Weigh Date: 6/18/11
Test Date: 6/7-17/11

Type/Model of Drying Oven: Blue M

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 10:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 6/18/11 10:15
Date/Time out: 6/18/11 13:45

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID: ERM 4.0	1	10	0.81766	0.81654	0.00112	10	0.11200	0.11200
	2	10	0.81958	0.81879	0.00079	8	0.09875	0.07900
GLEC Number: 8988	3	10	0.82026	0.81930	0.00096	10	0.09600	0.09600
	4	10	0.82446	0.82332	0.00114	10	0.11400	0.11400
	5	10	0.81199	0.81133	0.00066	7	0.09429	0.06600
	6	10	0.81964	0.81893	0.00071	7	0.10143	0.07100
	7	10	0.81958	0.81886	0.00072	8	0.09000	0.07200
	8	10	0.82143	0.82073	0.00070	10	0.07000	0.07000
						AVERAGE:	0.09706	0.08500

GLEC
Great Lakes Environmental Center

10-Day *Hyalella azteca* WEIGHT DATA

Sample ID: ERM 5.5
Project Name: TVA 5069-02
Technician's Initials: DS/mw

Test Species: *H. azteca*
Weigh Date: 6/18/11
Test Date: 6/7-17/11

Type/Model of Drying Oven: Blue M

Oven Temperature: 60 °C
Drying Duration (Hours): ~24 hrs
Date/Time in: 6/17/11 18:00
Date/Time out: 6/18/11 10:15

Dessicator
Date/Time in: 6/18/11 10:15
Date/Time out: 6/18/11 13:55

QC'd by: KN

Sample ID	Replicate Number	A Number of Organisms at Test Initiation	B Dry Weight of Pan and Organisms (g)	C Dry Weight of Pan (g)	B-C Total Dry Weight of Organisms (g)	D Number of Organisms Weighed	B-C/D Average Weight (mg)	B-C/A Biomass Weight (mg)
Sample ID:	1	10	0.81790	0.81727	0.00063	7	0.09000	0.06300
ERM 5.5	2	10	0.82055	0.82003	0.00052	6	0.08667	0.05200
GLEC Number:	3	10	0.82400	0.82329	0.00071	8	0.08875	0.07100
8989	4	10	0.82099	0.82028	0.00071	8	0.08875	0.07100
	5	10	0.81910	0.81843	0.00067	8	0.08375	0.06700
	6	10	0.82525	0.82456	0.00069	9	0.07667	0.06900
	7	10	0.82616	0.82585	0.00031	6	0.05167	0.03100
	8	10	0.82154	~~0.82210~~ 0.82090	0.00064	7	0.09143 NW 9/7/11	0.06400
						AVERAGE:	~~0.08221~~ 0.08321 NW 9/7/11	0.06100

DS 9/8/11

Hyalella azteca 10d Survival and Growth Test-10-day survival

Start Date:	6/7/2011	Test ID:	LCSerha	Sample ID:	-LCS
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:		Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca

Comments: LCS=Lab Control Sediment; ERW=Emory River Water; GLW=GLEC Lab Water

Conc-	1	2	3	4	5	6	7	8
GLW	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000	1.0000
LCS + GLW	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
LCS + ERW	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
GLW	0.9875	1.0000	1.3916	1.2490	1.4120	4.140	8		
LCS + GLW	0.9875	1.0000	1.3916	1.2490	1.4120	4.140	8	*	
LCS + ERW	0.9750	0.9873	1.3713	1.2490	1.4120	5.501	8	64.00	51.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.61116	0.887	-1.7006	1.23581
F-Test indicates equal variances (p = 0.49)	1.71429	8.88539		
The control means are not significantly different (p = 1.00)	0	2.14479		
Hypothesis Test (1-tail, 0.05)				
Wilcoxon Two-Sample Test indicates no significant differences				
Treatments vs LCS + GLW				

Hyalella azteca 10d Survival and Growth Test-10-Day Average Growth

Start Date:	6/7/2011	Test ID: LCSerha	Sample ID: -LCS
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:		Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: LCS=Lab Control Sediment; ERW=Emory River Water; GLW=GLEC Lab Water

Conc-	1	2	3	4	5	6	7	8
GLW	0.1070	0.1180	0.1240	0.1230	0.1150	0.0900	0.1210	0.1400
LCS + GLW	0.1340	0.1422	0.1710	0.1460	0.1470	0.1210	0.1560	0.1250
LCS + ERW	0.0967	0.1000	0.1020	0.1120	0.1420	0.1100	0.1200	0.1850

			Transform: Untransformed					Rank	1-Tailed
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
GLW	0.1172	0.8212	0.1172	0.0900	0.1400	12.332	8		
LCS + GLW	0.1428	1.0000	0.1428	0.1210	0.1710	11.439	8	*	
*LCS + ERW	0.1210	0.8472	0.1210	0.0967	0.1850	24.473	8	47.00	51.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.86513	0.887	1.53285	2.84072
F-Test indicates equal variances (p = 0.14)	3.28517	8.88539		
The control means are significantly different (p = 5.16E-03)	3.31008	2.14479		
Hypothesis Test (1-tail, 0.05)				
Wilcoxon Two-Sample Test indicates significant differences Treatments vs LCS + GLW				

Hyalella azteca 10d Survival and Growth Test-10-day Biomass

Start Date:	6/7/2011	Test ID: LCSerha	Sample ID: -LCS
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:		Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: LCS=Lab Control Sediment; ERW=Emory River Water; GLW=GLEC Lab Water

Conc-	1	2	3	4	5	6	7	8
GLW	0.1070	0.1180	0.1240	0.1230	0.1150	0.0810	0.1210	0.1400
LCS + GLW	0.1340	0.1280	0.1710	0.1460	0.1470	0.1210	0.1560	0.1250
LCS + ERW	0.0870	0.1000	0.1020	0.1120	0.1420	0.1100	0.1080	0.1850

			Transform: Untransformed					Rank	1-Tailed
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
GLW	0.1161	0.8236	0.1161	0.0810	0.1400	14.646	8		
LCS + GLW	0.1410	1.0000	0.1410	0.1210	0.1710	12.166	8	*	
*LCS + ERW	0.1183	0.8387	0.1183	0.0870	0.1850	26.368	8	48.00	51.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.87152	0.887	1.50653	2.6918
F-Test indicates equal variances (p = 0.14)	3.30364	8.88539		
The control means are significantly different (p = 0.01)	2.91251	2.14479		
Hypothesis Test (1-tail, 0.05)				
Wilcoxon Two-Sample Test indicates significant differences				
Treatments vs LCS + GLW				

Hyalella azteca 10d Survival and Growth Test-10-day survival

Start Date:	6/7/2011	Test ID: 5069erha TVA Emory	Sample ID: -ERM 0.5
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000
ERS + ERW	1.0000	1.0000	1.0000	0.8000	0.9000	1.0000	1.0000	0.8000
ERM 0.5	0.9000	1.0000	0.7000	0.9000	1.0000	1.0000	0.9000	1.0000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	1.0400	1.3713	1.2490	1.4120	5.501	8			
ERS + ERW	0.9375	1.0000	1.3154	1.1071	1.4120	10.667	8	*		
ERM 0.5	0.9250	0.9867	1.2983	0.9912	1.4120	11.400	8	0.238	1.761	0.1270

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.7888		0.887		-1.0511	-0.0584
F-Test indicates equal variances (p = 0.89)	1.11267		8.88539			
The control means are not significantly different (p = 0.34)	0.99151		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates no significant differences Treatments vs ERS + ERW	0.07541	0.08055	0.00117	0.0208	0.81562	1, 14

Hyalella azteca 10d Survival and Growth Test-10-Day Average Growth

Start Date:	6/7/2011	Test ID:	5069erha TVA Emory	Sample ID:	-ERM 0.5
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0967	0.1000	0.1020	0.1120	0.1420	0.1100	0.1200	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1350	0.1333	0.1120	0.1220	0.1312
ERM 0.5	0.1100	0.0980	0.0714	0.1044	0.0890	0.1250	0.0889	0.1270

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1210	1.0277	0.1210	0.0967	0.1850	24.473	8			
ERS + ERW	0.1177	1.0000	0.1177	0.0980	0.1350	12.598	8	*		
*ERM 0.5	0.1017	0.8642	0.1017	0.0714	0.1270	18.634	8	1.878	1.761	0.0150

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96998		0.887		-0.0843	-0.9273
F-Test indicates equal variances (p = 0.53)	1.63415		8.88539			
The control means are not significantly different (p = 0.78)	0.27854		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.01499	0.12732	0.00102	0.00029	0.08138	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day Biomass

Start Date:	6/7/2011	Test ID:	5069erha TVA Emory
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064
Sample ID:	-ERM 0.5		
Sample Type:	-WHOLE SEDIMENT		
Test Species:	HA-Hyalella azteca		

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0870	0.1000	0.1020	0.1120	0.1420	0.1100	0.1080	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1080	0.1200	0.1120	0.1220	0.1050
ERM 0.5	0.0990	0.0980	0.0500	0.0940	0.0890	0.1250	0.0800	0.1270

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1183	1.0811	0.1183	0.0870	0.1850	26.368	8			
ERS + ERW	0.1094	1.0000	0.1094	0.0980	0.1220	7.864	8	*		
ERM 0.5	0.0953	0.8709	0.0953	0.0500	0.1270	25.825	8	1.533	1.761	0.0162

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.91923	0.887	-0.5023	2.35428
F-Test indicates equal variances (p = 0.01)	8.17861	8.88539		
The control means are not significantly different (p = 0.45)	0.77608	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs ERS + ERW	0.01623	0.14836	0.0008	0.00034	0.14752	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day survival

Start Date:	6/7/2011	Test ID: 0.8ha TVA Emory	Sample ID: -ERM 0.8
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000
ERS + ERW	1.0000	1.0000	1.0000	0.8000	0.9000	1.0000	1.0000	0.8000
ERM 0.8	1.0000	1.0000	0.7000	0.9000	1.0000	1.0000	1.0000	1.0000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	1.0400	1.3713	1.2490	1.4120	5.501	8			
ERS + ERW	0.9375	1.0000	1.3154	1.1071	1.4120	10.667	8	*		
ERM 0.8	0.9500	1.0133	1.3390	0.9912	1.4120	11.328	8	-0.323	1.761	0.1287

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.71302	0.887	-1.4724	1.08421
F-Test indicates equal variances (p = 0.84)	1.16879	8.88539		
The control means are not significantly different (p = 0.34)	0.99151	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.07657	0.08179	0.00223	0.02135	0.75135	1, 14
Treatments vs ERS + ERW						

Hyalella azteca 10d Survival and Growth Test-10-Day Average Growth

Start Date:	6/7/2011	Test ID:	0.8ha TVA Emory	Sample ID:	-ERM 0.8	
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca	
Comments:	ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water					

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0967	0.1000	0.1020	0.1120	0.1420	0.1100	0.1200	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1350	0.1333	0.1120	0.1220	0.1312
ERM 0.8	0.1210	0.1100	0.1357	0.1067	0.1190	0.1170	0.0970	0.1190

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1210	1.0277	0.1210	0.0967	0.1850	24.473	8			
ERS + ERW	0.1177	1.0000	0.1177	0.0980	0.1350	12.598	8	*		
ERM 0.8	0.1157	0.9828	0.1157	0.0970	0.1357	9.889	8	0.306	1.761	0.0117

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.94513	0.887	-0.0511	-0.9997
F-Test indicates equal variances (p = 0.51)	1.68024	8.88539		
The control means are not significantly different (p = 0.78)	0.27854	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs ERS + ERW	0.01166	0.09908	1.6E-05	0.00018	0.76419	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day Biomass

Start Date:	6/7/2011	Test ID: 0.8ha TVA Emory	Sample ID: -ERM 0.8
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0870	0.1000	0.1020	0.1120	0.1420	0.1100	0.1080	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1080	0.1200	0.1120	0.1220	0.1050
ERM 0.8	0.1210	0.1100	0.0950	0.0960	0.1190	0.1170	0.0970	0.1190

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1183	1.0811	0.1183	0.0870	0.1850	26.368	8			
ERS + ERW	0.1094	1.0000	0.1094	0.0980	0.1220	7.864	8	*		
ERM 0.8	0.1093	0.9989	0.1093	0.0950	0.1210	10.479	8	0.025	1.761	0.0089

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.89797	0.887	-0.1846	-1.5506
F-Test indicates equal variances (p = 0.47)	1.77166	8.88539		
The control means are not significantly different (p = 0.45)	0.77608	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs ERS + ERW	0.00892	0.08153	6.3E-08	0.0001	0.98065	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day survival

Start Date:	6/7/2011	Test ID: 1.0ha TVA Emory	Sample ID: -ERM 1.0
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000
ERS + ERW	1.0000	1.0000	1.0000	0.8000	0.9000	1.0000	1.0000	0.8000
ERM 1.0	1.0000	0.7000	0.8000	1.0000	0.8000	1.0000	1.0000	0.8000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	1.0400	1.3713	1.2490	1.4120	5.501	8			
ERS + ERW	0.9375	1.0000	1.3154	1.1071	1.4120	10.667	8	*		
ERM 1.0	0.8875	0.9467	1.2451	0.9912	1.4120	14.654	8	0.864	1.761	0.1433

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.83694		0.887		-0.3821	-1.66
F-Test indicates equal variances (p = 0.50)	1.69086		8.88539			
The control means are not significantly different (p = 0.34)	0.99151		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates no significant differences	0.08691	0.09283	0.01979	0.02649	0.40192	1, 14
Treatments vs ERS + ERW						

Hyalella azteca 10d Survival and Growth Test-10-Day Average Growth

Start Date:	6/7/2011	Test ID:	1.0ha TVA Emory	Sample ID:	-ERM 1.0	
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca	

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0967	0.1000	0.1020	0.1120	0.1420	0.1100	0.1200	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1350	0.1333	0.1120	0.1220	0.1312
ERM 1.0	0.1000	0.0800	0.1188	0.1040	0.1400	0.1640	0.1600	0.0887

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1210	1.0277	0.1210	0.0967	0.1850	24.473	8			
ERS + ERW	0.1177	1.0000	0.1177	0.0980	0.1350	12.598	8	*		
ERM 1.0	0.1194	1.0148	0.1194	0.0800	0.1640	26.791	8	-0.140	1.761	0.0220

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96648	0.887	0.32913	-0.5234
F-Test indicates equal variances (p = 0.06)	4.65748	8.88539		
The control means are not significantly different (p = 0.78)	0.27854	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs ERS + ERW	0.02196	0.18659	1.2E-05	0.00062	0.89103	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day Biomass

Start Date:	6/7/2011	Test ID: 1.0ha TVA Emory	Sample ID: -ERM 1.0
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0870	0.1000	0.1020	0.1120	0.1420	0.1100	0.1080	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1080	0.1200	0.1120	0.1220	0.1050
ERM 1.0	0.1000	0.0560	0.0950	0.1040	0.1120	0.1640	0.1600	0.0710

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1183	1.0811	0.1183	0.0870	0.1850	26.368	8			
ERS + ERW	0.1094	1.0000	0.1094	0.0980	0.1220	7.864	8	*		
ERM 1.0	0.1078	0.9851	0.1078	0.0560	0.1640	35.388	8	0.118	1.895	0.0262

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.89623	0.887	0.52316	1.49511
F-Test indicates unequal variances (p = 8.46E-04)	19.6524	8.88539		
The control means are not significantly different (p = 0.45)	0.77608	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Heteroscedastic t Test indicates no significant differences Treatments vs ERS + ERW	0.02618	0.23939	1.1E-05	0.00076	0.90807	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day survival

Start Date:	6/7/2011	Test ID: 2.5ha TVA Emory	Sample ID: -ERM 2.5
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000
ERS + ERW	1.0000	1.0000	1.0000	0.8000	0.9000	1.0000	1.0000	0.8000
ERM 2.5	0.5000	0.2000	0.5000	0.4000	0.7000	0.3000	0.6000	0.6000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	1.0400	1.3713	1.2490	1.4120	5.501	8			
ERS + ERW	0.9375	1.0000	1.3154	1.1071	1.4120	10.667	8	*		
*ERM 2.5	0.4750	0.5067	0.7578	0.4636	0.9912	22.993	8	7.051	1.761	0.1393

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9014	0.887	-0.6054	-0.7408
F-Test indicates equal variances (p = 0.58)	1.54191	8.88539		
The control means are not significantly different (p = 0.34)	0.99151	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.08404	0.08977	1.24396	0.02502	5.8E-06	1, 14

Hyalella azteca 10d Survival and Growth Test-10-Day Average Growth

Start Date:	6/7/2011	Test ID: 2.5ha TVA Emory	Sample ID: -ERM 2.5
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0967	0.1000	0.1020	0.1120	0.1420	0.1100	0.1200	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1350	0.1333	0.1120	0.1220	0.1312
ERM 2.5	0.0920	0.0900	0.0720	0.0750	0.0657	0.0833	0.0483	0.0433

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1210	1.0277	0.1210	0.0967	0.1850	24.473	8			
ERS + ERW	0.1177	1.0000	0.1177	0.0980	0.1350	12.598	8	*		
*ERM 2.5	0.0712	0.6051	0.0712	0.0433	0.0920	25.331	8	5.630	1.761	0.0145

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.93099		0.887		-0.3497	-1.1714
F-Test indicates equal variances (p = 0.62)	1.48017		8.88539			
The control means are not significantly different (p = 0.78)	0.27854		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.01454	0.12355	0.00864	0.00027	6.2E-05	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day Biomass

Start Date:	6/7/2011	Test ID:	2.5ha TVA Emory	Sample ID:	-ERM 2.5	
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca	

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0870	0.1000	0.1020	0.1120	0.1420	0.1100	0.1080	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1080	0.1200	0.1120	0.1220	0.1050
ERM 2.5	0.0460	0.0180	0.0360	0.0300	0.0460	0.0250	0.0290	0.0260

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1183	1.0811	0.1183	0.0870	0.1850	26.368	8			
ERS + ERW	0.1094	1.0000	0.1094	0.0980	0.1220	7.864	8	*		
*ERM 2.5	0.0320	0.2926	0.0320	0.0180	0.0460	31.295	8	16.578	1.761	0.0082

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9391	0.887	0.3181	-0.962
F-Test indicates equal variances (p = 0.70)	1.35554	8.88539		
The control means are not significantly different (p = 0.45)	0.77608	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.00822	0.07516	0.02395	8.7E-05	1.3E-10	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day survival

Start Date:	6/7/2011	Test ID:	3.0ha TVA Emory	Sample ID:	-ERM 3.0
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000
ERS + ERW	1.0000	1.0000	1.0000	0.8000	0.9000	1.0000	1.0000	0.8000
ERM 3.0	0.4000	0.6000	0.3000	0.3000	0.4000	0.6000	0.6000	0.7000

			Transform: Arcsin Square Root					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	1.0400	1.3713	1.2490	1.4120	5.501	8	*		
ERS + ERW	0.9375	1.0000	1.3154	1.1071	1.4120	10.667	8			
*ERM 3.0	0.4875	0.5200	0.7723	0.5796	0.9912	20.551	8	9.642	1.761	0.1094

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.91867	0.887	-0.1749	-0.7661
F-Test indicates equal variances (p = 0.07)	4.42558	8.88539		
The control means are not significantly different (p = 0.34)	0.99151	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs LCS + ERW	0.05317	0.05534	1.43525	0.01544	1.5E-07	1, 14

Hyalella azteca 10d Survival and Growth Test-10-Day Average Growth

Start Date:	6/7/2011	Test ID: 3.0ha TVA Emory	Sample ID: -ERM 3.0
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0967	0.1000	0.1020	0.1120	0.1420	0.1100	0.1200	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1350	0.1333	0.1120	0.1220	0.1312
ERM 3.0	0.0850	0.0917	0.0933	0.0900	0.1050	0.1000	0.1050	0.1100

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1210	1.0277	0.1210	0.0967	0.1850	24.473	8			
ERS + ERW	0.1177	1.0000	0.1177	0.0980	0.1350	12.598	8	*		
*ERM 3.0	0.0975	0.8284	0.0975	0.0850	0.1100	8.999	8	3.316	1.761	0.0107

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.94842	0.887	-0.0977	-1.1308
F-Test indicates equal variances (p = 0.19)	2.85577	8.88539		
The control means are not significantly different (p = 0.78)	0.27854	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.01073	0.09115	0.00163	0.00015	0.0051	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day Biomass

Start Date:	6/7/2011	Test ID: 3.0ha TVA Emory	Sample ID: -ERM 3.0
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0870	0.1000	0.1020	0.1120	0.1420	0.1100	0.1080	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1080	0.1200	0.1120	0.1220	0.1050
ERM 3.0	0.0340	0.0550	0.0280	0.0270	0.0420	0.0600	0.0630	0.0770

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1183	1.0811	0.1183	0.0870	0.1850	26.368	8			
ERS + ERW	0.1094	1.0000	0.1094	0.0980	0.1220	7.864	8	*		
*ERM 3.0	0.0482	0.4411	0.0482	0.0270	0.0770	37.824	8	8.569	1.761	0.0126

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.97503	0.887	0.25357	-0.3139
F-Test indicates equal variances (p = 0.07)	4.50205	8.88539		
The control means are not significantly different (p = 0.45)	0.77608	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.01256	0.11487	0.01495	0.0002	6.1E-07	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day survival

Start Date:	6/7/2011	Test ID:	3.5ha TVA Emory	Sample ID:	-ERM 3.5
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000
ERS + ERW	1.0000	1.0000	1.0000	0.8000	0.9000	1.0000	1.0000	0.8000
ERM 3.5	0.4000	0.1000	0.0000	0.2000	0.1000	0.4000	0.4000	0.4000

			Transform: Arcsin Square Root					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	1.0400	1.3713	1.2490	1.4120	5.501	8			
ERS + ERW	0.9375	1.0000	1.3154	1.1071	1.4120	10.667	8	*		
*ERM 3.5	0.2500	0.2667	0.5006	0.1588	0.6847	42.562	8	9.034	1.761	0.1589

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.86695	0.887	-0.5804	-1.0611
F-Test indicates equal variances (p = 0.29)	2.30587	8.88539		
The control means are not significantly different (p = 0.34)	0.99151	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.09819	0.10488	2.65577	0.03254	3.2E-07	1, 14

Hyalella azteca 10d Survival and Growth Test-10-Day Average Growth

Start Date:	6/7/2011	Test ID: 3.5ha	Sample ID: -ERM 3.5
End Date:	6/17/2011	Lab ID: -GREAT LAKES ENVIRONM	Sample Type: -WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol: EPA 600/R-99/064	Test Species: HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Ref Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0967	0.1000	0.1020	0.1120	0.1420	0.1100	0.1200	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1350	0.1333	0.1120	0.1220	0.1312
ERM 3.5	0.0700	0.0700	0.0900	0.1000	0.0800	0.0750	0.1050	

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1210	1.0277	0.1210	0.0967	0.1850	24.473	8			
ERS + ERW	0.1177	1.0000	0.1177	0.0980	0.1350	12.598	8	*		
*ERM 3.5	0.0843	0.7161	0.0843	0.0700	0.1050	16.928	7	4.430	1.771	0.0134

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9126	0.881	0.11872	-1.5816
F-Test indicates equal variances (p = 0.94)	1.07996	10.7859		
The control means are not significantly different (p = 0.78)	0.27854	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.01336	0.11347	0.00417	0.00021	6.8E-04	1, 13

Hyalella azteca 10d Survival and Growth Test-10-day Biomass

Start Date:	6/7/2011	Test ID:	3.5ha TVA Emory	Sample ID:	-ERM 3.5	
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	5/24/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca	

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0870	0.1000	0.1020	0.1120	0.1420	0.1100	0.1080	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1080	0.1200	0.1120	0.1220	0.1050
ERM 3.5	0.0280	0.0070	0.0000	0.0180	0.0100	0.0320	0.0300	0.0420

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1183	1.0811	0.1183	0.0870	0.1850	26.368	8			
ERS + ERW	0.1094	1.0000	0.1094	0.0980	0.1220	7.864	8	*		
*ERM 3.5	0.0209	0.1909	0.0209	0.0000	0.0420	69.157	8	14.896	1.761	0.0105

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.97907	0.887	-0.0153	-0.6795
F-Test indicates equal variances (p = 0.20)	2.81704	8.88539		
The control means are not significantly different (p = 0.45)	0.77608	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.01046	0.09568	0.03133	0.00014	5.6E-10	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day survival

Start Date:	6/7/2011	Test ID:	4.0ha TVA Emory	Sample ID:	-ERM 4.0
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000
ERS + ERW	1.0000	1.0000	1.0000	0.8000	0.9000	1.0000	1.0000	0.8000
ERM 4.0	1.0000	0.8000	1.0000	1.0000	0.7000	0.7000	0.8000	1.0000

			Transform: Arcsin Square Root					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	1.0400	1.3713	1.2490	1.4120	5.501	8			
ERS + ERW	0.9375	1.0000	1.3154	1.1071	1.4120	10.667	8	*		
ERM 4.0	0.8750	0.9333	1.2306	0.9912	1.4120	16.159	8	0.986	1.761	0.1516

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.83582	0.887	-0.3512	-1.6758
F-Test indicates equal variances (p = 0.38)	2.00847	8.88539		
The control means are not significantly different (p = 0.34)	0.99151	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs ERS + ERW	0.09284	0.09916	0.02879	0.02961	0.34085	1, 14

Hyalella azteca 10d Survival and Growth Test-10-Day Average Growth

Start Date:	6/7/2011	Test ID:	4.0ha TVA Emory	Sample ID:	-ERM 4.0
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0967	0.1000	0.1020	0.1120	0.1420	0.1100	0.1200	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1350	0.1333	0.1120	0.1220	0.1312
ERM 4.0	0.1120	0.0987	0.0960	0.1140	0.0943	0.1014	0.0900	0.0700

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1210	1.0277	0.1210	0.0967	0.1850	24.473	8			
ERS + ERW	0.1177	1.0000	0.1177	0.0980	0.1350	12.598	8	*		
*ERM 4.0	0.0971	0.8246	0.0971	0.0700	0.1140	14.165	8	2.887	1.761	0.0126

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.93552	0.887	-0.4092	-0.6767
F-Test indicates equal variances (p = 0.85)	1.16321	8.88539		
The control means are not significantly different (p = 0.78)	0.27854	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.01259	0.10698	0.0017	0.0002	0.01194	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day Biomass

Start Date:	6/7/2011	Test ID:	4.0ha TVA Emory	Sample ID:	-ERM 4.0
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:	5/23/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0870	0.1000	0.1020	0.1120	0.1420	0.1100	0.1080	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1080	0.1200	0.1120	0.1220	0.1050
ERM 4.0	0.1120	0.0790	0.0960	0.1140	0.0660	0.0710	0.0720	0.0700

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1183	1.0811	0.1183	0.0870	0.1850	26.368	8			
ERS + ERW	0.1094	1.0000	0.1094	0.0980	0.1220	7.864	8	*		
*ERM 4.0	0.0850	0.7771	0.0850	0.0660	0.1140	23.011	8	3.227	1.761	0.0133

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.92238	0.887	0.75605	-0.2725
F-Test indicates equal variances (p = 0.05)	5.17113	8.88539		
The control means are not significantly different (p = 0.45)	0.77608	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.01331	0.12165	0.00238	0.00023	0.00609	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day survival

Start Date:	6/7/2011	Test ID:	5.5ha TVA Emory	Sample ID:	-ERM 5.5
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT
Sample Date:	5/24/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000
ERS + ERW	1.0000	1.0000	1.0000	0.8000	0.9000	1.0000	1.0000	0.8000
ERM 5.5	0.7000	0.6000	0.8000	0.8000	0.8000	0.9000	0.6000	0.7000

			Transform: Arcsin Square Root						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.9750	1.0400	1.3713	1.2490	1.4120	5.501	8			
ERS + ERW	0.9375	1.0000	1.3154	1.1071	1.4120	10.667	8	*		
*ERM 5.5	0.7375	0.7867	1.0406	0.8861	1.2490	12.012	8	4.136	1.761	0.1170

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.88654		0.887		-0.4158	-1.0244
F-Test indicates equal variances (p = 0.77)	1.25995		8.88539			
The control means are not significantly different (p = 0.34)	0.99151		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.06857	0.07325	0.30208	0.01766	0.00101	1, 14

Hyalella azteca 10d Survival and Growth Test-10-Day Average Growth

Start Date:	6/7/2011	Test ID:	5.5ha TVA emory	Sample ID:	-ERM 5.5	
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	5/24/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca	

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0967	0.1000	0.1020	0.1120	0.1420	0.1100	0.1200	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1350	0.1333	0.1120	0.1220	0.1312
ERM 5.5	0.0900	0.0867	0.0887	0.0887	0.0838	0.0767	0.0517	0.0914

			Transform: Untransformed						1-Tailed	
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1210	1.0277	0.1210	0.0967	0.1850	24.473	8			
ERS + ERW	0.1177	1.0000	0.1177	0.0980	0.1350	12.598	8	*		
*ERM 5.5	0.0822	0.6985	0.0822	0.0517	0.0914	16.039	8	5.059	1.761	0.0124

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.92311	0.887	-0.8876	0.19548
F-Test indicates equal variances (p = 0.76)	1.26447	8.88539		
The control means are not significantly different (p = 0.78)	0.27854	2.14479		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.01236	0.10498	0.00504	0.0002	1.7E-04	1, 14

Hyalella azteca 10d Survival and Growth Test-10-day Biomass

Start Date:	6/7/2011	Test ID:	5.5ha TVA emory	Sample ID:	-ERM 5.5	
End Date:	6/17/2011	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	5/24/2011	Protocol:	EPA 600/R-99/064	Test Species:	HA-Hyalella azteca	

Comments: ERM=Emory River Mile Sediment; LCS=Lab Control Sediment; ERS=Emory Reference Sediment; ERW=Emory River Water

Conc-	1	2	3	4	5	6	7	8
LCS + ERW	0.0870	0.1000	0.1020	0.1120	0.1420	0.1100	0.1080	0.1850
ERS + ERW	0.1000	0.0980	0.1100	0.1080	0.1200	0.1120	0.1220	0.1050
ERM 5.5	0.0630	0.0520	0.0710	0.0710	0.0670	0.0690	0.0310	0.0640

			Transform: Untransformed					1-Tailed		
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
LCS + ERW	0.1183	1.0811	0.1183	0.0870	0.1850	26.368	8			
ERS + ERW	0.1094	1.0000	0.1094	0.0980	0.1220	7.864	8	*		
*ERM 5.5	0.0610	0.5577	0.0610	0.0310	0.0710	22.289	8	8.505	1.761	0.0100

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.88495		0.887		-1.3842	2.47167
F-Test indicates equal variances (p = 0.25)	2.49867		8.88539			
The control means are not significantly different (p = 0.45)	0.77608		2.14479			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences Treatments vs ERS + ERW	0.01002	0.0916	0.00936	0.00013	6.7E-07	1, 14

Appendix E
Sediment Density Weight Sheets

Project Name: Tennesse Valley Authority (TVA)-Emory River

Test Dates: June 7- Jun 17, 2011

Test Type: 10-Day Screening Whole Sediment ~~Toxicity~~ Toxicity Test; Survival and Growth

Project Number: 5069-02

Sample ID: ERM 0.5 (GLC Number 8982)
ERM 0.8 (GLC Number 8983)
ERM 1.0 (GLC Number 8984)
ERM 2.5 (GLC Number 8985)

Test Species: *Chironomus dilutus* and *Hyalella azteca*

Scale: PJ400 **Initials** DS

Sediment Denisty-Wet Weight per Volume

	Sediment Density				
Replicate Number	Volume per Replicate	Actual Weight of ERM 0.5 (GLC Number 8982)	Actual Weight of ERM 0.8 (GLC Number 8983)	Actual Weight of ERM 1.0 (GLC Number 8984)	Actual Weight of ERM 2.5 (GLC Number 8985)
1	100 ml	148.75	DS 6/9/11 ~~139.56~~ 139.56	149.40	153.63
2	100 ml	144.45	145.27	150.30	151.70
3	100 ml	143.96	141.60	149.24	153.65
Mean		145.72	142.14	149.64	152.99
grams/ml		1.4572	1.4214	1.4964	1.5299
grams/100ml		145.72	142.14	149.64	152.99

Sediment Dilution Chart

Test Control Samples	Total Sediment Volume per Concentration (ml)	Sediment per Replicate mls/gram			Volume of Overlying Water for each Replicate per Renewal*
		Volume (ml)	grams sediment/ 100 mls		Volume (ml)
ERM 0.5	800	100	145.72		175
ERM 0.8	800	100	142.14		175
ERM 1.0	800	100	149.64		175
ERM 2.5	800	100	152.99		175

* Two Overlying Water Renewals with in a 24 hour period; 175 mls every 12 hours
ERS=Emory River Sediment
ERW=Emory River Water
LCS=Laboratory Control Sediment
GLW=GLEC Laboratory Water

Actual Weight of Sediment Added to Replicate						
	Test Control Samples					
Replicate Number	ERM 0.5	ERM 0.8	ERM 1.0	ERM 2.5		
1	See	above				
2						
3						

Project Name: Tennesse Valley Authority (TVA)-Emory River

Project Number: 5069-02

Test Dates: June 7- June 17, 2011
Test Type: 10-Day Screening Whole Sediment ~~Toxicity~~ Test; Survival and Growth Toxicity DMW 9/7/11

Test Species: *Chironomus dilutus* and *Hyalella azteca*

Sample ID: ERS (GLC No. 8981), LCS-Laboratory Control Sediment

Scale: ~~Ohaus #117~~ PJ400 DMW 9/7/11

Initials DS

Sediment Denisty-Wet Weight per Volume

	Sediment Density		
Replicate Number	Volume per Replicate	Actual Weight of ERS	Acutal Weight of LCS
1	100 ml	139	176
2	100 ml	146	174
3	100 ml	142	171
Mean		142.33	173.66
grams/ml		1.42	1.736
grams/100ml		142.33	173.66

Sediment Dilution Chart

Test Control Samples	Total Sediment Volume per Concentration (ml)	Sediment per Replicate mls/gram		Volume of Overlying Water for each Replicate per Renewal*
		Volume (ml)	grams sediment/ 100 mls	Volume (ml)
9/7/11 DMW ERS + ERW				
~~CRS + CRW~~	800	100	142.33	175
DMW 9/7/11 LCS + ~~CRW~~ ERW	800	100	173.16	175
LCS + GLW	800	100	173.66	175
GLW	0	0	NA	175

* Two Overlying Water Renewals with in a 24 hour period; 175 mls every 12 hours
ERS=Emory River Sediment
ERW=Emory River Water
LCS=Laboratory Control Sediment
GLW=GLEC Laboratory Water

Actual Weight of Sediment Added to Replicate								
	Test Control Samples							
Replicate Number	ERS + ERW		LCS + CRW					
1								
2	See ABOVE							
3								

Project Name: Tennesse Valley Authority (TVA)-Emory River

Test Dates: June 7- Jun 17, 2011

Test Type: 10-Day Screening Whole Sediment ~~Toxicity~~ toxicity mean 9/7/11 Test; Survival and Growth

Project Number: 5069-02

Sample ID: ERM 3.0 (GLC Number 8986)
ERM 3.5 (GLC Number 8987)
ERM 4.0 (GLC Number 8988)
ERM 5.5 (GLC Number 8989)

Test Species: *Chironomus dilutus* and *Hyalella azteca*

Scale: PJ400

Initials DS AS

Sediment Denisty-Wet Weight per Volume

	Sediment Density				
Replicate Number	Volume per Replicate	Actual Weight of ERM 3.0 (GLC Number 8986)	Actual Weight of ERM 3.5 (GLC Number 8987)	Actual Weight of ERM 4.0 (GLC Number 8988)	Actual Weight of ERM 5.5 (GLC Number 8989)
1	100 ml	149.08	170.24	132.71	~~135.30~~ 9/8/11 135.30
2	100 ml	152.91	171.83	129.26	130.24
3	100 ml	150.46	160.60	128.05	144.90
Mean		149.15	167.56	129.67	~~144.73~~ DS 9/8/11 136.81
grams/ml		1.49	1.67	129	~~1.44~~ DS 9/8/11 1.3681
grams/100ml		149.15	167.56	129.67	~~144.73~~ 9/8/11 136.81

Sediment Dilution Chart					
Test Control Samples	Total Sediment Volume per Concentration (ml)	Sediment per Replicate mls/gram			Volume of Overlying Water for each Replicate per Renewal*
		Volume (ml)	grams sediment/ 100 mls		Volume (ml)
ERM 3.0	800	100	149.15		175
ERM 3.5	800	100	167.56		175
ERM 4.0	800	100	129.67		175
ERM 5.5	0	0	~~144.73~~ 136.81	DS 9/8/11	175

* Two Overlying Water Renewals with in a 24 hour period; 175 mls every 12 hours
ERS=Emory River Sediment
ERW=Emory River Water
LCS=Laboratory Control Sediment
GLW=GLEC Laboratory Water

* Math error
New weights used to calculate Definitive dilution which were taken prior to mixing

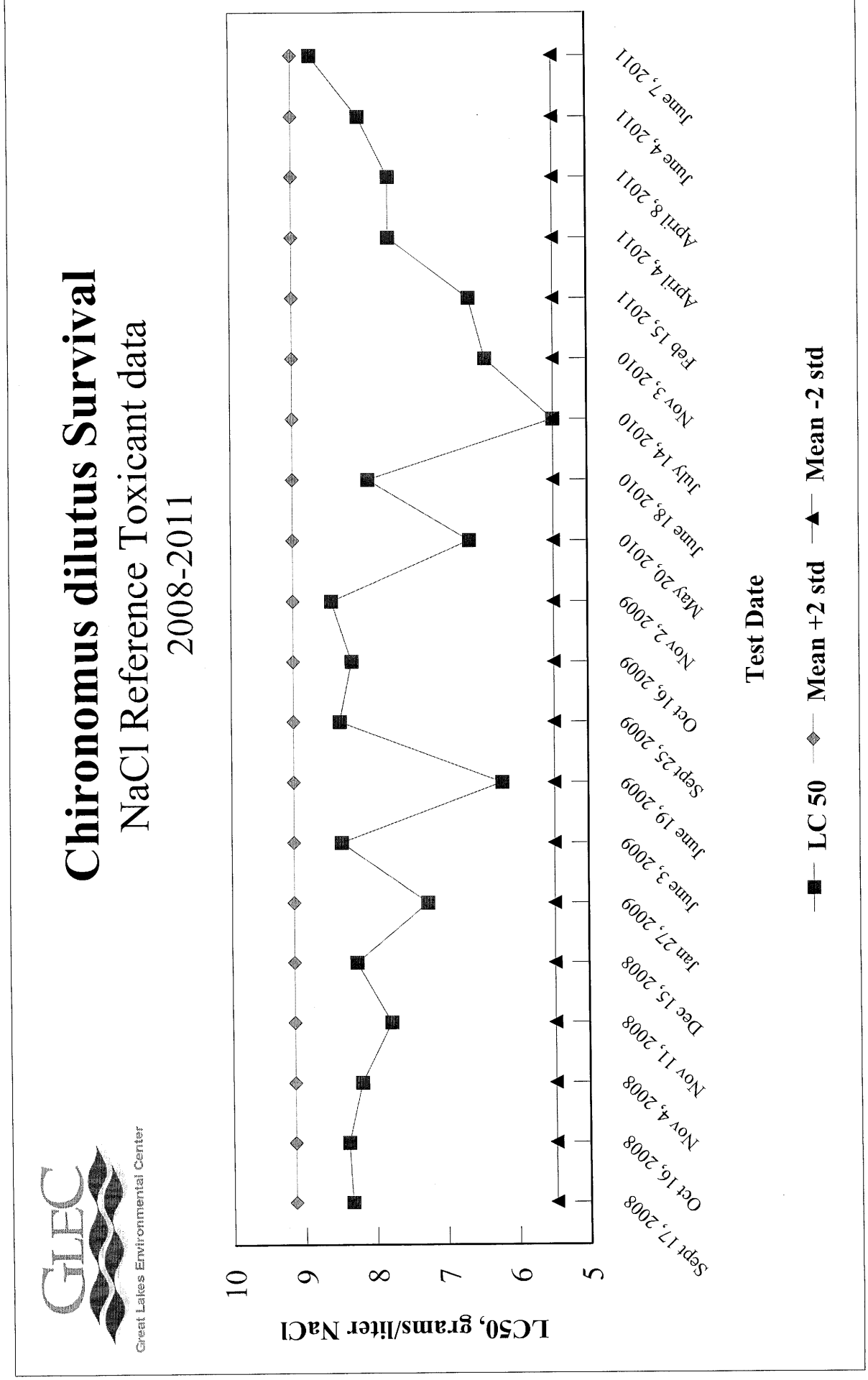
Actual Weight of Sediment Added to Replicate						
	Test Control Samples					
Replicate Number	ERM 3.0	ERM 3.5	ERM 4.0	ERM 5.5		
1	NA	See	Above			
2						
3						

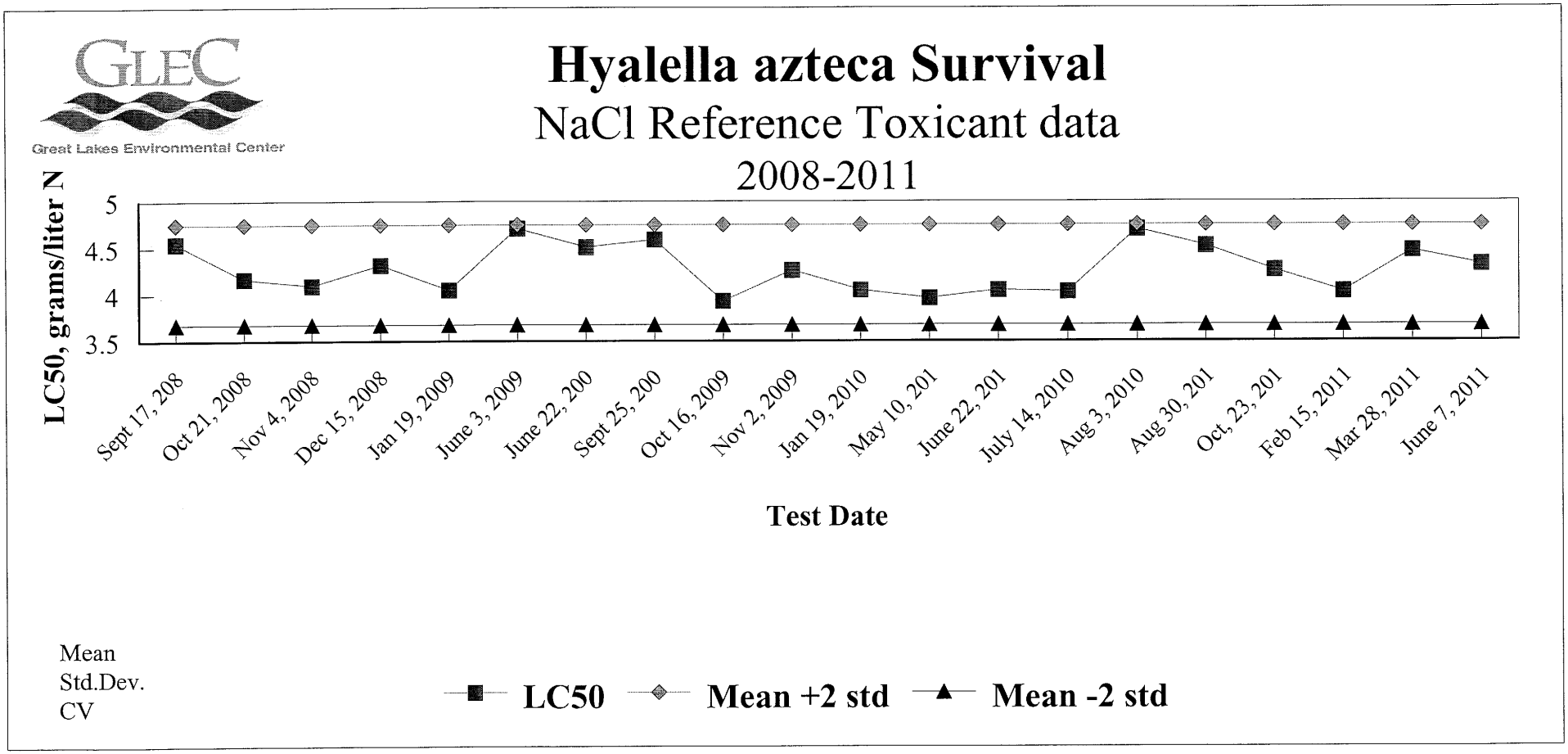
Appendix F
Reference Toxicant Data

Chironomus dilutus Survival

NaCl Reference Toxicant data

2008-2011




GLEC
Great Lakes Environmental Center
Hyalella azteca Survival
NaCl Reference Toxicant data
2008-2011
LC50, grams/liter N
5
4.5
4
3.5
Sept 17, 208
Oct 21, 2008
Nov 4, 2008
Dec 15, 2008
Jan 19, 2009
June 3, 2009
June 22, 200
Sept 25, 200
Oct 16, 2009
Nov 2, 2009
Jan 19, 2010
May 10, 201
June 22, 201
July 14, 2010
Aug 3, 2010
Aug 30, 201
Oct, 23, 201
Feb 15, 2011
Mar 28, 2011
June 7, 2011
Test Date
Mean
Std.Dev.
CV
LC50
Mean +2 std
Mean -2 std