

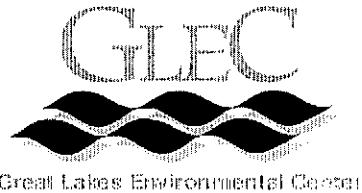
Final Report:

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

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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 with 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 in the Clinch River. The Clinch River is one of two rivers that were impacted by a fly ash spill at the Kingston Fossil 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 Clinch River and used in the 10-day whole sediment toxicity tests were designated: CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0 and CRM 4.5. All survival and growth results were compared to the reference sediment sample (Clinch River reference control sediment) collected upstream of the spill site on the Clinch River. Surface water collected from the Clinch River was used as the overlying water in the eight investigative sediments, the reference control sediment, and the laboratory control sediment exposures. These tests were conducted following the U.S. Environmental Protection Agency (EPA) and the American Society Testing and Materials (ASTM) whole sediment 10-day toxicity test methods for determining toxicity. The endpoints of these whole sediment toxicity tests conducted with *C. dilutus* and *H. azteca* were survival and growth. These whole sediment toxicity tests were performed February 15 through February 25, 2011.

The survival and growth performance criteria were met in all control samples for both the *C. dilutus* and *H. azteca* whole sediment toxicity tests. After 10 days, the eight investigative sediment samples showed no statistically significant reduction in survival in either the *C. dilutus* or the *H. azteca* tests when compared to the Clinch River reference control sediment. However, in investigative sediment sample CRM 2.0 and CRM 4.0 growth was significantly reduced in *C. dilutus* after 10 days of exposure when compared to the Clinch River reference control sediment organisms. In addition, in investigative sediment samples CRM 1.5, 2.5, and 4.5, growth was significantly reduced in *H. azteca* after 10-days of exposure when compared to the Clinch River reference control sediment organisms.

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 Clinch 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 Clinch River and used in the 10-day whole sediment toxicity tests were: CRM 0.0, CRM 1.5, CRM 2.0, CRM, 2.5, CRM 3.0, CRM 3.5, CRM 4.0 and CRM 4.5. All survival and growth results were statistically compared to the reference sediment sample (Clinch River reference control sediment) collected upstream of the spill site in the Clinch River. Surface water collected from the Clinch River upstream of the spill site, was used as the overlying water in the eight investigative sediment, reference control sediment and a laboratory control sediment tests.

As outlined in the TVA Kingston sediment study design, an additional laboratory control sediment and water only control were also analyzed during the testing period for the whole sediment toxicity tests. The overlying water for the water only and 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 sample identification numbers, 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 Estimates (expressed as average ash-free-dry-weight (AFDW))
- Table 3: 10-Day *H. azteca* Average Percent Survival
- Table 4: 10-Day *H. azteca* Growth and Biomass Estimates
- Table 5: Control Data: 10-Day *C. dilutus* Average Percent Survival
- Table 6: Control Data: 10-Day *C. dilutus* Growth and Biomass Estimates (expressed as average ash-free-dry-weight (AFDW))
- Table 7: Control Data: 10-Day *H. azteca* Average Percent Survival
- Table 8: Control Data: 10-Day *H. azteca* Growth and Biomass Estimates

Water quality data for the overlying water 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 E, respectively.

MATERIALS and METHODS

The eight investigative and one reference sediment samples collected from the Clinch River were analyzed 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 Clinch 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 February 7 through February 11, 2011 and shipped to the GLEC laboratory via a refrigerated carrier on February 11, 2011. The samples were received at GLEC on February 12, 2011. Upon arrival at GLEC the samples were assigned a unique GLEC laboratory identification numbers and stored in the dark for 3 days at 4°C until test initiation. Additional surface water was collected on February 14, 2011, and arrived at the laboratory on February 16, 2011. Sample identification and collection information is provided in the table below.

Sample I.D.	GLEC Lab. ID Number	Date Sampled	Date Received
Clinch Reference Sediment	8897	February 09, 2011	February 12, 2011
CRM 0.0	8888	February 07, 2011	February 12, 2011
CRM 1.5	8889	February 07, 2011	February 12, 2011
CRM 2.0	8891	February 07, 2011	February 12, 2011
CRM 2.5	8892	February 07, 2011	February 12, 2011
CRM 3.0	8893	February 08, 2011	February 12, 2011
CRM 3.5	8894	February 08, 2011	February 12, 2011
CRM 4.0	8895	February 08, 2011	February 12, 2011
CRM 4.5	8896	February 08, 2011	February 12, 2011
Clinch River Water	8898	February 11, 2011	February 12, 2011
Clinch River Water	8900	February 14, 2011	February 16, 2011

The 10-day *C. dilutus* and *H. azteca* toxicity tests were initiated on February 15, 2011, with each of the eight investigative sediment samples, the Clinch River reference sediment, two laboratory control sediments and one water only exposure. The surface water collected from the Clinch River (CRM 7.0) was used as the overlying water in the eight investigative sediment samples, in the Clinch 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 Clinch 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 laboratory controls; each replicate contained 10 animals. The Clinch River reference control sediment was a 50:50 composite sample collected by TVA and RSI from two reference locations upstream of the spill site on the Clinch River. The laboratory control sediment was a reference sediment collected from the Boardman River, a local stream with nearly 100 percent forested watershed, located in the Pere Marquette State Forest, near Traverse City.

The *C. dilutus* and *H. azteca* were exposed 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 thoroughly homogenized using a pre-cleaned stainless steel all purpose mixer and a power drill until a uniform color and texture was achieved. 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 Clinch River reference control, the eight investigative sediment samples, and one of the laboratory controls was Clinch River site water (CRM 7.0, which had an average hardness of 134 mg/L and an average alkalinity of 120 mg/L. The overlying water for the second laboratory control sediment and the water only control consisted of de-chlorinated municipal tap (Lake Michigan) water, with an average hardness of 127 mg/L and an average alkalinity of 106 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 Clinch River surface water was measured at the beginning of the toxicity tests and when the Clinch River water batch was nearly depleted.

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 1.0 mL mixture of yeast, trout food, and cerophyl (YTC; 1,800 mg/L solids) once daily.

The test chambers were placed in a temperature controlled water bath under the specified conditions of $23 \pm 1^{\circ}\text{C}$; photoperiod 16 hours light:8 hours dark; and light intensity of 192-310 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. Alkalinity, hardness, pH, and total ammonia (as N) were measured in the overlying water on test days 0 and 9 for both the *C. dilutus* (Table 9 and Appendix B) and *H. azteca* (Table 10 and Appendix B) tests. These results were also 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 5. 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] was also determined at test termination, and the results are summarized in Tables 2 and 6.

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 3 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 4 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 endpoints. Prior to analysis, all survival data were transformed using an arc sine-square root transformation. The transformed data were then tested using either the homoscedatic or heteroscedastic t-tests, which are intended 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 to be analyzed using the heteroscedastic t-test. If the data are not normally distributed, then the data are to be analyzed using the nonparametric t-test (e.g., Steel's Many-One Rank or Wilcoxon with Bonferroni's).

Growth data were initially evaluated for normal distribution and homogeneity of variances. In those cases where the data were not normally distributed or homogenous, then 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, the growth was analyzed as biomass (average dry weight of surviving organisms divided by the number of initial organisms). The percent survival and growth for each investigative sample was considered statistically different when it was significantly lower ($p < 0.05$) than the organisms exposed to the Clinch River reference control sediment (GLC Number 8897).

Organisms exposed to the GLEC laboratory control sediments and the water only control exposures for each toxicity test 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). In this instance, the laboratory control sediment with laboratory water (dechlor) and the water only control were used as a measure of test acceptability and of the 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 Clinch River surface water (CRM 7.0) was used to measure the toxicity of the surface water being used as the overlying water in the whole sediment toxicity tests. Control survival, growth and biomass results are summarized in Tables 5 and 6 for the *C. dilutus*, and in Tables 7 and 8 for the *H. azteca*.

RESULTS and DISCUSSION

10-Day *Chironomus dilutus*

The organisms exposed to the Clinch 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, 5 and 6). One hundred percent of the organisms exposed to the Clinch River reference control sediment survived (both laboratory controls had 93.8 percent survival, and the water only control had 90.0 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 between *C. dilutus* survival, growth, or biomass in the laboratory control sediment with Clinch River surface water and the laboratory control sediment with laboratory water. When the organisms exposed to the laboratory control sediment with laboratory water, were statistically compared to the water only control, there was no statistical difference in survival. However, there was a statistical difference in both growth and biomass between the laboratory control sediment with laboratory water controls and the water only control. The mean growth and biomass for *C. dilutus* exposed to the laboratory control sediment with laboratory water were 0.94797 mg and 0.88750 mg, respectively, while the mean growth and biomass for *C. dilutus* exposed to the water only control was 1.12848 mg and 1.00500 mg, respectively.

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 $23 \pm 1^{\circ}\text{C}$; D.O. 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. The dissolved oxygen fell below 2.5 mg/L in the water only control (2.1 mg/L on February 24, 2011) and in the overlying site water of the laboratory control sediment (2.4 mg/L on February 25, 2011). In response to the drop in DO on February 24, we added a third overlying water renewal to all of the controls and investigative test sediment replicates. The brief drop in DO was 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 with the test organisms in these sediment samples.

Statistical Analysis for 10-Day *Chironomus dilutus* Tests

Clinch River Reference Sediment Sample Compared to Investigative Sediment Samples: CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0 and CRM 4.5

Survival and growth results from the Clinch River reference control sediment sample (GLC Number: 8897) were compared statistically to the eight investigative sediment samples: CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0 and CRM 4.5. There was no statistically significant reduction ($p \geq 0.05$) in *C. dilutus* survival in any of the eight investigative sediment samples after 10 days of exposure when compared to the Clinch River reference control sediment (Tables 1 and 11).

Chironomus growth [measured as AFDW of surviving organisms (mg)] was significantly reduced in one investigative sediment sample; CRM 4.0 (GLC Number: 8895) when compared to the Clinch River reference control sediment sample (Tables 2 and 11). The growth data was also evaluated using the biomass [AFDW of surviving organisms divided by the initial number of organisms (mg)]. The *C. dilutus* growth expressed as biomass was statistically reduced ($p < 0.05$) in two investigative sediment samples: CRM 2.0 (GLC Number: 8891), and CRM 4.0 (GLC Number: 8895), after 10 days of exposure when compared to the Clinch 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 Clinch River reference control sediment, the laboratory control sediments and in the water only exposure control exceeded the minimum survival criterion (80 percent), and there was measurable growth relative to the weight of organisms at test initiation (Tables 3, 4, 7 and 8). After 10 days of exposure, the *H. azteca* exposed to the Clinch River reference control sediment had 95.0 percent survival and organisms exposed to the laboratory control sediment with Clinch River surface water had 96.3 percent survival, and the organisms exposed to the laboratory control sediment with laboratory water and the water only control both had 97.5 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 for *H. azteca* between survival, growth, or biomass in the laboratory control sediment with Clinch River surface water relative to the laboratory control sediment with laboratory water. Survival of organisms exposed to the laboratory control sediment with laboratory water, when statistically compared to the water only control, showed no difference for survival. However there was a statistical difference for these organisms in both growth and biomass. The mean growth and biomass for *H. azteca* exposed to the laboratory

control sediment with laboratory water were 0.12753 mg and 0.12525 mg, respectively. Whereas the mean growth and biomass for *H. azteca* exposed to the water only control were 0.05053 mg and 0.04925 mg, respectively. These data suggest to us that the sediment provided an additional food source for the *H. azteca*.

The overlying water quality measurements (Table 10) were also within the acceptable limits according to the EPA testing protocol (i.e., daily mean temperatures were $23 \pm 1^{\circ}\text{C}$; D.O. 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 (Appendix B)).

All test chambers were checked daily to assess organism behavior and no unusual observations were noted, with an exception observed on day 10 (test termination). On February 25, 2011, during test termination in replicate one of investigative sediment CRM 2.0 (GLC Number: 8891), there were no organisms recovered. However, there was 100 percent recovery of organisms in the other seven replicates of investigative sediment CRM 2.0. We believe that there was a technician error during test initiation which resulted in no organisms added to replicate one of CRM 2.0. Therefore, we did not include this replicate in the statistical analysis.

Consequently, the *H. azteca* whole sediment toxicity tests with samples Clinch River reference, CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0 and CRM 4.5 are valid assessments of sediment toxicity.

Statistical Analysis for 10-Day *Hyalella azteca* Tests

Clinch River Reference Sediment Sample Compared to Investigative Sediment Samples: CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0 and CRM 4.5

Survival and growth results from the Clinch River reference sediment sample (GLC Number: 8897) from the 10-day whole sediment toxicity tests were statistically compared to the eight investigative sediment samples: CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0 and CRM 4.5. There was no statistically significant reduction ($p \geq 0.05$) in *H. azteca* survival in any of the eight investigative sediment samples after 10 days of exposure when compared to the Clinch River reference control sediment (Tables 3, 4 and 12).

In contrast, *H. azteca* growth in the surviving organisms (measured as average dry weight in mg) was significantly reduced in three of the eight investigative samples; CRM 1.5, CRM 2.5, and CRM 4.5 (GLC Numbers: 8889, 8892, and 8896, respectively) when compared to the Clinch River reference control sediment (Tables 4 and 12). The *H. azteca* growth data was also evaluated using biomass (weight of surviving organisms divided by the initial number of organisms), and we found a statistically significant reduction in *H. azteca* growth (as biomass) in one investigative sediment sample; CRM 1.5 (GLC Number: 8889) when compared to the Clinch River reference control sediment (Tables 4 and 12).

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

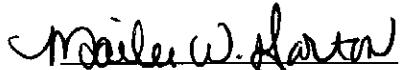
In-House Reference Toxicant Results for *Chironomus dilutus* and *Hyalella azteca*

The in-house NaCl reference toxicant 96-hour LC₅₀ (median lethal toxicant concentration) results for *C. dilutus* was 6.66 mg/L, and 4.03 mg/L for *H. azteca*. Those 96-hour LC₅₀ results for both organisms were within \pm 2 standard deviations of the mean toxicity value (LC₅₀). The summarized control charts are provided in Appendix E. After 96-hours 100 percent of the controls for both the *C. dilutus* and *H. azteca* reference toxicant tests were alive.

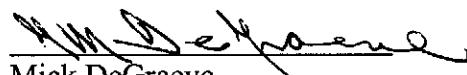
In summary, survival and growth performance criteria were met in all controls of both the *C. dilutus* and *H. azteca* whole sediment toxicity tests. After 10-days, the eight investigative sediment samples showed no statistical reduction in survival for either the *C. dilutus* or the *H. azteca*, when compared to the Clinch River reference control sediment results. However, growth of *C. dilutus* exposed to investigative sediment samples CRM 2.0 and CRM 4.0 was reduced (expressed as growth or biomass) after 10 days of exposure when statistically compared to the Clinch River reference control. In addition, growth of *H. azteca* exposed to investigative sediment samples; CRM 1.5, 2.5, and 4.5, was significantly reduced (expressed as growth or biomass after 10 days of exposure when statistically compared to the Clinch River reference control sediment.

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



TABLE 1. Comparison of Number of Surviving Organisms per Replicate and Percent Survival Between the Clinch River Reference Control Sediment Sample and the Investigative Sediment Samples (CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0, and CRM 4.5) for the Tennessee Valley Authority (TVA) *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted February 15–February 25, 2011.

Replicate Number	Number Test Organisms Surviving per Replicate ^r										
	Laboratory Control	Clinch River Reference Control	CRM 0.0	CRM 1.5	CRM 2.0	CRM 2.5	CRM 3.0	CRM 3.5	CRM 4.0	CRM 4.5	
	with Clinch River Water CRM 7.0	GLC# 8897	GLC# 8888	GLC# 8889	GLC# 8891	GLC# 8892	GLC# 8893	GLC# 8894	GLC# 8895	GLC# 8896	
1	10	10	10	10	10	10	10	10	10	10	
2	10	10	10	10	9	10	9	10	5	10	
3	9	10	10	9	10	10	10	10	10	10	
4	9	10	10	10	10	10	10	10	10	10	
5	10	10	10	10	10	9	10	10	10	10	
6	10	10	10	10	10	10	10	10	10	10	
7	9	10	10	7	9	10	10	10	10	9	
8	8	10	10	6	10	10	10	10	9	9	
10-Day Percent Survival	93.8	100.0	100.0	90.0	97.5	98.8	98.8	100.0	92.5	97.5	

^r Replicates initiated with 10 organisms each



TABLE 2.

Comparison of Average¹ Ash-Free-Dry Weight (AFDW) (mg), Biomass² (AFDW) (mg) and Percent Survival Between the Clinch River Reference Control Sediment Sample and the Investigative Sediment Samples (CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0, and CRM 4.5) for the Tennessee Valley Authority (TVA) *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted February 15–February 25, 2011.

REPLICATE #	Laboratory Control	Clinch River Reference Control		CRM 0.0		CRM 1.5		CRM 2.0		CRM 2.5		CRM 3.0		CRM 3.5		CRM 4.0		CRM 4.5			
	with Clinch River Water CRM 7.0	GLC# 8897		GLC# 8888		GLC# 8889		GLC# 8891		GLC# 8892		GLC# 8893		GLC# 8894		GLC# 8895		GLC# 8896			
	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	0.82300	0.82300	0.80500	0.80500	0.91700	0.91700	0.78700	0.78700	0.74300	0.74300	0.71500	0.71500	0.67100	0.67100	0.79400	0.79400	0.49800	0.49800	0.93100	0.93100	
2	1.01600	1.01600	0.89100	0.89100	0.76200	0.76200	0.66300	0.66300	0.56778	0.51100	0.66400	0.66400	0.95333	0.85800	0.76100	0.76100	0.75000	0.37500	0.87600	0.87600	
3	0.96000	0.86400	0.85400	0.85400	0.85500	0.85500	0.80889	0.72800	0.58800	0.58800	0.68300	0.68300	1.61100	1.61100	0.83800	0.83800	0.49200	0.49200	0.69800	0.69800	
4	0.98667	0.88800	0.67100	0.67100	0.95500	0.95500	1.05400	1.05400	0.67300	0.67300	0.64700	0.64700	0.70500	0.70500	0.91100	0.91100	0.52600	0.52600	0.72600	0.72600	
5	1.05700	1.05700	0.95800	0.95800	0.75600	0.75600	0.80700	0.80700	0.44700	0.44700	0.83889	0.75500	0.73800	0.73800	0.76800	0.76800	0.66400	0.66400	0.74800	0.74800	
6	1.10700	1.10700	0.62200	0.62200	0.81200	0.81200	0.84889	0.76400	0.74200	0.74200	0.70600	0.70600	0.86400	0.86400	0.76800	0.76800	0.52600	0.52600	0.63300	0.63300	
7	0.83778	0.75400	0.61400	0.61400	0.65800	0.65800	0.91571	0.64100	0.79111	0.71200	0.73500	0.73500	0.93600	0.93600	0.71700	0.71700	0.44300	0.44300	0.86333	0.77700	
8	1.18750	0.95000	0.81600	0.81600	0.81800	0.81800	1.21000	0.72600	0.87000	0.87000	0.74400	0.74400	0.76400	0.76400	0.99400	0.99400	0.63333	0.57000	0.65222	0.58700	
Average ¹ Ash-Free-Dry-Weight (AFDW) (mg)	0.99687		0.77887		0.81663		0.88681		0.67774		0.71661		0.90529		0.81887		0.56654		0.76594		
Average (AFDW) Biomass ² Weight (mg)		0.93237		0.77887		0.81663		0.77125		0.66075 ^a		0.70612		0.89337		0.81887		0.51175 ^a		0.74700	
10-Day Percent Survival	93.8		100.0		100.0		90.0		97.5		98.8		98.8		100.0		92.5		97.5		

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.

^a Significantly different ($p \leq 0.05$) from Clinch River Reference Control Sediment (GLC# 8897)

Note: Average Ash-Free-Dry Weight of *Chironomus dilutus* at test initiation = 0.20100 mg



TABLE 3. Comparison of Number of Surviving Organisms per Replicate and Percent Survival Between the Clinch River Reference Control Sediment Sample and the Investigative Sediment Samples (CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0, and CRM 4.5) for the Tennessee Valley Authority (TVA) *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted February 15–February 25, 2011.

Replicate Number	Number Test Organisms Surviving per Replicate ^r										
	Laboratory Control	Clinch Reference	CRM 0.0	CRM 1.5	CRM 2.0	CRM 2.5	CRM 3.0	CRM 3.5	CRM 4.0	CRM 4.5	
	with Clinch River Water CRM 7.0	GLC# 8897	GLC# 8888	GLC# 8889	GLC# 8891	GLC# 8892	GLC# 8893	GLC# 8894	GLC# 8895	GLC# 8896	
1	10	10	10	10	T.E.	10	9	9	7	10	
2	9	10	10	10	10	10	10	10	10	10	
3	9	8	10	10	10	10	10	10	10	10	
4	10	9	10	10	10	10	8	10	10	10	
5	10	9	10	10	10	10	10	10	10	10	
6	9	10	10	10	10	10	10	10	10	10	
7	10	10	10	10	10	10	10	10	10	10	
8	10	10	10	9	10	10	10	10	3	10	
10-Day Percent Survival	96.3	95.0	100.0	98.8	100.0	100.0	96.3	98.8	87.5	100.0	

^r Replicates initiated with 10 organisms each

T.E.: Technician Error, no animals added and not used in statistical analysis



TABLE 4.

Comparison of Average¹ Dry Weight (mg), Biomass² Dry Weight (mg) and Percent Survival Between the Clinch River Reference Control Sediment Sample and the Investigative Sediment Samples (CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0, and CRM 4.5) for the Tennessee Valley Authority (TVA) *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted February 15–February 25, 2011.

REPLICATE #	Laboratory	Control	Clinch Reference	CRM 0.0		CRM 1.5		CRM 2.0		CRM 2.5		CRM 3.0		CRM 3.5		CRM 4.0		CRM 4.5			
	with Clinch River Water CRM 7.0		GLC# 8897	GLC# 8888		GLC# 8889		GLC# 8891		GLC# 8892		GLC# 8893		GLC# 8894		GLC# 8895		GLC# 8896			
	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	0.09300	0.09300	0.10400	0.10400	0.11300	0.11300	0.05900	0.05900	T.E.	T.E.	0.07300	0.07300	0.08889	0.08000	0.09111	0.08200	0.08000	0.05600	0.09100	0.09100	
2	0.14000	0.12600	0.15800	0.15800	0.09700	0.09700	0.08700	0.08700	0.08000	0.08000	0.07000	0.07000	0.07000	0.07000	0.10400	0.10400	0.08700	0.08700	0.07400	0.07400	
3	0.08778	0.07900	0.10875	0.08700	0.09900	0.09900	0.07800	0.07800	0.09100	0.09100	0.07700	0.07700	0.09500	0.09500	0.08600	0.08600	0.09200	0.09200	0.09800	0.09800	
4	0.10900	0.10900	0.08556	0.07700	0.11300	0.11300	0.08900	0.08900	0.08700	0.08700	0.08500	0.08500	0.08250	0.06600	0.09800	0.09800	0.09500	0.09500	0.08600	0.08600	
5	0.12200	0.12200	0.09556	0.08600	0.12900	0.12900	0.07900	0.07900	0.07900	0.07900	0.08300	0.08300	0.12000	0.12000	0.11100	0.11100	0.12400	0.12400	0.08800	0.08800	
6	0.14000	0.12600	0.09800	0.09800	0.11900	0.11900	0.10800	0.10800	0.08800	0.08800	0.09200	0.09200	0.09600	0.09600	0.09400	0.09400	0.10900	0.10900	0.08000	0.08000	
7	0.09900	0.09900	0.11400	0.11400	0.06900	0.06900	0.07200	0.07200	0.10100	0.10100	0.09900	0.09900	0.08700	0.08700	0.08800	0.08800	0.11500	0.11500	0.08500	0.08500	
8	0.11500	0.11500	0.07800	0.07800	0.08400	0.08400	0.07556	0.06800	0.09900	0.09900	0.10700	0.10700	0.08200	0.08200	0.08200	0.08200	0.03333	0.01000	0.08300	0.08300	
Average ¹ Dry Weight (mg)	0.11322		0.10523		0.10287		a 0.08094		0.08929		a 0.08575		0.09017		0.09426		0.09192		a 0.08563		
Average Biomass ² Weight (mg)		0.10863		0.10025		0.10287		a 0.08000		0.08929		0.08575		0.08700		0.09312		0.08600		0.08563	
10-Day Percent Survival	96.3		95.0		100.0		98.8		100.0		100.0		96.3		98.8		87.5		100.0		

¹ Average dry weight is the total dry weight of surviving organisms

²Biomass weight is the total dry weight of surviving organisms divided by the initial number of organisms.

^a Significantly different ($p < 0.05$) from Clinch River Reference Control Sediment (GLC# 8897)

Note: Average Dry Weight of *Hyalella azteca* at test initiation = 0.02000 mg

T.E.: Technician Error, no animals added and not used in statistical analysis



TABLE 5. Comparison of 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 Clinch River Water (CRM 7.0) for the Tennessee Valley Authority (TVA) *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted February 15-February 25, 2011.

Replicate Number	Number Test Organisms Surviving per Replicate ^r			
	Laboratory Control	Water Only Control	Laboratory Control	Clinch River Reference Control
	with Laboratory Water (Dechlor)	Laboratory Water (Dechlor)	with Clinch River Water CRM 7.0	GLC# 8897
1	10	8	10	10
2	9	9	10	10
3	10	10	9	10
4	9	10	9	10
5	9	10	10	10
6	9	8	10	10
7	9	8	9	10
8	10	9	8	10
10-Day Percent Survival		93.8	90.0	93.8
				100.0

^r Replicates initiated with 10 organisms each



TABLE 6.

Comparison of Average¹ Ash-Free-Dry Weight (AFDW) (mg), Biomass² (AFDW) (mg) and Percent Survival Between the Laboratory Control Sediment with Laboratory Control water and the Water Only Control and Laboratory Control Sediment with Clinch River Water (CRM 7.0) for the Tennessee Valley Authority (TVA) *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted February 15–February 25, 2011.

REPLICATE #	Laboratory Control		Water Only Control		Laboratory Control		Clinch River Reference Control	
	with Laboratory Water (Dechlor)		Laboratory Water (Dechlor)		with Clinch River Water CRM 7.0		GLC# 8897	
	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	0.89700	0.89700	1.12625	0.90100	0.82300	0.82300	0.80500	0.80500
2	1.00667	0.90600	1.18556	1.06700	1.01600	1.01600	0.89100	0.89100
3	0.74100	0.74100	1.00500	1.00500	0.96000	0.86400	0.85400	0.85400
4	0.94667	0.85200	0.98400	0.98400	0.98667	0.88800	0.67100	0.67100
5	1.09000	0.98100	0.88300	0.88300	1.05700	1.05700	0.95800	0.95800
6	1.00444	0.90400	1.24500	0.99600	1.10700	1.10700	0.62200	0.62200
7	0.79000	0.71100	1.35125	1.08100	0.83778	0.75400	0.61400	0.61400
8	1.10800	1.10800	1.24778	1.12300	1.18750	0.95000	0.81600	0.81600
Average ¹ Dry Weight (mg)	0.94797 ^a		1.12848 ^a		0.99687		0.77887	
Average Biomass ² Weight (mg)								0.77887
10-Day Percent Survival	93.8		90.0		93.8		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 dry weight of surviving organisms divided by the initial number of organisms

^a Significantly different means between Laboratory Control Sediment with Laboratory Water and the Water Only Control

Note: Average Ash-Free-Dry Weight of *Chironomus dilutus* at test initiation = 0.20100 mg



TABLE 7. Comparison of 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 Clinch River Water (CRM 7.0) for the Tennessee Valley Authority (TVA) *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted February 15-February 25, 2011.

Replicate Number	Number Test Organisms Surviving per Replicate ^r			
	Laboratory Control	Water Only Control	Laboratory Control	Clinch River Reference Control
	with Laboratory Water (Dechlor)	Laboratory Water (Dechlor)	with Clinch River Water CRM 7.0	GLC# 8897
1	10	10	10	10
2	10	10	9	10
3	8	9	9	8
4	10	10	10	9
5	10	10	10	9
6	10	10	9	10
7	10	10	10	10
8	10	9	10	10
10-Day Percent Survival	97.5	97.5	96.3	95.0

^r Replicates initiated with 10 organisms each



TABLE 8. Comparison of Average¹ Dry Weight (mg), Biomass² (mg) and Percent Survival Between the Laboratory Control Sediment with Laboratory Control water and the Water Only Control and Laboratory Control Sediment with Clinch River Water (CRM 7.0) for the Tennessee Valley Authority (TVA) *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted February 15–February 25, 2011.

REPLICATE #	Laboratory Control		Water Only Control		Laboratory Control		Clinch River Reference Control	
	with Laboratory Water (Dechlor)		Laboratory Water (Dechlor)		with Clinch River Water CRM 7.0		GLC# 8897	
	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	0.17800	0.17800	0.06400	0.06400	0.09300	0.09300	0.10400	0.10400
2	0.10100	0.10100	0.05600	0.05600	0.14000	0.12600	0.15800	0.15800
3	0.09125	0.07300	0.04667	0.04200	0.08778	0.07900	0.10875	0.08700
4	0.15400	0.15400	0.03900	0.03900	0.10900	0.10900	0.08556	0.07700
5	0.10800	0.10800	0.06200	0.06200	0.12200	0.12200	0.09556	0.08600
6	0.09600	0.09600	0.04200	0.04200	0.14000	0.12600	0.09800	0.09800
7	0.17700	0.17700	0.03900	0.03900	0.09900	0.09900	0.11400	0.11400
8	0.11500	0.11500	0.05556	0.05000	0.11500	0.11500	0.07800	0.07800
Average ¹ Dry Weight (mg)	0.12753 ^a		0.05053 ^a		0.11322		0.10523	
Average Biomass ² Weight (mg)			0.12525 ^a		0.04925 ^a		0.10863	0.10025
10-Day Percent Survival	97.5		97.5		96.3		95.0	

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 and the Water Only Control

Note: Average Dry Weight of *Hyalella azteca* at test initiation = 0.02000 mg



Table 9. Summary of Mean Water Quality Parameters of Overlying Water Samples Collected Prior to Renewal for the Tennessee Valley Authority (TVA) Clinch River *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted February 15- February 25, 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 (CaCO ₃ mg/L) (range) n=2 n=3; CRM 2.5 and CRM 4.0	Hardness (CaCO ₃ mg/L) (range) n=2 n=3; CRM 2.5 and CRM 4.5	Ammonia (mg/L as N) (range) n=2
Clinch River Reference Control GLC No.: 8897	22.8 (22.3-23.1)	7.64 (7.51-7.77)	4.9 (2.5-6.5)	326 (324-329)	122 (122-122)	180 (144-216)	0.15 (0.06-0.23)
CRM 0 GLC No.: 8888	22.8 (22.2-23.0)	7.61 (7.48-7.72)	4.2 (3.1-5.8)	344 (338-350)	132 (128-136)	142 (140-144)	0.28 (0.27-0.28)
CRM 1.5 GLC No.: 8889	22.8 (22.3-23.0)	7.49 (7.41-7.59)	4.6 (3.3-6.2)	315 (307-322)	118 (116-120)	140 (136-144)	0.08 J (0.08-0.08)
CRM 2.0 GLC No.: 8891	22.9 (22.3-23.2)	7.64 (7.54-7.72)	4.9 (3.7-6.5)	315 (309-322)	118 (114-122)	142 (140-144)	0.04 J (0.01-0.07)
CRM 2.5 GLC No.: 8892	22.9 (22.3-23.2)	7.58 (7.48-7.69)	4.8 (3.2-6.5)	314 (306-322)	107 (100-120)	143 (136-152)	0.06 J (0.03-0.10)
CRM 3.0 GLC No.: 8893	22.9 (22.3-23.2)	7.59 (7.53-7.66)	4.3 (2.9-6.1)	340 (335-345)	128 (122-134)	150 (144-156)	0.27 (0.25-0.29)
CRM 3.5 GLC No.: 8894	22.8 (22.3-23.1)	7.68 (7.64-7.72)	4.4 (3.0-6.1)	327 (320-333)	121 (116-126)	144 (144-144)	0.12 (0.09-0.14)
CRM 4.0 GLC No.: 8895	22.8 (22.3-23.2)	7.63 (7.58-7.67)	4.8 (3.0-6.5)	316 (313-321)	119 (114-126)	138 (132-144)	0.09 J (0.07-0.10)
CRM 4.5 GLC No.: 8896	22.8 (22.3-23.1)	7.65 (7.56-7.74)	4.6 (2.7-6.5)	321 (315-327)	117 (114-120)	141 (140-144)	0.03 U (0.00-0.06)
LCS & CRW Laboratory Control Sediment with Clinch River Water- CRM 7.0	22.7 (22.2-23.1)	7.57 (7.42-7.71)	3.7 (2.4-5.6)	338 (336-340)	117 (104-130)	146 (144-148)	0.31 (0.27-0.35)
LCS & GLW Laboratory Control Sediment with Laboratory Water	22.7 (22.1-23.0)	7.41 (7.29-7.56)	4.0 (2.8-5.7)	329 (327-331)	114 (110-118)	138 (136-140)	0.21 (0.18-0.24)
GLW Laboratory Water Only	22.8 (22.2-23.0)	7.69 (7.47-7.90)	4.8 (2.1-7.9)	310 (307-312)	94 (86-102)	132 (128-136)	0.21 (0.01-0.41)

J = Between MDL (0.04) and RL (0.1)

U = Below MDL (0.04) (non detect)



Table 10. Summary of Mean Water Quality Parameters of Overlying Water Samples Collected Prior to Renewal for the Tennessee Valley Authority (TVA) Clinch River *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted February 15- February 25, 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 (CaCO ₃ mg/L) (range) n=2 n=3; CRM 1.5 and CRM 2.5	Hardness (CaCO ₃ mg/L) (range) n=2 n=3; CRM 2.5 and CRM 3.5	Ammonia (mg/L as N) (range) n=2 n=3; CRM 2.5 and CRM 3.0
Clinch River Reference Control GLC No.: 8897	22.6 (22.3-22.9)	7.79 (7.68-7.85)	6.5 (5.7-7.2)	325 (323-325)	124 (122-126)	174 (132-216)	0.13 (0.02-0.23)
CRM 0 GLC No.: 8888	22.6 (22.1-23.0)	8.05 (7.63-8.43)	5.9 (5.1-6.9)	347 (345-349)	137 (136-138)	148 (144-152)	0.17 (0.06-0.28)
CRM 1.5 GLC No.: 8889	22.6 (22.2-23.0)	7.76 (7.56-7.97)	6.3 (5.1-7.2)	312 (306-318)	118 (112-122)	132 (128-136)	0.06 J (0.03-0.08)
CRM 2.0 GLC No.: 8891	22.6 (22.2-23.0)	7.81 (7.62-7.96)	6.5 (5.5-7.5)	317 (312-322)	108 (102-114)	136 (132-140)	0.02 U (0.01-0.03)
CRM 2.5 GLC No.: 8892	22.6 (22.2-23.0)	7.77 (7.59-7.96)	6.6 (5.8-7.5)	315 (307-323)	109 (100-124)	143 (136-152)	0.03 U (0.02-0.04)
CRM 3.0 GLC No.: 8893	22.6 (22.2-22.9)	8.00 (7.59-8.44)	5.7 (3.8-7.0)	346 (343-349)	135 (134-136)	156 (156-156)	0.13 (0.04-0.29)
CRM 3.5 GLC No.: 8894	22.7 (22.2-23.0)	8.05 (7.46-8.55)	6.1 (5.0-7.0)	334 (319-347)	129 (116-142)	147 (144-148)	0.05 J (0.00-0.09)
CRM 4.0 GLC No.: 8895	22.6 (22.2-23.0)	7.78 (7.58-8.00)	6.5 (5.7-7.5)	317 (312-322)	120 (114-126)	140 (136-144)	0.06 J (0.01-0.10)
CRM 4.5 GLC No.: 8896	22.6 (22.2-22.9)	7.76 (7.60-7.87)	6.4 (5.7-7.1)	318 (310-325)	119 (114-124)	142 (140-144)	0.02 U (0.00-0.03)
LCS & CRW Laboratory Control Sediment with Clinch River Water- CRM 7.0	22.6 (22.2-23.0)	7.71 (7.65-7.78)	5.4 (4.3-6.3)	334 (330-338)	131 (130-132)	140 (132-148)	0.17 (0.06-0.27)
LCS & GLW Laboratory Control Sediment with Laboratory Water	22.6 (22.2-23.0)	7.59 (7.49-7.65)	5.9 (4.9-7.4)	327 (320-344)	117 (116-118)	140 (140-140)	0.14 (0.10-0.18)
GLW Laboratory Water Only	22.6 (22.2-22.9)	7.90 (7.87-7.92)	6.7 (5.0-7.7)	306 (303-309)	107 (102-112)	134 (132-136)	0.07 J (0.01-0.12)

J = Between MDL (0.04) and RL (0.1)

U = Below MDL (0.04) (non detect)

Table 11. Summary of Statistically Significant Differences ($p < 0.05$) Between the Clinch River Reference Control Sediment Sample and the Investigative Sediment Samples (CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0, and CRM 4.5) for the Tennessee Valley Authority (TVA) Clinch River *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted February 15- February 25, 2011.

Sample ID GLC No.	10-Day Survival with Clinch River Reference Control Sediment (GLC Number: 8897)	10-Day Growth (AFDW) with Clinch River Reference Control Sediment (GLC Number: 8897)	10-Day Biomass (AFDW) with Clinch River Reference Control Sediment (GLC Number: 8897)
CRM 0 GLC No.: 8888			
CRM 1.5 GLC No.: 8889			
CRM 2.0 GLC No.: 8891			a
CRM 2.5 GLC No.: 8892			
CRM 3.0 GLC No.: 8893			
CRM 3.5 GLC No.: 8894			
CRM 4.0 GLC No.: 8895		a	a
CRM 4.5 GLC No.: 8896			

a=Significantly different ($p < 0.05$) from Clinch River Reference Control Sediment (GLC Number: 8897)
 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 Clinch River Reference Control Sediment Sample and the Investigative Sediment Samples (CRM 0.0, CRM 1.5, CRM 2.0, CRM 2.5, CRM 3.0, CRM 3.5, CRM 4.0, and CRM 4.5) for the Tennessee Valley Authority (TVA) Clinch River *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted February 15–February 25, 2011.

Sample ID GLC No.	10-Day Survival with Clinch River Reference Control Sediment (GLC Number: 8897)	10-Day Growth with Clinch River Reference Control Sediment (GLC Number: 8897)	10-Day Biomass with Clinch River Reference Control Sediment (GLC Number: 8897)
CRM 0 GLC No.: 8888			
CRM 1.5 GLC No.: 8889		a	a
CRM 2.0 GLC No.: 8891			
CRM 2.5 GLC No.: 8892		a	
CRM 3.0 GLC No.: 8893			
CRM 3.5 GLC No.: 8894			
CRM 4.0 GLC No.: 8895			
CRM 4.5 GLC No.: 8896		a	

a=Significantly different ($p < 0.05$) from Clinch River Reference Control Sediment (GLC Number: 8897)
 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

Page 1 of 1

Client: TVA	Dennis McCauley dmccauley@glec.com	Project Name: KIF Ash Toxicity Study	Delivered By (Circle One): <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> UPS <input type="checkbox"/> Bus <input type="checkbox"/> Client <input type="checkbox"/> Courier <input type="checkbox"/> Courier <input type="checkbox"/> Other (specify): _____							
Date of Sample Collection: 02/11/2011	Great Lakes Environmental Center (GLEC) 739 Hastings Street Traverse City, MI 49686	Location: CRM7.0 TVA - L415-NTC-TOK-003	General Comments: Bulk Clinch River reference water for sediment toxicity study collected in 2.5 gallon (10L) cubitainers.							
Collected By: M. Greer (RSI), C.L. Jackson (TVA), R. Jozefczyk (RSI), T. J. Kelly (RSI), D. Lee (RSI), C. Fauless (RSI), J. Kerr (RSI), A. Johnson (RSI)	TVA O1 is Bedch A									
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, No Inches	Log #	Arrival Temp. (°C)	By	Time	Appearance
BULKSW-CRM7.0-GLEC	G	02/11/2011	10S 1	(50) 10L cubitainers	3.65		8893	04-2.3°C	DS	13-15:30 6:00D
<i>SG 02/11/11</i>										
Sample Custody – Fill In From Top Down										
Relinquished By (Signature)/Affiliation:		Date/Time	Received By (Signature)/Affiliation:	Date/Time						
<i>Dennis McCauley / LSC</i>	02/11/11 14:08	<i>Kate Jones / TUA</i>	02/11/11 / <i>14:08</i>	<i>14:08 KJ 2011</i>						
<i>Kate Jones / TUA</i>	02/11/11 14:13	<i>Trish Smith / GEC</i>	02/11/11 / <i>14:13</i>	<i>14:13 Trish Smith 2011</i>						
Associated UPS Tracking #'s (if applicable): There is no tracking # associated with this shipment. TVA lock# 007777 001784										

Logbook: TVA-KIF NTC -TOX-001,002,003

BIOMONITORING CHAIN OF CUSTODY RECORD

Page 1 of 1

COC No. **BULKSED-021111-GLEC**

Client: TVA	Dennis McCauley dmccauley@glec.com			Delivered By (Circle One): <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> UPS <input type="checkbox"/> Bus <input type="checkbox"/> Client <input type="checkbox"/> Courier		
Project Name: KIF Ash Toxicity Study						
Date of Sample Collection: 02/07/11, 02/08/11, 02/09/11						
Location: CRM0.0, CRM1.5, CRM2.0, CRM2.5, CRM3.0, CRM3.5, CRM4.0, CRM4.5, CRM6.5, CRM7.5	Great Lakes Environmental Center (GLEC) 739 Hastings St. Traverse City, MI 49686 231.941.2230 Cell 231.649.3740					
Collected By: R. Josefczyk (RSI), L. Jackson (TVA), R. Vance (RSI), E. Arnold (RSI), M. Greer (RSI), D. Mathis (RSI)						

Field Identification / Sample Description	Grab/ Comp	Collection Date/Time	Number of Containers & Volume Collected*	Depth (ft)	Rain Event? (Mark as Appropriate)	Laboratory Use (as applicable)
Example: BULKSED-CRM0.0-GLEC		Date	Time		Yes Inches	No Trace
BULKSED-CRM0.0-GLEC	G	02/07/11	1014	(2) 3 gallon	0.0-0.5 N/A	N/A
BULKSED-CRM1.5-GLEC	G	02/07/11	1243	(2) 3 gallon	0.0-0.5 N/A	N/A
BULKSED-CRM2.0-GLEC	G	02/07/11	0955	(2) 3 gallon	0.0-0.5 N/A	N/A
BULKSED-CRM2.5-GLEC	G	02/07/11	1340	(2) 3 gallon	0.0-0.5 N/A	N/A
BULKSED-CRM3.0-GLEC	G	02/08/11	0921	(2) 3 gallon	0.0-0.5 N/A	N/A
BULKSED-CRM3.5-GLEC	G	02/08/11	1000	(2) 3 gallon	0.0-0.5 N/A	N/A
BULKSED-CRM4.0-GLEC	G	02/08/11	1235	(2) 3 gallon	0.0-0.5 N/A	N/A
BULKSED-CRM4.5-GLEC	G	02/08/11	1058	(2) 3 gallon	0.0-0.5 N/A	N/A
BULKSED-CLINCHREFERENCE-GLEC	C	02/09/11	0940	(2) 3 gallon	0.0-0.5 N/A	N/A

Sample Custody – Fill In From Top Down

Relinquished By (Signature)/Affiliation:	Date/Time	Received By (Signature)/Affiliation:	Date/Time
Dennis McCauley / TVA	02/10/11 / 0920	Kotic Jackson / TVA	02/10/11 / 0920
Kot Jackson / TVA	02/11/11 / 1352	John P. Finch / GLEC	02/11/11 / 11:15

Associated UPS Tracking #s (if applicable): There is no tracking # associated with this shipment.
TVA lock # 00117725 Call 784



Custom Critical

PO Box 5001 • Green, OH 44232-5001 • customcritical.fedex.com

SCAC: FDCC



B O P D

BILL OF LADING PROOF OF DELIVERY Page 3 of 143

Not negotiable

Page 1 of 1

Shipper, mark all copies clearly and sign.

Shipper Tracking #	Authorization #	Purchase Order #	Carrier PRO/BOL #																												
		<u>201424921</u>																													
① Shipper (from)		② Consignee (to)																													
Name <u>1-800-222-1234</u> Address <u>181 Lakeshore St.</u>		Name <u>East Lake Environmental Center</u> Address <u>101 Hunting St.</u>																													
City <u>Harrison</u> State or Province <u>TN</u>		City <u>Elk Grove</u> State or Province <u>IL</u>																													
Country <u>USA</u> Zip <u>35114</u> Phone <u>()</u>		Country <u>CA</u> Zip <u>11684</u> Phone <u>()</u>																													
Attn <u>Susan Brown</u> <u>314</u>		Attn _____																													
③ Freight charges are: <input checked="" type="checkbox"/> Prepaid <input type="checkbox"/> Collect <input type="checkbox"/> Third Party		Bill freight charges to:																													
Name _____ Address _____																															
P.O. Box _____ City _____ State _____ Zip _____																															
④ C.O.D. Collect on Delivery \$		Remit C.O.D. to: Name _____ Phone _____ Street _____ City _____ State _____ Zip _____																													
<table border="1"> <thead> <tr> <th># Handling Units</th> <th>HM (X)</th> <th>Description of Articles, Kind of Packaging, Dimensions, Special Marks, Exceptions and Unit Measurements, (i.e., pounds, gallons, etc.) Shipper → Mark HM column for hazardous materials.</th> <th>Weight in lbs. (Subject to correction)</th> </tr> </thead> <tbody> <tr> <td>45</td> <td></td> <td><u>See Shippers DCL</u></td> <td><u>110</u></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				# Handling Units	HM (X)	Description of Articles, Kind of Packaging, Dimensions, Special Marks, Exceptions and Unit Measurements, (i.e., pounds, gallons, etc.) Shipper → Mark HM column for hazardous materials.	Weight in lbs. (Subject to correction)	45		<u>See Shippers DCL</u>	<u>110</u>																				
# Handling Units	HM (X)	Description of Articles, Kind of Packaging, Dimensions, Special Marks, Exceptions and Unit Measurements, (i.e., pounds, gallons, etc.) Shipper → Mark HM column for hazardous materials.	Weight in lbs. (Subject to correction)																												
45		<u>See Shippers DCL</u>	<u>110</u>																												
⑥ Hazmat Certification - This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.																															
Emergency Response Phone Number		Shipper Name (signature)																													
		Legible Authorized Name (print)																													
Offer's Name/Contract #		Phone Number																													
⑦ If this shipment is to be delivered to the consignee without recourse on the shipper, the shipper shall sign the following statement. The carrier may decline to make delivery of this shipment without payment of freight and all other lawful charges. <u>(Shipper Signature)</u>		⑨ Consequential Damages - Carrier is not responsible or liable for any loss or damage resulting from delay, non-delivery or damage to shipment except as noted below. This includes loss of sales, income, interest, profits, attorneys fees and other costs, but is not limited to these items. Such damages are called "consequential damages." Limitation of Liability/Declared Value Damage or Loss - We are liable for no more than \$50,000 per shipment in the event of physical loss or damage to cargo, unless you fill in a higher Declared Value , document higher actual loss in the event of a claim and pay an additional fee subject to Service Guide Tariff FDCC 101 provisions for declared value. Special conditions apply to Used and Refurbished Equipment, documents, data, data records and Rescued/Interlined shipments. See reverse side for additional valuation terms and conditions. Complete terms and conditions appear in prevailing Service Guide Tariff FDCC 101 available at www.customcritical.fedex.com Shipper must state specifically in the space below the agreed or declared value of the property as follows: Shipper hereby states that the agreed or declared value of the property is: <u>\$</u>																													
⑧ Tariff Terms and Conditions; Charges - Absent a contractual agreement, all terms and conditions for transportation services (including charges) shall be set forth in Carrier's tariff as maintained at Carrier's Corporate Headquarters and in effect on the date service is provided. Copies available upon request or at customcritical.fedex.com . Delay - There is always a risk of late delivery or non-delivery. In the event of a late delivery, at your request within 30 days of shipment, FedEx Custom Critical may under certain conditions refund part of transportation charges paid.																															
⑩ Loaded by: <input checked="" type="checkbox"/> Shipper <input type="checkbox"/> Driver <input checked="" type="checkbox"/> Shipper Load & Count <input type="checkbox"/> Shipper Comments: <input checked="" type="checkbox"/> Requested cargo hold temp <u>30°F to 40°F</u> <input checked="" type="checkbox"/> Seal number <u>DD1154</u> <u>Int'l. 36°F</u> <input type="checkbox"/> Pallets/Container said to contain _____ pieces <input type="checkbox"/> Shrink wrap _____ <input checked="" type="checkbox"/> Condition of freight unknown due to: <u>PAKETS</u>																															
⑪ Shipper's Record Date <u>2/13/11</u> Shipper Signature <u>Susan Brown</u> Date <u>2/13/11</u> Driver Signature <u>D. Brown</u>		Arrived <u>2/14/11</u> a.m. <input checked="" type="checkbox"/> Departed <u>2/14/11</u> p.m. <input type="checkbox"/> Trailer # <u>N/A</u> Truck # <u>DR1532</u>																													
⑫ Delivery Record (Please print and sign full name) Received shipment described above in good order and condition except as noted. <input type="checkbox"/> Consignee Unloaded Signature: <u>Susan Brown</u> Print: <u>D. Brown</u>		Date <u>2/13/11</u> <input type="checkbox"/> Seal Intact Arrived <u>2/13/11</u> a.m. <input checked="" type="checkbox"/> Departed <u>2/13/11</u> p.m. <input type="checkbox"/> Delivery Comments: _____																													



Sample CHECK-IN FORM

CLIENT: TENNESSEE VALLEY AUTHORITY PROJECT NUMBER: 5069-00

INITIAL SAMPLE CHEMISTRY (UPON RECEIPT)

DATE RECEIVED	2/12/2011	2/12/2011	2/12/2011	DS	INITIALS
SAMPLE ID	CRM 4.0	CRM 4.5	Clinch Reference	DS	
TYPE (W=water, SED=sediment, M=material)	Sed	Sed	Sed	DS	
COLLECTION (G=grab, C=composite)	G	G	G	DS	
GLC NUMBER	8895	8896	8897	DS	
COLLECTION DATE (Time Interval)	2/8/11 12:35	2/8/11 10:58	2/8/11 09:40	DS	
TEMPERATURE (<6 degrees Celsius ¹)	A 1.8 / 1.6	A 2.3 / 1.9	A 1.1 / 1.1	DS	
SAMPLE DESCRIPTION / OBSERVATIONS (clarity, color, odor)	6-ozd container Condition, No odor muddy	Container in grab condition No odor muddy	Container in open condition NO odor Sanity	DS	

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:
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: TENNESSEE VALLEY AUTHORITYPROJECT NUMBER: 5069-00**INITIAL SAMPLE CHEMISTRY (UPON RECEIPT)**

DATE RECEIVED	2/12/2011	2/12/2011	2/12/2011	DS	INITIALS
SAMPLE ID	CRM 2.5	CRM 3.0	CRM 3.5	DS	
TYPE (W=water, SED=sediment, M=material)	SED	SED	SED	DS	
COLLECTION (G=grab, C=composite)	G	G	G	DS	
GLC NUMBER	8892	8893	8894	DS	
COLLECTION DATE (Time Interval)	2/7/11 13:40	2/8/11 9:21	2/8/11 10:00	DS	
TEMPERATURE (<6 degrees Celsius ¹)	A 2.0 / B 2.0	A 2.1 / B 2.0	A 2.5 / B 1.7	DS	
SAMPLE DESCRIPTION / OBSERVATIONS (clarity, color, odor)	Container in good condition, no odor Muddy	Container in good condition, no odor Muddy	Container in good condition, no odor Muddy	DS	

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:
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: TENNESSEE VALLEY AUTHORITY PROJECT NUMBER: 5069-00

INITIAL SAMPLE CHEMISTRY (UPON RECEIPT)

DATE RECEIVED	2/12/2011	2/12/2011	2/12/2011	DS
SAMPLE ID	CRM 0.0	CRM 1.5	CRM 2.0	DS
TYPE (W=water, SED=sediment, M=material)	SED	SED	SED	DS
COLLECTION (G=grab, C=composite)	G	G	G	DS
GLC NUMBER	8888	8889	8891	DS
COLLECTION DATE (Time Interval)	2/7/11 10:14	2/7/11 12:43	2/7/11 09:55	DS
TEMPERATURE (<6 degrees Celsius ¹)	A 2.5 / B 2.8	A 17 / B 1.8	A 2.3 / B 2.0	DS
SAMPLE DESCRIPTION / OBSERVATIONS (clarity, color, odor)	Containers in good condition Muddy, No odor	Containers in good condition Muddy, No odor	Containers in good condition Muddy, No odor	DS

¹ If out of range see project manager

SAMPLE CHEMISTRY AT TEST TEMPERATURES

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: TENNESSEE VALLEY AUTHORITY PROJECT NUMBER: 5069-00

INITIAL SAMPLE CHEMISTRY (UPON RECEIPT)

DATE RECEIVED	2/12/2011	2/12/2011	2/12/2011	DS	INITIALS
SAMPLE ID	CRM 7.0				
TYPE (W=water, SED=sediment, M=material)	WATER				
COLLECTION (G=grab, C=composite)	G				
GLC NUMBER	8898				
COLLECTION DATE (Time Interval)	2/11/11 10:57				
TEMPERATURE (<6 degrees Celsius ¹)	RANGE 0.3 - 2.3°C				
SAMPLE DESCRIPTION / OBSERVATIONS (clarity, color, odor)	Clear no odor				

¹ 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:
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: 02/11/2011

COURIER COMPANY:

FedEx

From:	To:
TVA c/o Katie Gassaway 189 Lakeshore Drive Harriman, TN 37748 865-803-4503	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:
70	50 - 2.5 gallon cubes of water 18 - 5 gallon buckets of sediment 2 coolers - one empty and the other with empty bottles

Shippers Name/Company: Lia Murray / FedEx Custom CriticalDate / Time: 02/11/11 / 2103Courier Signature/Company: Lia Murray / FedEx Custom CriticalDate / Time: 02/11/11 / 2103Receipt Signature/Company: Paul H. Great Lakes Environmental CenterDate / Time: 2/12/11 11:15

Corresponding Chains of Custody:

BULKSED-021111-GLEC page 1 of 1	
BULKSW-021111-GLEC page 1 of 1	

TVA lock #: 0011784

CHAIN OF CUSTODY RECORD

Page 1 of 1

COC No. BULKSW-021411-G1EC

Client: TVA		Delivered By (Circle One):								
		FedEx	UPS							
		Bus	Client							
		Other (specify): <u>Courier Relieved</u>								
Project Name: KIF Ash Toxicity Study		General Comments:								
Date of Sample Collection: 02/14/2011		Bulk Clinch River reference water for sediment toxicity study collected in 2.5 gallon (10L) cubitainers.								
Location: CRM7.0		Batch B - NO rain event recorded								
TVA - KIF - NCL -TOX -CO3		Batch A								
Collected By: C.L. Jackson (TVA), R. Josefczyk (RSI), C. Fairless (RSI), A. Johnson (RSI), T. Walls (RSI), G. Schwartz (RSI)		Laboratory Use (as applicable)								
Field Identification / Sample Description	Grab/ Comp.	Collection Date/Time	Number of Containers & Volume Collected	Depth (m)	Rain Event? (Mark as Appropriate)	Log #	Arrival Temp. (°C)	By	Time	Appearance
BULKSW-CRM7.0-GLEC	G	02/14/2011 1047	(40) 10L cubitainers	8.10	NA NA	NA	43.5	New	08:59	Good
<i>RJ 021411</i>										
Sample Custody – Fill In From Top Down										
Relinquished By (Signature)/Affiliation:	Date/Time	Received By (Signature)/Affiliation:	Date/Time							
<i>John Josefzyk /RSI</i>	02/14/11 / 1413	<i>Mandy W. Baker /G1EC</i>	02/14/11 / 1413							
<i>- 251</i>	<i>- 251</i>	<i>Driver out of service, no truck</i>	<i>02/14/11 08:50</i>							
Associated UPS Tracking #'s (if applicable): TVA Package #011934 B.1101 leading # 149505										



STRAIGHT BILL OF LADING NOT NEGOTIABLE

Shipment Date	2/15/2011	Bill of Lading Number	149505
Customer PO		Carrier Name	ACCESS AMERICA TRANSPORT
		Origin	Destination
From Shipper	Tennessee Valley Authority	To Consignee	Great Lakes Environmental Center
Street	189 Lakeshore Drive	Street	739 Hastings Street
City-St-Zip	Harriman TN 37748	City-St-Zip	Traverse City MI 49686
Phone	865-207-2335	Phone	231-941-2230
Contact Name	Adam Johnson	Contact Name	Dennis McCauley
Bill Freight to:			

Special Instructions

Reefer to move today by 4:30 PM. Deliver tomorrow 1st thing in the morning.
 There is a gate at the shippers, call Adam Johnson at 865-207-2335 to open gate.
 Reefer must maintain 36 degrees for the extent of the trip.

Hazmat	HAZ Class	UN Number	Handling Units	Pallets	Package Type	Packing Group	Kind of packaging, descriptions of articles, special marks and exceptions list hazardous materials first	Class	Weight Lbs. (subject to corrections)
			25.00 25.00 DM021511	0 25 DM021511			Water Samples		835

20 plastic crates each with 22.5 gal cubitances of water.
 - DM021511

Units	20.00 25.00 DM021511	Total Wgt	835
-------	----------------------------	-----------	-----

RECEIVED, SUBJECT TO THE CLASSIFICATIONS AND TARIFFE IN EFFECT ON THE DATE OF THE ISSUE OF THIS BILL OF LADING. THE PROPERTY DESCRIBED ABOVE IN APPARENT GOOD ORDER, EXCEPT AS NOTED (CONTENTS AND CONDITION OF PACKAGE UNKNOWN), MARKED, CONSIGNIED, AND DESTINED AS INDICATED ABOVE WHICH SAID CARRIER, BEING UNDERSTOOD THROUGHOUT THIS CONTRACT AS MEANING ANY PERSON, CORPORATION IN POSSESSION OF THE PROPERTY UNDER THE CONTRACT) AGREES TO CARRY ITS USUAL PLACE OF DELIVERY AT SAID DESTINATION, IF ON ITS ROUTE, OTHERWISE TO DELIVER TO ANOTHER CARRIER ON THE ROUTE TO SAID DESTINATION. IT IS MUTUALLY AGREED AS TO EACH CARRIER OF ALL OR ANY OF SAID PROPERTY OVER ALL OR ANY PORTION OF SAID ROUTE TO DESTINATION AND AS TO EACH PARTY AT ANY TIME INTERESTED IN ALL OR ANY SAID PROPERTY, THAT EVERY SERVICE TO BE PERFORMED HEREUNDER SHALL BE SUBJECT TO ALL THE BILL OF LADING TERMS AND CONDITIONS IN THE GOVERNING CLASSIFICATION ON THE DATE OF THE SHIPMENT. SHIPPER HEREBY CERTIFIES THAT HE IS FAMILAR WITH ALL THE BILL OF LADING TERMS AND CONDITIONS IN THE GOVERNING CLASSIFICATION AND THE SAID TERMS AND CONDITIONS ARE HEREBY AGREED TO BY THE SHIPPER.

NOTE: WHERE THE RATE IS DEPENDENT ON VALUE, SHIPPERS ARE REQUIRED TO STATE SUBJECT TO SECTION 7 OF THE CONDITIONS, IF THIS SHIPMENT IS TO BE DELIVERED TO THE CONSIGNOR WITHOUT SPECIFICALLY IN WRITING THE AGREED OR DECLARED VALUE OF THE PROPERTY, THE AGREED RECOURSE THE CONSIGNOR SHALL SIGN THE FOLLOWING STATEMENT THE CARRIER SHALL NOT MAKE DELIVERY OF OR DECLARED VALUE IS HEREBY SPECIFICALLY STATED BY THE SHIPPER TO BE NOT THE SHIPMENT WITHOUT PAYMENT OF FREIGHT AND ALL OTHER LAWFUL CHARGES EXCEEDING PER

Units (skids,ctns,bundle,etc.)

Emergency Response #

(Signature of Consignor)

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED, AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION

Shipper Per	Carrier Per	Date
David Mathis /RS1 Date 02/15/2011	Michelle Lelli Per	2574 Date 2/15/11

Michelle Lelli
Michelle Lelli

2/16/11



Sample CHECK-IN FORM

CLIENT: TVA

PROJECT NUMBER: 50a9.02

INITIAL SAMPLE CHEMISTRY (UPON RECEIPT)

DATE RECEIVED	2/16/11			INITIALS
SAMPLE ID	Bulk SW-Cem 7.0 .. GLC			
TYPE (W=water, SED=sediment, M=material)	Water			
COLLECTION (G=grab, C=composite)	G			
GLC NUMBER	8900			
COLLECTION DATE (Time Interval)	2/16/2011	1047		
TEMPERATURE (<6 degrees Celsius ¹)	0.3-1.5	Range see TVA logbook.		
SAMPLE DESCRIPTION / OBSERVATIONS (clarity, color, odor)	Clear no 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:
Used:	mL used:	mL used:	mL used:	mL used:	mL used:
Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:

From: Tennessee Valley Authority
189 Lakeshore Drive
Harriman TN 37748

SHIP TO: Great Lakes Environmental Center
739 Hastings Street
Traverse City MI 49686

Contact: Dennis McCauley **231-941-2230**

-----FOLD HERE-----

<u>TSR Number</u>	<u>Reserve#</u>	<u>Material Request#</u>	<u>Work Order#</u>	<u>Item Type</u>	<u>Order Comments</u>
149505				Water Samples	

COURIER TRANSPORT DOCUMENTATION

DATE: 02/15/2011

COURIER COMPANY:

Access America Transport

From:	To:
TVA c/o David Mathis 189 Lakeshore Drive Harriman, TN 37748 865-202-8313	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: 20 40	Description: 2.5 gallon cubes of water in crates	TVA Padlock #: 0011974
DMO 21511		

Shippers Name/Company: David Mathis / PSI

Date / Time: 02/15/11 / 11:18

Courier Signature/Company: Mark Morris 2574

Date / Time: 12/15/11

Receipt Signature/Company: Maile W. Clark

Date / Time: 02/16/2011 0820

Corresponding Chains of Custody:

BULKSW-021411-GLEC page 1 of 1

Appendix B

Overlying Water Quality Summaries

- *Chironomus dilutus*

Project Name: Tennessee Valley Authority (TVA)
Project Number: 5069-02

Test Dates: February 15-25, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Chironomus dilutus*

Data Entry

<u>Date</u>	<u>Initials</u>	<u>Data Entry</u>
3/3/11	mwg	0-10 day plus survival and weight
3/7/2011	NS	Full QC
3/7/11	eb	10%QC
4/14/2011	mwg	corrected crm 0.0 and CRM 3.0 as per TVA review

Project Name: Tennessee Valley Authority (TVA)
 Project Number: 5069-02
 Sample ID: Clinch Reference Sediment (GLC No. 8897)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
15-Feb-11	0	22.8 22.9	7.51 7.77	6.3 6.5	326 325	122	216	0.23		
16-Feb-11	1	23.0 23.0		4.8 4.8						
17-Feb-11	2	23.0 23.0		4.3 3.8						
18-Feb-11	3	23.0 23.0		4.9 4.8						
19-Feb-11	4	23.0 23.0		4.2 4.1						
20-Feb-11	5	23.0 23.0		5.4 5.7						
21-Feb-11	6	23.1 23.0		5.3 5.4						
22-Feb-11	7	22.7 22.7		5.5 5.9						
23-Feb-11	8	22.6 22.7		5.7 5.3						
24-Feb-11	9	22.7 22.8	7.66 7.61	2.5 4.6	324 329	122	144	0.06	J	started 3rd renewal
25-Feb-11	10	22.3 22.3		4.4 4.3						
Mean		22.8	7.64	4.9	326	122	180	0.15		
Number		22	4	22	4	2	2	2		
Max #		23.1	7.77	6.5	329	122	216	0.23		
Min#		22.3	7.51	2.5	324	122	144	0.06		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	10	10
Weight-AFDW (mg)	0.80500	0.89100	0.85400	0.67100	0.95800	0.62200	0.61400	0.81600
Biomass- AFDW (mg)	0.80500	0.89100	0.85400	0.67100	0.95800	0.62200	0.61400	0.81600

10-Day Percent Survival 100.0%
 Avg. Weight-AFDW (mg) 0.77888
 Avg. Biomass-AFDW (mg) 0.77888
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.201

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 (TVA)
 Project Number: 5069-02
 Sample ID: CRM 0.0 (GLC No. 8888)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
15-Feb-11	0	22.7	7.72	5.6	350	136	144	0.28		
		22.8	7.72	5.8	345					
16-Feb-11	1	22.9		4.1						
		23.0		4.0						
17-Feb-11	2	22.7		3.8						
		22.8		3.3						
18-Feb-11	3	23.0		4.1						
		23.0		4.2						
19-Feb-11	4	23.0		4.0						
		22.9		4.2						
20-Feb-11	5	23.0		4.5						
		23.0		5.0*						
21-Feb-11	6	23.0		5.2						
		23.0		5.1						
22-Feb-11	7	22.5		4.8						
		22.5		4.9						
23-Feb-11	8	22.6		3.1						
		22.4		3.1						
										started 3rd renewal
24-Feb-11	9	22.7	7.48	3.4	342	128	140	0.27		
		22.7	7.51	3.8	338					
25-Feb-11	10	22.2		3.6						
		22.2		3.5						
Mean Number		22.8	7.61	4.2	344	132	142	0.28		
Max #		23.0	7.72	5.8	350	136	144	0.28		
Min#		22.2	7.48	3.1	338	128	140	0.27		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	10	10
Weight-AFDW (mg)	0.91700	0.76200	0.85500	0.95500	0.75600	0.81200	0.65800	0.81800
Biomass-AFDW (mg)	0.91700	0.76200	0.85500	0.95500	0.75600	0.81200	0.65800	0.81800

10-Day Percent Survival	100.0%	Ammonia Key:
Avg. Weight-AFDW (mg)	0.81663	MDL = 0.04
Avg. Biomass-AFDW (mg)	0.81663	RL = Reporting Limit (lowest standard, 0.1)
80 organisms weighed at test initiation		J = Between MDL and RL
Avg. weight (mg)	0.201	U = Below MDL (non detect)
		NA = Not Applicable

*DO data entered wrong corrected to match the bench sheets

Project Name: Tennessee Valley Authority (TVA)
 Project Number: 5069-02
 Sample ID: CRM 1.5 (GLC No. 8889)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
15-Feb-11	0	23.0 23.0	7.50 7.59	6.2 5.9	307 309	120	136	0.08	J	
16-Feb-11	1	22.9 22.9		4.6 4.6						
17-Feb-11	2	22.8 22.8		4.1 3.9						
18-Feb-11	3	23.0 23.0		4.5 4.6						
19-Feb-11	4	22.9 23.0		4.0 3.7						
20-Feb-11	5	23.0 23.0		5.4 5.3						
21-Feb-11	6	23.0 23.0		4.2 4.7						
22-Feb-11	7	22.5 22.5		4.9 5.1						
23-Feb-11	8	22.6 22.6		5.1 5.3						
24-Feb-11	9	22.8 22.8	7.41 7.44	3.4 3.3	321 322	116	144	0.08	J	started 3rd renewal
25-Feb-11	10	22.3 22.3		4.4 4.6						
Mean Number		22.8 22	7.49 4	4.6 22	315 4	118 2	140 2	0.08 2		
Max #		23.0	7.59	6.2	322	120	144	0.08		
Min#		22.3	7.41	3.3	307	116	136	0.08		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	9	10	10	10	7	6
Weight-AFDW (mg)	0.78700	0.66300	0.80889	1.05400	0.80700	0.84889	0.91571	1.21000
Biomass-AFDW (mg)	0.78700	0.66300	0.72800	1.05400	0.80700	0.76400	0.64100	0.72600

10-Day Percent Survival: 90.0%
 Avg. Weight-AFDW (mg): 0.88681
 Avg. Biomass-AFDW (mg): 0.77125
 80 organisms weighed at test initiation
 Avg. weight (mg): 0.201

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 (TVA)
Project Number: 5069-02
Sample ID: CRM 2.0 (GLC No. 8891)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia (mg/L)	Comments
										Result Code
15-Feb-11	0	23.0 23.0	7.69 7.72	6.4 6.5	310 309	114	140	0.01	U	
16-Feb-11	1	22.9 22.9		5.0 4.8						
17-Feb-11	2	23.0 23.0		5.0 5.3						
18-Feb-11	3	23.0 23.0		4.2 4.5						
19-Feb-11	4	23.0 23.0		3.8 3.8						
20-Feb-11	5	23.0 23.0		5.0 5.4						
21-Feb-11	6	23.1 23.2		5.7 5.4						
22-Feb-11	7	22.5 22.6		4.7 4.9						
23-Feb-11	8	22.6 22.7		5.5 4.4						
										started 3rd renewal
24-Feb-11	9	22.9 22.8	7.61 7.54	5.0 3.7	319 322	122	144	0.07	J	
25-Feb-11	10	22.3 22.3		4.1 4.3						
Mean		22.9	7.64	4.9	315	118	142	0.04		
Number		22	4	22	4	2	2	2		
Max #		23.2	7.72	6.5	322	122	144	0.07		
Min#		22.3	7.54	3.7	309	114	140	0.01		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	9	10	10	10	10	9	10
Weight-AFDW (mg)	0.74300	0.56778	0.58800	0.67300	0.44700	0.74200	0.79111	0.87000
Biomass-AFDW (mg)	0.74300	0.51100	0.58800	0.67300	0.44700	0.74200	0.71200	0.87000

T.E.- Technician error; no animals recovered, no animals added.

10-Day Percent Survival 97.5%
Avg. Weight-AFDW (mg) 0.67774
Avg. Biomass-AFDW (mg) 0.66075

80 organisms weighed at test initiation
Avg. weight (mg) 0.201

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 (TVA)
 Project Number: 5069-02
 Sample ID: CRM 2.5 (GLC No. 8892)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
15-Feb-11	0	22.9 23.0	7.68 7.69	6.4 6.5	306 310	100 102	152 140	0.03 0.04	U J	
16-Feb-11	1	22.8 22.9		4.7 4.6						
17-Feb-11	2	22.8 22.9		3.9 4.0						
18-Feb-11	3	23.0 23.0		4.7 4.7						
19-Feb-11	4	23.0 23.1		3.8 3.6						
20-Feb-11	5	23.0 23.1		5.0 4.8						
21-Feb-11	6	23.2 23.2		5.0 5.5						
22-Feb-11	7	22.4 22.6		5.1 5.9						
23-Feb-11	8	22.7 22.8		5.2 5.0						
24-Feb-11	9	22.9 22.8	7.48 7.48	4.4 5.1	322 319	120	136	0.10		started 3rd renewal
25-Feb-11	10	22.3 22.3		4.3 3.2						
Mean Number		22.9 22	7.58 4	4.8 22	314 4	107 3	143 3	0.06 0		
Max #		23.2	7.69	6.5	322	120	152	0.10		
Min#		22.3	7.48	3.2	306	100	136	0.03		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	9	10	10	10
Weight-AFDW (mg)	0.71500	0.66400	0.68300	0.64700	0.83889	0.70600	0.73500	0.74400
Biomass-AFDW (mg)	0.71500	0.66400	0.68300	0.64700	0.75500	0.70600	0.73500	0.74400

10-Day Percent Survival 98.8%
 Avg. Weight-AFDW (mg) 0.71661
 Avg. Biomass-AFDW (mg) 0.70613
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.201

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 (TVA)
 Project Number: 5069-02
 Sample ID: CRM 3.0 (GLC No. 8893)

Test Dates: February 15-25, 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 (μmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
15-Feb-11	0	22.9 22.9	7.62 7.66	5.9 6.1	345 344	134	156	0.29		
16-Feb-11	1	22.8 22.9		4.3 4.4						
17-Feb-11	2	22.9 22.9		3.6 3.5						
18-Feb-11	3	23.1 23.1		4.5 4.6						
19-Feb-11	4	23.1 23.1		3.9 4.2						
20-Feb-11	5	23.1 23.2*		5.2 5.2						
21-Feb-11	6	23.1 23.1		5.2 5.2						
22-Feb-11	7	22.6 22.6		4.6 3.5						
23-Feb-11	8	22.7 22.7		4.3 2.9						
24-Feb-11	9	22.7 22.8	7.54 7.53	3.3 3.1	336 335	122	144	0.25		started 3rd renewal
25-Feb-11	10	22.3 22.3		2.9 3.2						
Mean Number		22.8 21	7.59 4	4.3 22	340 4	128 2	150 2	0.27 2		
Max #		23.1	7.66	6.1	345	134	156	0.29		
Min#		22.3	7.53	2.9	335	122	144	0.25		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	9	10	10	10	10	10	10
Weight-AFDW (mg)	0.67100	0.95333	1.61100	0.70500	0.73800	0.86400	0.93600	0.76400
Biomass-AFDW (mg)	0.67100	0.85800	1.61100	0.70500	0.73800	0.86400	0.93600	0.76400

10-Day Percent Survival: 98.8%
 Avg. Weight-AFDW (mg): 0.90529
 Avg. Biomass-AFDW (mg): 0.89338
 80 organisms weighed at test initiation
 Avg. weight (mg): 0.201

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

*temperature data entered wrong, corrected to match the bench sheets

Project Name: Tennessee Valley Authority (TVA)
 Project Number: 5069-02
 Sample ID: CRM 3.5 (GLC No. 8894)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Comments	Result Code
15-Feb-11	0	22.8	7.64	6.0	320	116	144	0.09	J	
		22.9	7.67	6.1	321					
16-Feb-11	1	22.9		4.7						
		22.9		4.5						
17-Feb-11	2	22.9		3.8						
		22.9		3.9						
18-Feb-11	3	23.1		4.8						
		23.1		4.6						
19-Feb-11	4	23.1		4.2						
		23.1		4.2						
20-Feb-11	5	23.0		5.2						
		23.0		5.4						
21-Feb-11	6	23.1		4.7						
		23.0		4.4						
22-Feb-11	7	22.6		4.4						
		22.5		4.4						
23-Feb-11	8	22.6		5.0						
		22.7		3.0						
										started 3rd renewal
24-Feb-11	9	22.7	7.72	3.0	332	126	144	0.14		
		22.8	7.67	3.3	333					
25-Feb-11	10	22.3		3.1						
		22.3		3.4						
Mean		22.8	7.68	4.4	327	121	144	0.12		
Number		22	4	22	4	2	2	2		
Max #		23.1	7.72	6.1	333	126	144	0.14		
Min#		22.3	7.64	3.0	320	116	144	0.09		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	10	10
Weight-AFDW (mg)	0.79400	0.76100	0.83800	0.91100	0.76800	0.76800	0.71700	0.99400
Biomass- AFDW (mg)	0.79400	0.76100	0.83800	0.91100	0.76800	0.76800	0.71700	0.99400

10-Day Percent Survival 100.0%
 Avg. Weight-AFDW (mg) 0.81888
 Avg. Biomass-AFDW (mg) 0.81888
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.201

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 (TVA)
 Project Number: 5069-02
 Sample ID: CRM 4.0 (GLC No. 8895)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
15-Feb-11	0	22.9	7.63	6.4	313	114	144	0.10		
		22.8	7.63	6.5	313					
16-Feb-11	1	23.0		5.2						
		23.0		5.2						
17-Feb-11	2	22.8		3.8						
		22.8		4.0						
18-Feb-11	3	23.1		4.7						
		23.1		4.8						
19-Feb-11	4	23.2		4.0						
		23.1		4.0						
20-Feb-11	5	23.0		5.2						
		23.0		5.2						
21-Feb-11	6	23.0		4.8						
		23.0		4.7						
22-Feb-11	7	22.6		5.1						
		22.6		5.3						
23-Feb-11	8	22.6		6.2						
		22.7		5.1						
24-Feb-11	9	22.8	7.67	3.0	316	116	132	0.07	J	started 3rd renewal
		22.7	7.58	5.6	321	126				
25-Feb-11	10	22.3		4.1						
		22.3		3.6						
Mean Number		22.8	7.63	4.8	316	119	138	0.09		
Max #		22	4	22	4	3	2	2		
Min#		23.2	7.67	6.5	321	126	144	0.10		
		22.3	7.58	3.0	313	114	132	0.07		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	5	10	10	10	10	10	9
Weight-AFDW (mg)	0.49800	0.75000	0.49200	0.52600	0.66400	0.52600	0.44300	0.63333
Biomass-AFDW (mg)	0.49800	0.37500	0.49200	0.52600	0.66400	0.52600	0.44300	0.57000

10-Day Percent Survival 92.5%
 Avg. Weight-AFDW (mg) 0.56654
 Avg. Biomass-AFDW (mg) 0.51175
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.201

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 (TVA)
 Project Number: 5069-02
 Sample ID: CRM 4.5 (GLC No. 8896)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
15-Feb-11	0	22.8	7.74	6.5	315	114	144	0.00	U	
		22.8	7.72	6.5	317					
16-Feb-11	1	23.0		5.4						
		23.0		5.3						
17-Feb-11	2	22.9		3.9						
		22.9		4.1						
18-Feb-11	3	23.1		4.5						
		23.1		4.6						
19-Feb-11	4	23.0		4.0						
		23.0		3.6						
20-Feb-11	5	23.0		5.5						
		23.0		5.3						
21-Feb-11	6	23.0		4.2						
		23.0		4.5						
22-Feb-11	7	22.6		4.6						
		22.6		5.1						
23-Feb-11	8	22.7		4.4						
		22.7		5.2						
										started 3rd renewal
24-Feb-11	9	22.7	7.56	2.7	323	120	140	0.06	J	
		22.7	7.57	3.9	327		140			
25-Feb-11	10	22.3		3.7						
		22.3		3.7						
Mean Number		22.8	7.65	4.6	321	117	141	0.03		
Max #		22	4	22	4	2	3	2		
Min#		23.1	7.74	6.5	327	120	144	0.06		
		22.3	7.56	2.7	315	114	140	0.00		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	9	9
Weight-AFDW (mg)	0.93100	0.87600	0.69800	0.72600	0.74800	0.63300	0.86333	0.65222
Biomass-AFDW (mg)	0.93100	0.87600	0.69800	0.72600	0.74800	0.63300	0.77700	0.58700

10-Day Percent Survival 97.5%
 Avg. Weight-AFDW (mg) 0.76594
 Avg. Biomass-AFDW (mg) 0.74700
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.201

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 (TVA)
 Project Number: 5069-02
 Sample ID: Laboratory Sediment(Bd) w/Site Clinch River
 Water-CRM 7.0

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
15-Feb-11	0	22.8 22.9	7.71 7.71	5.6 5.5	339 338	130	148	0.27		
16-Feb-11	1	22.8 22.9		4.2 4.2						
17-Feb-11	2	22.7 22.7		3.2 3.4						
18-Feb-11	3	23.0 23.0		4.0 4.0						
19-Feb-11	4	22.8 22.8		3.6 3.9						
20-Feb-11	5	22.9 22.9		3.2 3.5						
21-Feb-11	6	23.0 23.1		3.1 3.7						
22-Feb-11	7	22.4 22.4		3.1 4.0						
23-Feb-11	8	22.6 22.4		3.1 2.8						
24-Feb-11	9	22.7 22.7	7.42 7.42	4.6 3.8	340 336	104	144	0.35		started 3rd renewal
25-Feb-11	10	22.2 22.2		2.4 2.6						
Mean Number		22.7 22	7.57 4	3.7 22	338 4	117 2	146 2	0.31 0.35		
Max #		23.1	7.71	5.6	340	130	148	0.35		
Min#		22.2	7.42	2.4	336	104	144	0.27		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	9	9	10	10	9	8
Weight-AFDW (mg)	0.82300	1.01600	0.96000	0.98667	1.05700	1.10700	0.83778	1.18750
Biomass-AFDW (mg)	0.82300	1.01600	0.86400	0.88800	1.05700	1.10700	0.75400	0.95000

10-Day Percent Survival 93.8%
 Avg. Weight-AFDW (mg) 0.99687
 Avg. Biomass-AFDW (mg) 0.93238
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.201

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 (TVA)

Project Number: 5069-02

Sample ID: Laboratory Sediment (Bd) w/Laboratory water (Dechlor)
Control

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
15-Feb-11	0	23.0 22.9	7.45 7.56	5.7 5.6	328 330	118	140	0.18		
16-Feb-11	1	22.8 22.9		4.0 4.2						
17-Feb-11	2	22.6 22.7		3.3 3.5						
18-Feb-11	3	22.9 23.0		4.0 4.1						
19-Feb-11	4	23.0 22.8		3.7 3.6						
20-Feb-11	5	22.9 22.9		3.7 3.7						
21-Feb-11	6	22.9 23.0		3.0 3.2						
22-Feb-11	7	22.4 22.3		4.4 3.8						
23-Feb-11	8	22.1 22.3		4.2 2.8						
24-Feb-11	9	22.7 22.7	7.29 7.35	3.9 4.3	331 327	110	136	0.24		started 3rd renewal
25-Feb-11	10	22.2 22.1		4.2 4.0						
Mean Number		22.7 22	7.41 4	4.0 22	329 327	114 2	138 2	0.21 2		
Max #		23.0	7.56	5.7	331	118	140	0.24		
Min#		22.1	7.29	2.8	327	110	136	0.18		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	9	10	9	9	9	9	10
Weight-AFDW (mg)	0.89700	1.00667	0.74100	0.94667	1.09000	1.00444	0.79000	1.10800
Biomass- AFDW (mg)	0.89700	0.90600	0.74100	0.85200	0.98100	0.90400	0.71100	1.10800

10-Day Percent Survival 93.8%
Avg. Weight-AFDW (mg) 0.94797
Avg. Biomass-AFDW (mg) 0.88750
80 organisms weighed at test initiation
Avg. weight (mg) 0.201

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 (TVA)
 Project Number: 5069-02
 Sample ID: Laboratory Water (Dechlor) Only Control

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Result Code	Comments
15-Feb-11	0	23.0	7.89	7.7	308	102	136	0.01	U	
		23.0	7.90	7.9	307					
16-Feb-11	1	22.8		5.9						
		23.0		6.1						
17-Feb-11	2	22.8		4.7						
		22.8		4.5						
18-Feb-11	3	23.0		5.0						
		23.0		5.2						
19-Feb-11	4	22.8		5.0						
		22.8		5.2						
20-Feb-11	5	23.0		5.9						
		22.9		5.8						
21-Feb-11	6	23.0		5.5						
		23.0		5.2						
22-Feb-11	7	22.5		3.9						
		22.5		4.6						
23-Feb-11	8	22.6		4.1						
		22.6		3.2						
										started 3rd renewal
24-Feb-11	9	22.8	7.47	2.2	312	86	128	0.41		
		22.7	7.50	2.1	311					
25-Feb-11	10	22.2		3.2						
		22.2		3.4						
Mean Number		22.8	7.69	4.8	310	94	132	0.21		
Max #		23.0	7.90	7.9	312	102	136	0.41		
Min#		22.2	7.47	2.1	307	86	128	0.01		

Replicate	1	2	3	4	5	6	7	8
# Surviving	8	9	10	10	10	8	8	9
Weight-AFDW (mg)	1.12625	1.18556	1.00500	0.98400	0.88300	1.24500	1.35125	1.24778
Biomass-AFDW (mg)	0.90100	1.06700	1.00500	0.98400	0.88300	0.99600	1.08100	1.12300

10-Day Percent Survival 90.0%
 Avg. Weight-AFDW (mg) 1.12848
 Avg. Biomass-AFDW (mg) 1.00500
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.201

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

Overlying Water Quality Summaries

- *Hyalella azteca*

Project Name: Tennessee Valley Authority (TVA)
Project Number: 5069-02

Test Dates: February 15-25, 2011
Test Type: 10 Day Whole Sediment Toxicity Survival and Growth
Test Species: *Hyalella azteca*

Data Entry

<u>Date</u>	<u>Initials</u>	<u>Data Entry</u>
3/3/11	mwg	0-10 day plus survival and weight
3/7/2011	NS	100% QC all data
3/7/11	eb	10%QC
4/14/2011	mwg	corrected CRm 2.0 as per TVA review

Project Name: Tennessee Valley Authority (TVA)
Project Number: 5069-02
Sample ID: Clinch Reference Sediment (GLC No. 8897)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Comments	Results Code
15-Feb-11	0	22.3 22.3	7.68 7.79	6.3 6.5	325 325	122	216	0.23		
16-Feb-11	1	22.7 22.7		6.4 6.5						
17-Feb-11	2	22.7 22.8		5.7 5.8						
18-Feb-11	3	22.9 22.9		6.7 6.7						
19-Feb-11	4	22.8 22.8		6.6 6.5						
20-Feb-11	5	22.8 22.8		7.2 7.0						
21-Feb-11	6	22.9 22.8		7.0 6.9						
22-Feb-11	7	22.3 22.4		6.8 7.1						
23-Feb-11	8	22.3 22.4		6.6 6.2						
24-Feb-11	9	22.7 22.7	7.83 7.85	5.9 6.0	323 325	126	132	0.02		U
25-Feb-11	10	22.3 22.3		6.0 6.5						
Mean Number		22.6 22	7.79 4	6.5 22	325 4	124 2	174 2	0.13 2		
Max #		22.9	7.85	7.2	325	126	216	0.23		
Min#		22.3	7.68	5.7	323	122	132	0.02		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	8	9	9	10	10	10
Weight (mg)	0.10400	0.15800	0.10875	0.08556	0.09556	0.09800	0.11400	0.07800
Biomass (mg)	0.10400	0.15800	0.08700	0.07700	0.08600	0.09800	0.11400	0.07800

10-Day Percent Survival 95.0%
Avg. Weight (mg) 0.10523
Avg. Biomass (mg) 0.10025
80 organisms weighed at test initiation
Avg. weight (mg) 0.02

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 (TVA)
 Project Number: 5069-02
 Sample ID: CRM 0.0 (GLC No. 8888)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Results Code	Comments
15-Feb-11	0	22.1 22.7	7.63 7.73	5.9 6.0	347 345	136	144	0.28		
16-Feb-11	1	22.7 22.8		5.2 5.4						
17-Feb-11	2	22.7 22.7		5.8 5.8						
18-Feb-11	3	23.0 23.0		5.5 5.5						
19-Feb-11	4	22.7 22.8		6.1 5.6						
20-Feb-11	5	22.8 22.8		6.4 6.6						
21-Feb-11	6	22.9 22.9		6.9 6.8						
22-Feb-11	7	22.2 22.3		6.2 6.5						
23-Feb-11	8	22.3 22.3		6.0 6.0						
24-Feb-11	9	22.7 22.6	8.42 8.43	5.5 5.9	349 345	138	152	0.06	J	
25-Feb-11	10	22.2 22.2		5.1 5.4						
Mean Number		22.6 22	8.05 4	5.9 22	347 4	137 2	148 2	0.17 0.28		
Max #		23.0	8.43	6.9	349	138	152	0.28		
Min#		22.1	7.63	5.1	345	136	144	0.06		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	10	10
Weight (mg)	0.11300	0.09700	0.09900	0.11300	0.12900	0.11900	0.06900	0.08400
Biomass (mg)	0.11300	0.09700	0.09900	0.11300	0.12900	0.11900	0.06900	0.08400

10-Day Percent Survival: 100.0%
 Avg. Weight (mg): 0.10288
 Avg. Biomass (mg): 0.10288
 80 organisms weighed at test initiation
 Avg. weight (mg): 0.02

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 (TVA)
 Project Number: 5069-02
 Sample ID: CRM 1.5 (GLC No. 8889)

Test Dates: February 15-25, 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 (mos)	Alkalinity (mg/L)	Hardness (mg/L)	Anamonia (mg/L)	Ammonia (mg/L)	Comments
15-Feb-11	0	22.3 22.4	7.56 7.57	6.0 6.1	306 308	120	136	0.08	J	
16-Feb-11	1	22.8 22.8		5.9 5.8						
17-Feb-11	2	22.7 22.7		5.1 5.2						
18-Feb-11	3	23.0 23.0		6.4 6.3						
19-Feb-11	4	22.8 22.9		5.8 5.9						
20-Feb-11	5	22.9 22.8		6.5 6.7						
21-Feb-11	6	22.9 22.9		6.8 6.8						
22-Feb-11	7	22.3 22.2		6.3 6.4						
23-Feb-11	8	22.3 22.3		7.2 7.1						
24-Feb-11	9	22.7 22.6	7.97 7.94	7.1 6.2	318 317	122 112	128	0.03	U	
25-Feb-11	10	22.2 22.2		6.9 7.1						
Mean		22.6	7.76	6.3	312	118	132	0.06		
Number		22	4	22	4	3	2	2		
Max #		23.0	7.97	7.2	318	122	136	0.08		
Min#		22.2	7.56	5.1	306	112	128	0.03		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	10	9
Weight (mg)	0.05900	0.08700	0.07800	0.08900	0.07900	0.10800	0.07200	0.07556
Biomass (mg)	0.05900	0.08700	0.07800	0.08900	0.07900	0.10800	0.07200	0.06800

10-Day Percent Survival: 98.8%
 Avg. Weight (mg): 0.08095
 Avg. Biomass (mg): 0.08000
 80 organisms weighed at test initiation
 Avg. weight (mg): 0.02

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 (TVA)
 Project Number: 5069-02
 Sample ID: CRM 2.0 (GLC No. 8891)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Results	Comments
										Code
15-Feb-11	0	22.2	7.62	6.2*	312	114	140	0.01		U
		22.3	7.72	6.1*	314					
16-Feb-11	1	22.7		6.2						
		22.7		6.2						
17-Feb-11	2	22.8		5.5						
		22.8		5.8						
18-Feb-11	3	23.0		6.7						
		23.0		6.8						
19-Feb-11	4	22.9		5.9						
		22.9		6.0						
20-Feb-11	5	22.9		6.7						
		22.9		6.5						
21-Feb-11	6	22.9		6.8						
		22.9		6.8						
22-Feb-11	7	22.2		6.6						
		22.3		6.4						
23-Feb-11	8	22.4		7.5						
		22.4		7.5						
24-Feb-11	9	22.7	7.93	6.1	320	102	132	0.03*		U
		22.7	7.96	7.0	322					
25-Feb-11	10	22.2		6.2						
		22.2		7.0						
Mean Number		22.6	7.81	6.5	317	108	136	0.01		
		22	4	20	4	2	2	1		
Max #		23.0	7.96	7.5	322	114	140	0.01		
Min#		22.2	7.62	5.5	312	102	132	0.01		

Replicate	1	2	3	4	5	6	7	8
# Surviving	0-T.E.	10	10	10	10	10	10	10
Weight (mg)	0-T.E.	0.08000	0.09100	0.08700	0.07900	0.08800	0.10100	0.09900
Biomass (mg)	0-T.E.	0.08000	0.09100	0.08700	0.07900	0.08800	0.10100	0.09900

T.E.- Technician error; no animals recovered, no animals added.

10-Day Percent Survival 100.0%
 Avg. Weight (mg) 0.08929
 Avg. Biomass (mg) 0.08929

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

80 organisms weighed at test initiation

Avg. weight (mg) 0.02

*Data entered wrong, corrected to match the bench sheets

Project Name: Tennessee Valley Authority (TVA)
 Project Number: 5069-02
 Sample ID: CRM 2.5 (GLC No. 8892)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Results Code	Comments
15-Feb-11	0	22.3	7.59	6.3	307	100	152	0.03	U	
		22.3	7.59	6.2	307	102	140	0.04	J	
16-Feb-11	1	22.7		6.2						
		22.7		6.2						
17-Feb-11	2	22.7		6.0						
		22.7		6.2						
18-Feb-11	3	22.9		6.5						
		22.9		6.5						
19-Feb-11	4	23.0		5.9						
		22.9		6.0						
20-Feb-11	5	22.9		7.0						
		22.9		7.0						
21-Feb-11	6	23.0		6.7						
		22.9		6.7						
22-Feb-11	7	22.3		7.0						
		22.3		6.9						
23-Feb-11	8	22.4		7.5						
		22.3		7.3						
24-Feb-11	9	22.7	7.93	5.8	323	124	136	0.02	U	
		22.7	7.96	6.7	323					
25-Feb-11	10	22.3		6.7						
		22.2		6.9						
Mean		22.6	7.77	6.6	315	109	143	0.03		
Number		22	4	22	4	3	3	3		
Max #		23.0	7.96	7.5	323	124	152	0.04		
Min#		22.2	7.59	5.8	307	100	136	0.02		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	10	10
Weight (mg)	0.07300	0.07000	0.07700	0.08500	0.08300	0.09200	0.09900	0.10700
Biomass (mg)	0.07300	0.07000	0.07700	0.08500	0.08300	0.09200	0.09900	0.10700

10-Day Percent Survival: 100.0%
 Avg. Weight (mg): 0.08575
 Avg. Biomass (mg): 0.08575

80 organisms weighed at test initiation
 Avg. weight (mg): 0.02

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

*Data entered wrong, corrected to match the bench sheets

Project Name: Tennessee Valley Authority (TVA)
 Project Number: 5069-02
 Sample ID: CRM 3.0 (GLC No. 8893)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Results Code	Comments
15-Feb-11	0	22.2 22.3	7.59 7.64	5.9 5.9	343 345	134	156	0.29		
16-Feb-11	1	22.7 22.8		5.3 5.4						
17-Feb-11	2	22.7 22.7		5.4 5.1						
18-Feb-11	3	22.9 22.9		6.0 6.0						
19-Feb-11	4	22.9 22.9		5.9 5.9						
20-Feb-11	5	22.9 22.9		7.0 7.0						
21-Feb-11	6	22.9 22.9		6.7 6.4						
22-Feb-11	7	22.3 22.3		5.1 5.8						
23-Feb-11	8	22.3 22.3		5.2 5.9						
24-Feb-11	9	22.6 22.7	8.33 8.44	5.0 5.3	347 349	136	156	0.04 0.05	J J	
25-Feb-11	10	22.3 22.3		3.8 4.3						
Mean		22.6	8.00	5.7	346	135	156	0.13		
Number		22	4	22	4	2	2	3		
Max #		22.9	8.44	7.0	349	136	156	0.29		
Min#		22.2	7.59	3.8	343	134	156	0.04		

Replicate	1	2	3	4	5	6	7	8
# Surviving	9	10	10	8	10	10	10	10
Weight (mg)	0.08889	0.07000	0.09500	0.08250	0.12000	0.09600	0.08700	0.08200
Biomass (mg)	0.08000	0.07000	0.09500	0.06600	0.12000	0.09600	0.08700	0.08200

10-Day Percent Survival: 96.3%
 Avg. Weight (mg): 0.09017
 Avg. Biomass (mg): 0.08700
 80 organisms weighed at test initiation
 Avg. weight (mg): 0.02

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 (TVA)
 Project Number: 5069-02
 Sample ID: CRM 3.5 (GLC No. 8894)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Results Code	Comments
15-Feb-11	0	22.4 22.4	7.46 7.62	6.1 6.0	322 319	116	144	0.09	J	
16-Feb-11	1	22.8 22.8		6.0 6.1						
17-Feb-11	2	22.7 22.7		5.8 5.8						
18-Feb-11	3	23.0 23.0		6.5 6.3						
19-Feb-11	4	22.9 22.9		6.1 6.4						
20-Feb-11	5	22.9 22.9		7.0 7.0						
21-Feb-11	6	22.9 22.9		6.8 6.8						
22-Feb-11	7	22.3 22.3		6.2 6.2						
23-Feb-11	8	22.4 22.4		6.4 6.0						
24-Feb-11	9	22.6 22.7	8.55 8.55	5.6 5.4	347 347	142 148	148 148	0.00	U	
25-Feb-11	10	22.2 22.2		5.0 5.1						
Mean		22.7	8.05	6.1	334	129	147	0.05		
Number		22	4	22	4	2	3	2		
Max #		23.0	8.55	7.0	347	142	148	0.09		
Min#		22.2	7.46	5.0	319	116	144	0.00		

Replicate	1	2	3	4	5	6	7	8
# Surviving	9	10	10	10	10	10	10	10
Weight (mg)	0.09111	0.10400	0.08600	0.09800	0.11100	0.09400	0.08800	0.08200
Biomass (mg)	0.08200	0.10400	0.08600	0.09800	0.11100	0.09400	0.08800	0.08200

10-Day Percent Survival: 98.8%
 Avg. Weight (mg): 0.09426
 Avg. Biomass (mg): 0.09313
 80 organisms weighed at test initiation
 Avg. weight (mg) = 0.02

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 (TVA)
 Project Number: 5069-02
 Sample ID: CRM 4.0 (GLC No. 8895)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Results Code	Comments
15-Feb-11	0	22.2	7.58	6.0	312	114	144	0.10	J	
		22.3	7.58	6.2	314					
16-Feb-11	1	22.7		6.3						
		22.7		6.3						
17-Feb-11	2	22.7		5.7						
		22.8		6.0						
18-Feb-11	3	23.0		6.2						
		23.0		6.4						
19-Feb-11	4	22.9		6.4						
		22.8		6.5						
20-Feb-11	5	22.8		7.1						
		22.8		7.2						
21-Feb-11	6	22.9		6.7						
		22.8		7.0						
22-Feb-11	7	22.3		6.7						
		22.3		7.5						
23-Feb-11	8	22.4		6.6						
		22.3		6.6						
24-Feb-11	9	22.6	7.95	5.9	321	126	136	0.01	U	
		22.6	8.00	5.8	322					
25-Feb-11	10	22.3		6.6						
		22.3		6.7						
Mean Number		22.6	7.78	6.5	317	120	140	0.06		
Max #		23.0	8.00	7.5	322	126	144	0.10		
Min#		22.2	7.58	5.7	312	114	136	0.01		

Replicate	1	2	3	4	5	6	7	8
# Surviving	7	10	10	10	10	10	10	3
Weight (mg)	0.08000	0.08700	0.09200	0.09500	0.12400	0.10900	0.11500	0.03333
Biomass (mg)	0.05600	0.08700	0.09200	0.09500	0.12400	0.10900	0.11500	0.01000

10-Day Percent Survival 87.5%
 Avg. Weight (mg) 0.09192
 Avg. Biomass (mg) 0.08600
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.02

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 (TVA)
 Project Number: 5069-02
 Sample ID: CRM 4.5 (GLC No. 8896)

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Results Code	Comments
15-Feb-11	0	22.2	7.60	5.9	310	114	144	0.00	U	
		22.3	7.72	6.3	314					
16-Feb-11	1	22.7		6.5						
		22.8		6.5						
17-Feb-11	2	22.7		6.1						
		22.7		6.1						
18-Feb-11	3	22.9		6.7						
		22.9		6.7						
19-Feb-11	4	22.8		6.6						
		22.8		6.8						
20-Feb-11	5	22.8		6.9						
		22.8		7.1						
21-Feb-11	6	22.8		7.0						
		22.8		7.0						
22-Feb-11	7	22.4		6.5						
		22.5		6.6						
23-Feb-11	8	22.3		6.4						
		22.4		6.7						
24-Feb-11	9	22.7	7.85	5.7	324	124	140	0.03	U	
		22.7	7.87	5.7	325					
25-Feb-11	10	22.2		5.9						
		22.2		6.0						
Mean		22.6	7.76	6.4	318	119	142	0.02		
Number		22	4	22	4	2	2	2		
Max #		22.9	7.87	7.1	325	124	144	0.03		
Min#		22.2	7.60	5.7	310	114	140	0.00		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	10	10	10	10	10	10
Weight (mg)	0.09100	0.07400	0.09800	0.08600	0.08800	0.08000	0.08500	0.08300
Biomass (mg)	0.09100	0.07400	0.09800	0.08600	0.08800	0.08000	0.08500	0.08300

10-Day Percent Survival 100.0%
 Avg. Weight (mg) 0.08563
 Avg. Biomass (mg) 0.08563
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.02

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 (TVA)
 Project Number: 5069-02
 Sample ID: Laboratory Sediment(Bd) w/Site Clinch River
 Water-CRM 7.0

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Results Code	Comments
15-Feb-11	0	22.3	7.68	5.8	336	130	148	0.27		
		22.3	7.74	6.0	338					
16-Feb-11	1	22.8		4.6						
		22.8		4.5						
17-Feb-11	2	22.7		4.5						
		22.8		4.6						
18-Feb-11	3	23.0		5.4						
		23.0		5.6						
19-Feb-11	4	22.7		6.0						
		22.7		5.7						
20-Feb-11	5	22.8		6.0						
		22.8		5.7						
21-Feb-11	6	22.8		6.3						
		22.8		6.3						
22-Feb-11	7	22.2		4.4						
		22.3		5.8						
23-Feb-11	8	22.2		5.5						
		22.3		4.5						
24-Feb-11	9	22.6	7.78	5.3	331	132	132	0.06	J	
		22.6	7.65	6.2	330					
25-Feb-11	10	22.2		4.3						
		22.2		4.7						
Mean		22.6	7.71	5.4	334	131	140	0.17		
Number		22	4	22	4	2	2	2		
Max #		23.0	7.78	6.3	338	132	148	0.27		
Min#		22.2	7.65	4.3	330	130	132	0.06		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	9	9	10	10	9	10	10
Weight (mg)	0.09300	0.14000	0.08778	0.10900	0.12200	0.14000	0.09900	0.11500
Biomass (mg)	0.09300	0.12600	0.07900	0.10900	0.12200	0.12600	0.09900	0.11500

10-Day Percent Survival 96.3%
 Avg. Weight (mg) 0.11322
 Avg. Biomass (mg) 0.10863
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.02

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 (TVA)
 Project Number: 5069-02
 Sample ID: Laboratory Sediment (Bd) w/Laboratory water (Dechlor)
 Control

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Results Code	Comments
15-Feb-11	0	22.3	7.63	5.8	322	118	140	0.18		
		22.3	7.65	5.9	344					
16-Feb-11	1	22.7		7.4						
		22.7		7.4						
17-Feb-11	2	22.7		6.7						
		22.7		6.9						
18-Feb-11	3	22.9		5.5						
		22.9		5.5						
19-Feb-11	4	23.0		6.0						
		22.8		6.1						
20-Feb-11	5	22.8		5.7						
		22.8		5.6						
21-Feb-11	6	22.8		6.2						
		22.7		6.3						
22-Feb-11	7	22.2		5.5						
		22.3		5.6						
23-Feb-11	8	22.2		5.7						
		22.2		4.9						
24-Feb-11	9	22.6	7.49	5.5	323	116	140	0.10		
		22.6		7.60	5.5					
25-Feb-11	10	22.2		5.3						
		22.2		5.1						
Mean		22.6	7.59	5.9	327	117	140	0.14		
Number		22	4	22	4	2	2	2		
Max #		23.0	7.65	7.4	344	118	140	0.18		
Min#		22.2	7.49	4.9	320	116	140	0.10		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	8	10	10	10	10	10
Weight (mg)	0.17800	0.10100	0.09125	0.15400	0.10800	0.09600	0.17700	0.11500
Biomass (mg)	0.17800	0.10100	0.07300	0.15400	0.10800	0.09600	0.17700	0.11500

10-Day Percent Survival 97.5%
 Avg. Weight (mg) 0.12753
 Avg. Biomass (mg) 0.12525
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.02

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 (TVA)
 Project Number: 5069-02
 Sample ID: Laboratory Water (Dechlor) Only Control

Test Dates: February 15-25, 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 (mmhos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)	Ammonia Results Code	Comments
15-Feb-11	0	22.4	7.87	7.7	303	102	136	0.01	U	
		22.4	7.89	7.6	304					
16-Feb-11	1	22.7		5.1						
		22.7		5.2						
17-Feb-11	2	22.6		5.0						
		22.6		5.1						
18-Feb-11	3	22.9		6.4						
		22.9		6.5						
19-Feb-11	4	22.8		6.7						
		22.9		6.8						
20-Feb-11	5	22.8		7.0						
		22.8		7.1						
21-Feb-11	6	22.8		7.0						
		22.8		7.1						
22-Feb-11	7	22.2		7.0						
		22.3		7.4						
23-Feb-11	8	22.3		7.5						
		22.3		7.3						
24-Feb-11	9	22.5	7.92	6.9	307	112	132	0.12		
		22.6	7.92	7.0	309					
25-Feb-11	10	22.2		6.3						
		22.2		6.7						
Mean		22.6	7.90	6.7	306	107	134	0.07		
Number		22	4	22	4	2	2	2		
Max #		22.9	7.92	7.7	309	112	136	0.12		
Min#		22.2	7.87	5.0	303	102	132	0.01		

Replicate	1	2	3	4	5	6	7	8
# Surviving	10	10	9	10	10	10	10	9
Weight (mg)	0.06400	0.05600	0.04667	0.03900	0.06200	0.04200	0.03900	0.05556
Biomass (mg)	0.06400	0.05600	0.04200	0.03900	0.06200	0.04200	0.03900	0.05000

10-Day Percent Survival 97.5%
 Avg. Weight (mg) 0.05053
 Avg. Biomass (mg) 0.04925
 80 organisms weighed at test initiation
 Avg. weight (mg) 0.02

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

TVA: 9-02***Chironomus dilutus* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#: Dechlor water with Boardman Sediment Lab Control
 Sample ID: -- Boardman Sediment Lab Control
 Test Species: *Chironomus dilutus*
 Date Addition of Sediment: 2/14/11
 Test Initiation Date: 2/15/11

LCS + GLW

Test Photo period: 16:8

Test System: 175mL Manual Delivery

Test Temperature: 23± 1 °C

Test Organism Source/Age: ABSV 1-13 days

Test Termination Date: 2/25/11

Test Day: Day 10

Date: 2/25/11

Overlying Water: Dechlor

Overlying Water Batch ID (GLC Number): N/a

Number Daily Renewals: 2

Renewal time/Initials renewal time/InitialsRenewal time/Initials renewal time/InitialsFood: TFS# (4g/L) Feed 1.5 mL/replicateScreens Cleaned: yes no n/a

Replicate	Temperature (23± 1 °C)*	pH	Dissolved Oxygen (mg/L)*	Specific (µmhos/cm)	Hardness *	Alkalinity *	Ammonia (as N)	Observations/
1					136	110	0.312*	No survivors out of 10
2	77.7	11.7	11.0	16.2	end: 16.5		9.8	10 /10
3					start: 42.8	start: 11.0		10 /10
4	77.1	7.0	7.0	25	Titration 5.5 used (mL): 2.50		1	1 /10
5				136	Sample volume (mL): 3.4		9	1 /10
6							9	1 /10
7		7.29		331			9	1 /10
8		7.35		327			10	1 /10

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

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

Hard, alk, Nitri: Composite Sample all 8 reps - must 2 pass

* taken on 02/24/2011 - day 9

Chironomus dilutus WEIGHT DATA

LCS + GLW

TEST MATERIAL: Settled w/ dechlor H₂O - Lab WEIGH DATE: 2/26 8:27 AM TYPE/MODEL OF DRYING OVEN: BLUE M. and MuffleTEST NUMBER: 5069-02 TVATEST DATE: 2/15/2011- 2/25/2011OVEN TEMPERATURE (°C): 60/55/50TECHNICIAN'S INITIALS: AN | MWDRYING DURATION (HOURS): 24 HRSTEST SPECIES: C. dilutusProtocol: at 60°C, then desiccator for ~30 mins until weighed
then at 550°C when desiccated for minimum of ~30 mins until weighedQC: AB

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	A-B TOTAL ASH-FREE DRY WEIGHT (g)	C NUMBER OF ORGANISMS WEIGHED	A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)	(A-B)/C BIOMASS WEIGHT (mg)
	1	0.81685	0.80788	0.00897	10	0.89700	0.89700
	2	0.808287	0.79921	0.00906	9	1.00667	0.90666
	3	0.81851	0.81110	0.00741	10	0.74100	0.74100
	4	0.80993	0.80141	0.00852	9	0.94667	0.85300
	5	0.81884	0.80903	0.00981	9	1.09000	0.98100
	6	0.81155	0.80251	0.00904	9	1.00444	0.90400
	7	0.80172	0.79461	0.00711	9	0.79000	0.71100
	8	0.817987	0.80689	0.01108	10	1.10800	1.10800

Sample ID: BD
GLC#: Con
Sett LabDechlor H₂O
W/ BD Sett Lab
Con

LCS + GLW

TVA: 506 2***Chironomus dilutus* 10-Day Survival and Growth Whole Sediment Toxicity Test**QWW

GLC#: Declor water with Silica Sand	Test Photoperiod: 16:8
Sample ID: Water only exposure	Test System: 175mL Manual Delivery
Test Species: <i>Chironomus dilutus</i>	Test Temperature: 23± 1°C
Date Addition of Sediment: 2/14/11	Test Organism Source/Age: ABS/ 11-13 days
Test Initiation Date: 2/15/11	Test Termination Date: 2/25/11

Test Day: Day 10	
Date: 2/25/11	
Overlying Water: Declor	
Overlying Water Batch ID (GLC Number): n/a	

Number Daily Renewals: 21	
Renewal time/Initials	renewal time/Initials
<input type="checkbox"/> renewal time/Initials	renewal time/Initials
Food: TFS# (4g/L)	Feed 1.5 mL/replicate
Screens Cleaned: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> n/a	

Replicate	Temperature (23± 1°C)*	pH *	Dissolved Oxygen (mg/L)*	Specific (µmhos/cm)	Hardness *	Alkalinity *	Ammonia (as N)	Observations/ # surviving out of 10
1	22.0				128	86	0.414	NAV 8/10
2	22.0	3.2			49.4	22.8		9/10
3	22.0				46.3	start: 16.5		10/10
4	22.0	3.4			Titrant used (mL): 3.0	4.3		10/10
5					Sample volume (mL): 25	50		10/10
6								8/10
7		7.47			31.2			8/10
8		7.50			31.1			9/10

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

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

Hard, white, NH₄: Composite Sample all 8 cups*** pH, SC, Hard, Cuk, Cuk, NH₄ all analyzed day 9 - must day 9 - must**

***Chironomus dilutus* WEIGHT DATA**

TEST MATERIAL: Water Only GLW
 TEST NUMBER: 5069-02 TVA
 TECHNICIAN'S INITIALS: AP Initials
 QC: AS

WEIGH DATE: 3/26/11 3/27/11

TYPE/MODEL OF DRYING OVEN: BLUE M and Muffle

TEST DATE: 2/15/2011- 2/25/2011

OVEN TEMPERATURE (°C): 60/550

DRYING DURATION (HOURS): 24 hrs 4170hrs

TEST SPECIES: *C. dilutus*DRYING TEMP: 60° ~ 70° min duration 60 min minimum of ~ 30 min until weighed
550° ~ 550° min duration 60 min minimum of ~ 30 min until weighed

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	A-B TOTAL ASH-FREE DRY WEIGHT (g)	C NUMBER OF ORGANISMS WEIGHED	(A-B)/(A+B) * BIOMASS WEIGHT (mg)	
						A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)	(A-B)/(A+B) BIOMASS WEIGHT (mg)
1	0.81021	0.80120	0.00901	7	1.12625	0.90100	
2 *	0.81683	0.80616	0.01067	9	1.18556	1.06700	
3	0.82424	0.81419	0.01005	10	1.00500	01.00500	
4	0.81483	0.80499	0.00984	10	0.98400	0.98400	
5	0.80992	0.80109	0.00883	10	0.88300	0.88300	
6	0.81067	0.80071	0.00996	8	1.24500	0.99600	
7	0.80267	0.79186	0.01081	8	1.35125	1.08100	
8	0.81527	0.80404	0.01123	9	1.24718	1.12300	

TE - Dropped + Recovered

Sample ID: Water Only
 GLC#: Dechlor H₂O w/
 Silica Sand
 GLW

TVA: 5069***Chironomus dilutus* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#	Site water with Boardman Sediment Lab Control	LC5 + Cew	Test Photoperiod: 16:8
Sample ID:	-- CRM 7.0		Test System: 175mL Manual Delivery
Test Species:	<i>Chironomus dilutus</i>		Test Temperature: 23± 1°C
Date Addition of Sediment:	2/14/11		Test Organism Source/Age: ABS/ 11-12 days
Test Initiation Date:	2/15/11		Test Termination Date: 2/25/11

Test Day:	Day 10	Number Daily Renewals: 2
Date:	2/25/11	100% renewal time/Initials <input checked="" type="checkbox"/> renewal time/Initials
Overlying Water: Site	CRM 7.0	<input type="checkbox"/> renewal time/Initials <input checked="" type="checkbox"/> renewal time/Initials
Overlying Water Batch ID (GLC Number):	3400	Food: TFS# (4g/L) <input checked="" type="checkbox"/> Feed 1.5 mL/replicate
Screens Cleaned:	yes <input type="checkbox"/> no <input type="checkbox"/> n/a	

Replicate	Temperature (23± 1 °C)*	pH *	Dissolved Oxygen (mg/L)*	Specific (µmhos/cm)	Hardness *	Alkalinity *	Ammonia (as N) *	Observations/ # surviving out of 10
1	22.2			144	104	0.35*	water	10 /10
2	22.2	2.4		3.7	28.0			10 /10
3	22.2				start: 22.8			9 /10
4	22.2	2.4			Titrant used (mL): 3.6	5.3		9 /10
5					Sample volume (mL): 50	50		10 /10
6								10 /10
7		7.42			340			9 /10
8		7.42			336			8 /10

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

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

Hard are NH₄: Composite all 8 steps * pH, Si, Hard, and NH₄ will analyzed 2/24/11 - day 9 - hours

Chironomus dilutus WEIGHT DATA

LCS + Crew

TEST MATERIAL: Sediment CRM 7.0 w/ Bd Sed
 TEST NUMBER: 5069-02 TVA
 TECHNICIAN'S INITIALS: AD MWS
PC AB

WEIGH DATE: 2/26/11 2/27/11
 TYPE/MODEL OF DRYING OVEN: BLUE M and Muffle

TEST DATE: 2/15/2011- 2/25/2011OVEN TEMPERATURE (°C): 60/55/50

DRYING DURATION (HOURS): 24 HRS
 Drying @ 60°C then decrease to a minimum of ~30 mins until weighed
 then @ 55°C then decrease to a minimum of ~30 mins until weighed

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	A-B TOTAL ASH-FREE DRY WEIGHT (g)	C NUMBER OF ORGANISMS WEIGHED	A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)	
						(A-B)/C	Biomass Weight (mg)
1	0.80736	0.79913	0.00823	0.00823	10	0.82300	0.82300
2	0.81130	0.80114	0.01016	0.01016	10	1.01600	1.01600
3	0.80093	0.79229	0.00864	0.00864	9	0.96000	0.86400
4	0.80577	0.79689 ^{AD}	0.00888	0.00888	9	0.98667	0.88800
5	0.81177	0.80120	0.01057	0.01057	10	1.05700	1.05700
6	0.81153	0.80046	0.01107	0.01107	10	1.10700	1.10700
7	0.81933	0.81179	0.00754	0.00754	9	0.83778	0.75400
8	0.80851	0.81991	0.00950	0.00950	8	1.18750	0.95000

Sample ID: CRM 7.0

GLC#: Site H2O w/
 Bd Lab Con
 LCS + Crew

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	GLW, LCS +GLW, LCS +CRW	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environ	Sample Type:	AMB1-Ambient water	
Sample Date:		Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus	
Comments:	GLW=Lab water; LCS=Lab Control Sediment; CRW=Clinch River Water					
Conc-%	1	2	3	4	5	6
-GLW	0.8000	0.9000	1.0000	1.0000	0.8000	0.8000
-LCS + GLW	1.0000	0.9000	1.0000	0.9000	0.9000	0.9000
LCS + CRW	1.0000	1.0000	0.9000	0.9000	1.0000	0.9000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				1-Tailed Critical	MSD
			Min	Max	CV%	N		
-GLW	0.9000	0.9600	1.2569	1.1071	1.4120	11.234	8	
-LCS + GLW	0.9375	1.0000	1.3102	1.2490	1.4120	6.438	8	*
LCS + CRW	0.9375	1.0000	1.3128	1.1071	1.4120	8.821	8	-0.052
							1.761	0.0892

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.76785	0.887	-0.2876	-0.8647
F-Test indicates equal variances (p = 0.42)	1.88482	8.88539		
The control means are not significantly different (p = 0.38)	0.91502	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.05107	0.05471	2.8E-05	0.95926 1, 14
Treatments vs -LCS + GLW				

Chironomus dilutus 10 Day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth (AFDW)							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	GLW, LCS+GLW, LCS+CRW		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environmental Sample Type:				
Sample Date:		Protocol:	EPA 600/R-99/064	AMB1-Ambient water			
Comments:	GLW=Lab water; LCS=Lab Control Sediment; CRW=Clinch River Water			Test Species:			
Conc-%	1	2	3	4	5	6	7
-GLW	1.1263	1.1856	1.0050	0.9840	0.8830	1.2450	1.3513
-LCS + GLW	0.8970	1.0067	0.7410	0.9467	1.0900	1.0044	0.7900
LCS + CRW	0.8230	1.0160	0.9600	0.9867	1.0570	1.1070	0.8378

Conc-%	Transform: Untransformed					1-Tailed			
	Mean	N	Mean	Min	Max	N	t-Stat	Critical	MSD
-GLW	1.1285	1.1904	1.1285	0.8830	1.3513	14.094	8		
-LCS + GLW	0.9480	1.0000	0.9480	0.7410	1.1080	13.972	8	*	
LCS + CRW	0.9969	1.0516	0.9969	0.8230	1.1875	12.544	8	-0.759	1.761
								0.1134	

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.94628	0.887	-0.2547	-0.9717
F-Test indicates equal variances ($p = 0.88$)	1.122	8.88539		
The control means are significantly different ($p = 0.03$)	2.46666	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDP	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.11343	0.11966	0.00956	0.01659 1, 14
Treatments vs -LCS + GLW				

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass (AFDW)						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	GLW, LCS +GLW, LCS +CRW	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environ	Sample Type:	AMB1-Ambient water	
Sample Date:		Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus	
Comments:	GLW=Lab water; LCS=Lab Control Sediment; CRW=Clinch River Water					
Conc.-%	1	2	3	4	5	6
-GLW	0.9010	1.0670	1.0050	0.9840	0.8830	0.9960
-LCS + GLW	0.8970	0.9060	0.7410	0.8520	0.9810	0.9040
LCS + CRW	0.8230	1.0160	0.8640	0.8880	1.0570	1.1070

Conc.-%	Mean	N	Transform: Untransformed			t-Stat	Critical	MSD
			Mean	Min	Max			
-GLW	1.0050	1.1324	1.0050	0.8830	1.1230	8.390	8	
-LCS + GLW	0.8875	1.0000	0.8875	0.7110	1.1080	14.249	8	*
LCS + CRW	0.9324	1.0506	0.9324	0.7540	1.1070	13.058	8	-0.723

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's T Test indicates normal distribution ($p > 0.05$)	0.96606	0.887	0.1468	-0.6854
F-Test indicates equal variances ($p = 0.92$)	1.07892	8.88639		
The control means are significantly different ($p = 0.05$)	2.18658	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDP	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.10931	0.12317	0.00806	0.01541 0.48155 1, 14
Treatments vs -LCS + GLW				

TVA: 5069*Chironomus dilutus* 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#:	8897	Test Photoperiod:	16:8
Sample ID:	Climch Reference	Test System:	175mL Manual Delivery
Test Species:	<i>Chironomus dilutus</i>	Test Temperature:	23± 1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	ABSF 1-12 days
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11

Test Day:	Day 10
Date:	2/25/11
Overlying Water: Site	Open Top
Overlying Water Batch ID (GLC Number):	8410

Number Daily Renewals:	2	/	
<input checked="" type="checkbox"/> renewal time/Initials	10	/	renewal time/Initials
<input type="checkbox"/> renewal time/Initials	—	/	renewal time/Initials
Food: TFS# (4g/L)	✓	/	Feed 1.5 mL/replicate
Screens Cleaned:	<input type="checkbox"/> yes	<input checked="" type="checkbox"/> no	<input type="checkbox"/> n/a

Replicate	Temperature (23± 1 °C)*	pH	Dissolved Oxygen (mg/L)*	Specific Gravity (μmhos/cm)	Hardness	Alkalinity	Ammonia (as N)	Observations/ # surviving out of 10
1	20.3	4.4		144	132	0.005	✓	10 /10
2	20.3	4.4		144	132	0.005	✓	10 /10
3	20.3	4.3		35.4	36.4	1	✓	10 /10
4	20.3	4.3		31.8	30.3	1	✓	10 /10
5				Tirant used (mL): 3.6	Tirant used (mL): 4.1			10 /10
6				Sample 25 volume (mL): 50	Sample volume (mL): 50			10 /10
7		7.66	324					10 /10
8		7.61	329					10 /10

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

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

Herd, Ann Niki: Compound Sample of all 8 Reps
pH, TSC, Hard, Dark, White - all analyzed 2/24/11 day-mur

J: Between mol (0.04) and RL (0.10)

Chironomus dilutus WEIGHT DATA

CRS + CRW

GLC#8897

TEST MATERIAL: Ninch LabWEIGH DATE: 2/26/11 TYPE/MODEL OF DRYING OVEN: BLUE M and MuffleTEST NUMBER: 5069-02 TVATEST DATE: 2/15/2011- 2/25/2011 OVEN TEMPERATURE (°C): 60/550TECHNICIAN'S INITIALS: AODRYING DURATION (HOURS): 24+hrs TEST SPECIES: C. dilutus

24hrs @ 60°C then decrease to a minimum of ~30min until weighed
then increase to a minimum of ~30min until weighed

QC AS

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	A-B TOTAL ASH-FREE DRY WEIGHT (g)	C NUMBER OF ORGANISMS WEIGHED	A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)	(A-B) * 100 / total ashed BIOMASS WEIGHT (mg)
1	0.84757	0.83952	0.00805	0.83147	10	0.80500	0.80500
2	0.84595	0.83704	0.00891	0.82813	10	0.89100	0.89100
3	0.84317	0.83463	0.00854	0.82663	10	0.85400	0.85400
4	0.84518	0.83847	0.00671	0.83176	10	0.67100	0.67100
5	0.840340	0.83072	0.00958	0.82112	10	0.95800	0.95800
6	0.83848	0.83226	0.00622	0.82604	10	0.62200	0.62200
7	0.841080	0.83486	0.00614	0.82472	10	0.61400	0.61400
8	0.82810	0.81994	0.00816	0.81178	10	0.81600	0.81600

Sample ID: Chironomus dilutus

GLC#: 8897

CRS + CRW

TVA: 5069-1***Chironomus dilutus* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	8888	Test Day:	Day 10
Sample ID:	CRM 0.0	Date:	2/25/11
Test Species:	<i>Chironomus dilutus</i>	Overlying Water Site:	Open 7.0
Date Addition of Sediment:	2/14/11	Overlying Water Batch ID (GLC Number):	8100
Test Initiation Date:	2/15/11		

Test Photoperiod: 16:8
Test System: 175mL Manual Delivery
Test Temperature: 23± 1°C
Test Organism Source/Age: ABS/ 11-13 days
Test Termination Date: 2/25/11

Number Daily Renewals: 2
✓ renewal time/Initials
✓ renewal time/Initials
✓ renewal time/Initials
Food: TFS# (4g/L)
Feed 1.5 mL/replicate
Screens Cleaned: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> n/a

Replicate	Temperature (23± 1 °C)*	pH	Dissolved Oxygen (mg/L)*	Specific (μmhos/cm)	Hardness	Alkalinity	Ammonia (as N)	Observations/ # surviving out of 10
1					40	128	0.27%	N/A 10 /10
2	28.2	3.4			7.2	end: 24.4		10 /10
3	28.0				3.7	start: 28.0		10 /10
4	28.0	3.5			3.5	Titrant used (mL): 6.4		10 /10
5					Sample 25-40 volume (mL): 50	Sample volume (mL): 50		10 /10
6								10 /10
7		7.48			342			10 /10
8		7.51			338			10 /10

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

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

Hand calc. Only. Composile all 8 tests pH, SL, Hard, Out, Why all analysed 3/24/11 - day 9

Chironomus dilutus WEIGHT DATA

TEST MATERIAL: C2m 0.0 GLC# 8888 ♀

WEIGH DATE: 2/26 & 2/27/11
TYPE/MODEL OF DRYING OVEN: BLUE M and Muffle

TEST NUMBER: 5069-02-TVA

TEST DATE: 2/15/2011- 2/25/2011

OVEN TEMPERATURE (°C): 60/55/50

TECHNICIAN'S INITIALS: AN

TEST SPECIES: *C. dilutus*

QC: A/B

DRYING DURATION (HOURS): 24 HRS
24 hrs @ 60°C then dry down for a minimum of 30 mins until weighed
then @ 55°C then desiccate for a min max of ~30 mins until weighed

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	A-B TOTAL ASH-FREE DRY WEIGHT (g)	C NUMBER OF ORGANISMS WEIGHED	A-B/C	(A-B)/(A+B+C) BIOMASS WEIGHT (mg)
						AVERAGE ASH-FREE DRY WEIGHT (mg)	
1	0.81414	0.80497	0.00917	10	0.91700	0.91700	
2	0.816250	0.80858	0.00762	10	0.76300	0.76200	
3	0.82685	0.81830	0.00855	10	0.85500	0.85500	
4	0.80902	0.79947	0.00955	10	0.95500	0.95500	
5	0.81480	0.80724	0.00754	10	0.75600	0.75600	
6	0.81452	0.80640	0.00812	10	0.81200	0.81200	
7	0.80737	0.80079	0.00658	10	0.65800	0.65800	
8	0.81298	0.80480	0.00818	10	0.81800	0.81800	

Sample ID: C2m 0.0

GLC#: 8888

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 0.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environ	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed; CRW=Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	1.0000	1.0000	0.9000	0.9000	1.0000	0.9000
-CRS + CRW	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
CRM 0.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Conc-	Transform: Arcsin Square Root					Rank	1-Tailed Sum	Critical
	Mean	N-Mean	Mean	Min	Max			
-LCS + CRW	0.9375	0.9375	1.3128	1.1071	1.4120	8.821	8	*
-CRS + CRW	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	8	*
CRM 0.0	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	8	68.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	1	0.887		
Equality of variance cannot be confirmed				
The control means are significantly different (p = 0.03)	2.42359	2.14479		
Hypothesis Test (1-tail, 0.05)				
Wilcoxon Two-Sample Test indicates no significant differences				
Treatments vs -CRS + CRW				

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test:10-Day Growth (AFDW)

Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 0.0			
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn Sample Type:	-WHOLE SEDIMENT				
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus			
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed; CRW=Clinch River Water							
Conc-	1	2	3	4	5	6	7	8
-LCS + CRW	0.8230	1.0160	0.9600	0.9867	1.0570	1.1070	0.8378	1.1875
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220	0.6140	0.8160
CRM 0.0	0.9170	0.7620	0.8550	0.9550	0.7560	0.8120	0.6580	0.8180

Conc-	Transform: Untransformed					1-Tailed				
	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
-LCS + CRW	0.9969	1.2799	0.9969	0.8230	1.1875	12.544	8			
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*		
CRM 0.0	0.8166	1.0485	0.8166	0.6580	0.9550	11.575	8	-0.669	1.761	0.0994

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.95084	0.887	-0.1533	-1.0107
F-Test indicates equal variances ($p = 0.44$)	1.8515	8.88539		
The control means are significantly different ($p = 4.01E-03$)	3.43722	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSB	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.09939	0.12761	0.0057	0.01274 0.51441 1, 14
Treatments vs -CRS + CRW				

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass (AFDW)						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 0.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus	
Comments:	CRM=Clinch River Mile Sediment: LCS=Lab Control Sed. CRS=Clinch Reference Sed. CRW=Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	0.8230	1.0160	0.8640	0.8880	1.0570	1.1070
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220
CRM 0.0	0.9170	0.7620	0.8550	0.9550	0.7560	0.8120

Conc-	Transform: Untransformed					t-Stat	Critical	MSD
	Mean	N-Mean	Mean	Min	Max			
-LCS + CRW	0.9324	1.1971	0.9324	0.7540	1.1070	13.058	8	
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*
CRM 0.0	0.8166	1.0485	0.8166	0.6580	0.9550	11.575	8	-0.669
							1.761	0.0994

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.95084	0.887	-0.1533	-1.0107
F-Test indicates equal variances (p = 0.44)	1.8515	8.88539		
The control means are significantly different (p = 0.03)	2.45154	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSE	F-Prob
Homoscedastic t Test indicates no significant differences	0.09939	0.12761	0.0057	0.01274
Treatments vs -CRS + CRW				0.51441
				1.14

TVA: 5069-q***Chironomus dilutus* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	8889	Test Photoperiod:	16:8
Sample ID:	CRM 1.5	Test System:	175mL Manual Delivery
Test Species:	<i>Chironomus dilutus</i>	Test Temperature:	23 ± 1 °C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	ABSI W-13 day 5
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11

Test Day:	Day 10	Number Daily Renewals:	1
Date:	2/25/11	Renewal time/Initials	<input checked="" type="checkbox"/> renewal time/Initials
Overlying Water: Site	CRM 7.0	renewal time/Initials	<input type="checkbox"/> renewal time/Initials
Overlying Water Batch ID (GLC Number):	8900	Food: TFS# (4g/L)	<input checked="" type="checkbox"/> Feed 1.5 mL/replicate
Screens Cleaned:	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> n/a		

Replicate	Temperature (23±1 °C)*	pH	Dissolved Oxygen (mg/L)*	Specific Gravity (μhos/cm)	Hardness *	Alkalinity *	Ammonia (as N) *	Observations/ # surviving out of 10
1	22.3	7.4		144	116		0.088	ML 10/10
2				10.8	10.2	duplicate	0.08	10/10
3	22.3	4.4		7.2	31.4			Q 10/10
4		4.4		3.6	Titration used (mL): 5.8			10/10
5				25 to sample volume (mL): 50	sample volume (mL): 50			10/10
6							pupae & g (10) dead	7/10
7		7.41		321				7/10
8		7.44		322				6/10

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

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

Herd, Ann, NY: Composite all 8 replicates pH, SC, Hard, O2, NH4 all analyzed 2/24/11 - day 9 now

② RP should be <15%

J. Between mol(0.01) and Dl(0.10)

Chironomus dilutus WEIGHT DATA

TEST MATERIAL: CRM 1.5 GLC# 8889

WEIGH DATE: 2/26 & 3/37/11 TYPE/MODEL OF DRYING OVEN: BLUE M and Muffle

TEST NUMBER: 5069-02 TVA

TEST DATE: 2/15/2011- 2/25/2011 OVEN TEMPERATURE (°C): 60/550

TECHNICIAN'S INITIALS: AD

TEST SPECIES: *C. dilutus*

DRYING DURATION (HOURS): 24 HRS

24 hrs @ 60°C then desiccator for a minimum of 30 mins, until weighed
above 550°C Standard oven for a minimum of 30 mins, until weighed

QC: AS

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	A-B TOTAL ASH-FREE DRY WEIGHT (g)	C NUMBER OF ORGANISMS WEIGHED	(A-B)/C BIOMASS WEIGHT (mg)	
						A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)	(A-B)/C BIOMASS WEIGHT (mg)
1	0.84302	0.83515	0.00787	0.00787	10	0.78700	0.78700
2	0.84249	0.83586	0.00643	0.00643	10	0.46300	0.46300
3	0.82427	0.81679	0.00728	0.00728	9	0.80889	0.73800
4	0.84540	0.83486	0.01054	0.01054	10	1.05400	1.05400
5	0.83062	0.82255	0.00807	0.00807	10	0.80700	0.80700
6	0.82707	0.81943	0.00764	0.00764	9	0.84889	0.76400
7	0.81535	0.80894	0.00641	0.00641	7	0.91571	0.44100
8	0.81743	0.81017	0.00720	0.00720	6	1.21000	0.73000

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 1.5		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn Sample Type:	-WHOLE SEDIMENT			
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed; CRW=Clinch River Water						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	1.0000	1.0000	0.9000	0.9000	1.0000	0.9000	0.8000
-CRS + CRW	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
CRM 1.5	1.0000	1.0000	0.9000	1.0000	1.0000	0.7000	0.6000

Conc-	Transform: Arcsin Square Root					t-Stat	Critical	MSD
	Mean	N-Mean	Mean	Min	Max			
-LCS + CRW	0.9375	0.9375	1.3128	1.1071	1.4120	8.821	8	
-CRS + CRW	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	8	*
CRM 1.5	0.9000	0.9000	1.2733	0.8861	1.4120	16.957	8	1.817
							1.895	0.1446

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p < 0.05$)	0.74305	0.887	-1.5951	2.74691
Equality of variance cannot be confirmed				
The control means are significantly different ($p = 0.03$)	2.42359	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDP	MSB	F-Prob df
Heteroscedastic t Test indicates no significant differences	0.06427	0.06592	0.07697	0.02331 0.09065 1, 14
Treatments vs -CRS + CRW				

Reviewed by: 

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth (AFDW)							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 1.5		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environam Sample Type:	-WHOLE SEDIMENT			
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed; CRW=Clinch River Water						
Conc.	1	2	3	4	5	6	7
-LCS + CRW	0.8230	1.0160	0.9600	0.9867	1.0570	1.1070	0.8378
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220	0.6140
CRM 1.5	0.7870	0.6630	0.8089	1.0540	0.8070	0.8489	0.9157
							1.1875
							0.8160
							1.2100

Conc-	Transform: Untransformed				1-Tailed					
	Mean	N	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
-LCS + CRW	0.9969	1.2799	0.9969	0.8230	1.1875	12.544	8			
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*		
CRM 1.5	0.8868	1.1386	0.8868	0.6630	1.2100	19.399	8	-1.421	1.761	0.1338

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.96667	0.887		
F-Test indicates equal variances ($p = 0.46$)	1.78916	0.56106	-0.0376	
The control means are significantly different ($p = 4.01E-03$)	3.43722	8.89539		
Hypothesis Test (1-tail, 0.05)	MSD_U	MSB	MSE	F-Prob
Homoscedastic t Test indicates no significant differences	0.13376	0.17173	0.0466	0.02307
Treatments vs -CRS + CRW				0.17712
				1, 14

Reviewed by: ES

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass (AFDW)							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 1.5		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environment	Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	0.8230	1.0160	0.8640	0.8880	1.0570	1.1070	0.7540
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220	0.6140
CRM 1.5	0.7870	0.6630	0.7280	1.0540	0.8070	0.7640	0.6410
							0.7260

Conc-	Transform: Untransformed						1-Tailed Critical	MSD
	Mean	N	Mean	Min	Max	Cv%		
-LCS + CRW	0.9324	1.1971	0.9324	0.7540	1.1070	13.058	8	
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*
CRM 1.5	0.7713	0.9902	0.7713	0.6410	1.0540	16.556	8	0.119
							1.761	0.1129

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.94939	0.887	0.68472	0.33168
F-Test indicates equal variances ($p = 0.99$)	1.01459	8.886539		
The control means are significantly different ($p = 0.03$)	2.45154	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _u	MSD _p	MSE	F-Prob
Homoscedastic t Test indicates no significant differences	0.11286	0.1449	0.00023	0.90697
Treatments vs -CRS + CRW				1, 14

TVA: 50694

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

GLC#:	8891	Test Photoperiod:	16:8
Sample ID:	CRM 2.0	Test System:	175mL Manual Delivery
Test Species:	<i>Chironomus dilutus</i>	Test Temperature:	23±1 °C
Date Addition of Sediment:	2/4/11	Test Organism Source/Age:	ABSI 11-12 days
Test Initiation Date:	2/5/11	Test Termination Date:	2/25/11

Test Day:	Day 10	Number Daily Renewals:	✓ 1
Date:	2/25/11	Renewal time/Initials	<input checked="" type="checkbox"/> renewal time/Initials
Overlying Water:	Site CRM 1-O	renewal time/Initials	<input type="checkbox"/> renewal time/Initials
Overlying Water Batch ID (GLC Number):	8910	Food:	TFS# (4g/L) <input checked="" type="checkbox"/> Feed 1.5 mL/replicate
		Screens Cleaned:	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> n/a

Replicate	Temperature (23±1 °C)*	pH	Dissolved Oxygen (mg/L)*	Specific	Hardness	Alkalinity	Ammonia (as N)	Observations/ # surviving out of 10
1				144	123	0.0705	10	/10
2	22.3		4.1	14.4	46.3		9	/10
3				10.8	40.2		10	/10
4	22.3		4.3	Tirant used (mL): 3.6	Tirant used (mL): 6.1		10	/10
5				Sample 25 to volume (mL): 50	Sample volume (mL): 50		10	/10
6							10	/10
7		2.61	3.19				9	/10
8		7.54	3.22				10	/10

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

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

Hard alk. NH₄: Components of Sample all & kept
 pH, SC, Hard alk. NH₄ all analyzed 2/24/11 day 9 must

J. Between MDL (0.001) and RL (0.10)

Chironomus dilutus WEIGHT DATA

TEST MATERIAL: CRM 2.0 GLC#8891

WEIGH DATE: 2/26 2/27/11 TYPE/MODEL OF DRYING OVEN: BLUE M and Muffle

TEST NUMBER: 5069-02 TVA

TEST DATE: 2/15/2011- 2/25/2011

OVEN TEMPERATURE (°C): 60/550

TECHNICIAN'S INITIALS: AD

TEST SPECIES: C. dilutus

QC: B

DRYING DURATION (HOURS): 24 HRS
Drying time minimum of ~30 mins until weighed

Drying time calculation for a minimum of 30 mins until weighed

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	A-B TOTAL ASH-FREE DRY WEIGHT (g)	C NUMBER OF ORGANISMS WEIGHED	A-B/C	(A-B)/ [#] C ¹⁰⁰ BIOMASS WEIGHT (mg)
						AVERAGE ASH-FREE DRY WEIGHT (mg)	
1	0.83692	0.82949	0.00743	10	0.74300	0.74300	
2	0.82824	0.82313	0.00511	9	0.56778	0.56778	
3	0.83459	0.82871	0.00588	10	0.58800	0.58800	
4	0.82481	0.81808	0.00673	10	0.67300	0.67300	
5	0.834465	0.829948	0.00447	10	0.44700	0.44700	
6	0.84146	0.83404	0.00742	10	0.74300	0.74300	
7	0.83623	0.82911	0.00712	9	0.79111	0.79111	
8	0.84510	0.83640	0.00870	10	0.87000	0.87000	

Reviewed by: *ES*

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.0		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environ Sample Type:		-WHOLE SEDIMENT		
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch River Water						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	1.0000	1.0000	0.9000	0.9000	1.0000	0.9000	0.8000
-CRS + CRW	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
CRM 2.0	1.0000	0.9000	1.0000	1.0000	1.0000	0.9000	1.0000

Conc-	Transform: Arcsin Square Root					1-Tailed			MSD
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	
-LCS + CRW	0.9375	0.9375	1.3128	1.1071	1.4120	8.821	8		
-CRS + CRW	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	8		
CRM 2.0	0.9750	0.9750	1.3713	1.2490	1.4120	5.501	8	1.528	1.895
									0.0505

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)	0.67657	0.887	-1.807	2.82967
Equality of variance cannot be confirmed				
The control means are significantly different ($p = 0.03$)	2.42359	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp		
Heteroscedastic t Test indicates no significant differences	0.01818	0.01864	0.00664	0.00285
Treatments vs -CRS + CRW			0.1489	1, 14

Reviewed by: EJ

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth (AFDW)							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.0		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environ	Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed; CRW=Clinch River Water						

Conc-	Transform: Untransformed							1-Tailed t-Stat	Critical MSD
	Mean	N-Mean	Mean	Min	Max	Cv%	N		
-LCS + CRW	0.9969	1.2799	0.9969	0.8230	1.1875	12.544	8		
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*	
CRM 2.0	0.6777	0.8701	0.6777	0.4470	0.8700	20.232	8	1.522	0.1171

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.9492	0.887	-0.2581	-1.0301
F-Test indicates equal variances ($p = 0.87$)	1.13663	8.88539		
The control means are significantly different ($p = 4.01E-03$)	3.43722	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _B	MSE	F-Prob df
Homoscedastic t-Test indicates no significant differences	0.11707	0.15031	0.04092	0.01767 1, 14
Treatments vs -CRS + CRW				

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass (AFDW)						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn	Sample Type:	WHOLE SEDIMENT	
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed. CRW=Clinch River Water				<th></th>	
Conc-	1	2	3	4	5	6
-LCS + CRW	0.8230	1.0160	0.8640	0.8880	1.0570	1.1070
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220
*CRM 2.0	0.7430	0.5110	0.5880	0.6730	0.4470	0.7420
						0.7120
						0.8700

Conc-	Transform: Untransformed						1-Tailed Critical MSD
	Mean	N	Mean	Min	Max	CV%	
-LCS + CRW	0.9324	1.1971	0.9324	0.7540	1.1070	13.058	8
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8
*CRM 2.0	0.6608	0.8483	0.6608	0.4470	0.8700	20.888	8

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.94264	0.887	-0.1803	-1.0599
F-Test indicates equal variances ($p = 0.86$)	1.1515	8.88539		
The control means are significantly different ($p = 0.03$)	2.45154	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDP	MSB	F-Prob df
Homoscedastic t Test indicates significant differences	0.11748	0.15083	0.05581	0.01779 0.09832 1, 14
Treatments vs -CRS + CRW				

TVA: 5069-1***Chironomus dilutus* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	8892	Test Photoperiod:	16:8
Sample ID:	CRM 2.5	Test System:	175mL Manual Delivery
Test Species:	<i>Chironomus dilutus</i>	Test Temperature:	23±1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	ABSI 11-12 days
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11

Test Day:	Day 10	Number Daily Renewals:	21
Date:	2/25/11	<input checked="" type="checkbox"/> renewal time/Initials	/
Overtopping Water:	Site CRM 70	<input type="checkbox"/> renewal time/Initials	/
Overtopping Water Batch ID (GLC Number):	89UD	<input type="checkbox"/> Food: TFS# (4g/L)	/
		<input type="checkbox"/> Feed 1.5 mL/replicate	
		<input type="checkbox"/> Screens Cleaned: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> n/a	

Replicate	Temperature (23±1 °C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness *	Alkalinity *	Ammonia (as N) *	Observations/ # surviving out of 10
1				136	130	0.10	10/10	
2	22.3	4.3	4.3	178	180		10/10	
3	22.3	3.2		14.4	0.0		10/10	
4	22.3	3.2		Titrant used (mL): 3.4	6.0		10/10	
5				Sample volume (mL): 50	50		9/10	
6							10/10	
7		7.48		322			10/10	
8		7.48		319			10/10	

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

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

Hard, all, Nitro, Composite Sample on 8 Sep 05

TVA: Between mol(0.04) and RL(0.10)
Hard, all, Nitro, Composite Sample on 8 Sep 05
& pH, Si, Hard, alk, NH4 cell analyzed after 11 day of run

Chironomus dilutus WEIGHT DATA

TEST MATERIAL: CRM 2.5 GLC# 8892

WEIGH DATE: 2/16/11 2/27/11

TYPE/MODEL OF DRYING OVEN: BLUE M and Muffle

TEST NUMBER: 5069-02 TVA

TEST DATE: 2/15/2011- 2/25/2011

OVEN TEMPERATURE (°C): 60/550

TECHNICIAN'S INITIALS: AD JMK

DRYING DURATION (HOURS): 24 HRS

24 hrs @ 60°C
Dried in pan for a minimum of 30 mins, until weighed

QC: AS

2 hrs @ 550°C, then dried in pan for a minimum of ~30 mins until weighed

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	(A-B) / C * 100% TEST INFLUENCE BIOMASS WEIGHT (mg)	
					A-B TOTAL ASH-FREE DRY WEIGHT (g)	A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)
1	0.84055	0.83340	0.00715	10	0.71500	0.71500
2	0.83233	0.82569	0.00664	10	0.66400	0.66400
3	0.817897	0.81104	0.00683	10	0.68300	0.68300
4	0.82235	0.81588	0.00647	10	0.64700	0.64700
5	0.82145	0.81390	0.00755	9	0.83889	0.75500
6	0.82568	0.81862	0.00704	10	0.70600	0.70600
7	0.82050	0.81315	0.00735	10	0.73500	0.73500
8	0.82735	0.81991	0.00744	10	0.74400	0.74400

Sample ID: CRM 2.5

GLC#: 8892

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

Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.5			
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:	-WHOLE SEDIMENT				
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus			
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed; CRW=Clinch River Water							
Conc-	1	2	3	4	5	6	7	8
-LCS + CRW	1.0000	1.0000	0.9000	0.9000	1.0000	1.0000	0.9000	0.8000
-CRS + CRW	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
CRM 2.5	1.0000	1.0000	1.0000	1.0000	0.9000	1.0000	1.0000	1.0000

Conc-	Transform: Arcsin Square Root					1-Tailed			Kurt
	Mean	N	Mean	Min	Max	Cv%	N	t-Stat	
-LCS + CRW	0.9375	0.9375	1.3128	1.1071	1.4120	8.821	8		-3.5489 13.5047
-CRS + CRW	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	8	*	
CRM 2.5	0.9875	0.9875	1.3916	1.2490	1.4120	4.140	8	1.000	1.895 0.0386

Auxiliary Tests

Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)

Equality of variance cannot be confirmed

The control means are significantly different (p = 0.03)

Hypothesis Test (1-tail, 0.05)

Heteroscedastic t Test indicates no significant differences

Treatments vs -CRS + CRW

	Statistic	Critical	Skew	Kurt
	0.4689	0.887		
	2.42359	2.14479		
	MSDu	MSDp	MSE	F-Prob df
	0.01345	0.0138	0.00166	0.33428 1, 14

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth (AFDW)						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.5	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDL-Chironomus dilutus	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed; CRW=Clinch River Water					
Cone-	1	2	3	4	5	6
-LCS + CRW	0.8230	1.0160	0.9600	0.9867	1.0570	1.1070
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220
CRM 2.5	0.7150	0.6640	0.6830	0.6470	0.8389	0.7060

Conc-	Transform: Untransformed					1-Tailed				
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	Critical	MSD
-LCS + CRW	0.9969	1.2799	0.9969	0.8230	1.1875	12.544	8			
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*		
CRM 2.5	0.7166	0.9201	0.7166	0.6470	0.8389	8.323	8	1.242	1.761	0.0883

Auxiliary Tests		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)		0.97821	0.887	-0.0516	-0.3582
F-Test indicates equal variances (p = 0.06)		4.65056	8.88539		
The control means are significantly different (p = 4.01E-03)		3.43722	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSB	MSE	F-Prob
Homoscedastic t Test indicates no significant differences	0.08828	0.11335	0.01551	0.01005	0.23456
Treatments vs -CRS + CRW					1, 14

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass (AFDW)							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.5		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn	Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDII-Chironomus dilutus		
Comments:	CRM=Clinch River Mile Sediment, LCS=Lab Control Sed; CRS=Clinch Reference Sed. CRW=Clinch River Water						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	0.8230	1.0160	0.8640	0.8880	1.0570	1.1070	0.7540
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220	0.6140
CRM 2.5	0.7150	0.6640	0.6830	0.6470	0.7550	0.7060	0.7350
							0.7440

Conc-	Transform: Untransformed						
	Mean	N-Mean	Mean	Min	Max	Cv%	N
-LCS + CRW	0.9324	1.1971	0.9324	0.7540	1.1070	13.058	8
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8
CRM 2.5	0.7061	0.9066	0.7061	0.6470	0.7550	5.496	8

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.96518	0.887	-0.2017	0.12
F-Test indicates unequal variances ($p = 5.29E-03$)	10.9851	8.88539		
The control means are significantly different ($p = 0.03$)	2.45154	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSB	F-Prob
Heteroscedastic t Test indicates no significant differences	0.08832	0.1134	0.02117	0.00902
Treatments vs -CRS + CRW				0.14788
				1, 14

TVA: 5069-1*Chironomus dilutus* 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#:	8893	Test Photoperiod:	16:8
Sample ID:	CRM 3.0	Test System:	175mL Manual Delivery
Test Species:	<i>Chironomus dilutus</i>	Test Temperature:	23± 1 °C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	ABSI 11-17 days
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11

Test Day:	Day 10	Number Daily Renewals:	2
Date:	2/25/11	renewal time/Initials	/
Overlying Water: Site	CJMN 10	renewal time/Initials	/
Overlying Water Batch ID (GLC Number):	8900	Food: TFS# (4g/L)	/ Feed 1.5 mL/replicate
Overlying Water Batch ID (GLC Number):	8900	Screens Cleaned:	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> n/a

Replicate	Temperature (23± 1 °C)*	pH ★	Dissolved Oxygen (mg/L)*	Specific ★	Hardness ★	Alkalinity ★	Ammonia (as N) ★	Observations/ # surviving out of 10
1				144	132	★	0.35 0.244 new	10 /10
2	22.3	2.9		31.4	end: 12.3		0.35 0.244 new	9 /10
3	22.3			start: 17.8				10 /10
4	22.3	3.2		start: 19.0				10 /10
5				Titrant used (mL): 3.6	Titrant used (mL): 6.3			10 /10
6				Sample 25 to volume (mL): 50	Sample volume (mL): 50			10 /10
7		7.54						10 /10
8		7.53		335				10 /10

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

* Contact Laboratory Coordinator if Dissolved Oxygen level is < 2.5 mg/L or Temperature is out of range.
Hard, alk, NH₄: Composite Sample all 8 reps★ pH, Hard, alk, NH₄ all analyzed 2/24/11 day 9 - mean

Chironomus dilutus WEIGHT DATA

TEST MATERIAL: C Rm 3.0 GLC# 8893

WEIGH DATE: 2/16/11 2/27/11

TYPE/MODEL OF DRYING OVEN: BLUE M and Muffle

TEST NUMBER: 5069-02 TVA

TEST DATE: 2/15/2011- 2/25/2011

OVEN TEMPERATURE (°C): 60/550

TECHNICIAN'S INITIALS: AD/mms

DRYING DURATION (HOURS): 24 hrs

TEST SPECIES: *C. dilutus*

PL: AS

Drying @ 60°C
Duration for a minimum of 30 mins, until weighed
at 60 & 550°C them decrease to a minimum of 30 mins, until weighed

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	A-B TOTAL ASH-FREE DRY WEIGHT (g)	C NUMBER OF ORGANISMS WEIGHED	A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)	(A-B)/C BIOMASS WEIGHT (mg)
1	0.82649	0.81978	0.00671	10	0.0067100	0.67100	0.67100
2	0.83114	0.82256	0.00858	9	0.95333	0.85800	
3	0.84096	0.82485	0.01611	10	1.61100	1.61100	
4	0.82563	0.81858	0.00705	10	0.10500	0.70500	
5	0.83400	0.82662	0.00738	10	0.13800	0.73800	
6	0.83514	0.82650	0.00804	10	0.84400	0.86400	
7	0.83332	0.82396	0.00936	10	0.93600	0.93600	
8	0.83210	0.82446	0.00764	10	0.76400	0.76400	

not weighed

not weighed

not weighed

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 3.0		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environ	Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus		
Comments:	CRM=Clinch River Mite Sediment; LCS=Lab Control Sed; CRS=Clinch Referen						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	1.0000	1.0000	0.9000	0.9000	1.0000	1.0000	0.9000
-CRS + CRW	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
CRM 3.0	1.0000	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000

Conc-	Transform: Arcsin Square Root					1-Tailed		Kurt
	Mean	N-Mean	Mean	Min	Max	t-Stat	Critical	
-LCS + CRW	0.9375	0.9375	1.3128	1.1071	1.4120	8.821	8	
-CRS + CRW	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	8	*
CRM 3.0	0.9875	0.9875	1.3916	1.2490	1.4120	4.140	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 significantly different (p = 0.03)	2.42359	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSE	F-Prob
Heteroscedastic t Test indicates no significant differences	0.01345	0.0138	0.00166	0.33428
Treatments vs -CRS + CRW				1, 14

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth (AFDW)

Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 3.0
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Referen			CDIL-Chironomus dilutus	
Conc-	1	2	3	4	5
-LCS + CRW	0.8230	1.0160	0.9600	0.9867	1.0570
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580
CRM 3.0	0.6710	0.9533	1.6110	0.7050	0.7380

Conc-	Transform: Untransformed					t-Stat	Critical	MSD
	Mean	N-Mean	Mean	Min	Max			
-LCS + CRW	0.9969	1.2799	0.9969	0.8230	1.1875	12.544	8	
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*
CRM 3.0	0.9053	1.1623	0.9053	0.6710	1.6110	33.555	8	-1.084
							1.761	0.2054

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)	0.78685	0.887	2.13839	6.20283
F-Test indicates equal variances ($p = 0.04$)	5.5784	8.88539		
The control means are significantly different ($p = 4.01E-03$)	3.43722	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSE	F-Prob
Homoscedastic t Test indicates no significant differences	0.20542	0.26374	0.06392	0.29671
Treatments vs -CRS + CRW				1, 14

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass (AFDW)							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 3.0		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environ	Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch River Water						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	0.8230	1.0160	0.8640	0.8880	1.0570	1.1070	0.7540
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220	0.6140
CRM 3.0	0.6710	0.8580	1.6110	0.7050	0.7380	0.8640	0.9360
							0.7640

Conc-	Transform: Untransformed					1-Tailed				
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	Critical	MSD
-LCS + CRW	0.9324	1.1971	0.9324	0.7540	1.1070	13.058	8			
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*		
CRM 3.0	0.8934	1.1470	0.8934	0.6710	1.6110	33.971	8	-0.983	1.761	0.2053

Auxiliary TestsShapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)F-Test indicates equal variances ($p = 0.04$)The control means are significantly different ($p = 0.03$)**Hypothesis Test (1-tail, 0.05)**

Homoscedastic t-Test indicates no significant differences

Treatments vs -CRS + CRW

Conc-	Transform: Untransformed				1-Tailed					
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	Critical	MSD
-LCS + CRW	0.9324	1.1971	0.9324	0.7540	1.1070	13.058	8			
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*		
CRM 3.0	0.8934	1.1470	0.8934	0.6710	1.6110	33.971	8	-0.983	1.761	0.2053

TVA: 5069-1***Chironomus dilutus* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	8894	Test Photoperiod:	16:8
Sample ID:	CRM 3.5	Test System:	175mL Manual Delivery
Test Species:	<i>Chironomus dilutus</i>	Test Temperature:	23±1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	ABSI 11-12 days
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11
Test Day:	Day 10	Number Daily Renewals:	1
Date:	2/25/11	<input checked="" type="checkbox"/> renewal time/Initials	renewal time/Initials
Overlying Water: Site	CAN 1.0	<input type="checkbox"/> renewal time/Initials	renewal time/Initials
Overlying Water Batch ID (GLC Number):	8900	Food: TFS# (4g/L)	<input checked="" type="checkbox"/> Feed 1.5 mL/replicate
		Screens Cleaned:	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> n/a

Test Day: Day 10
 Date: 2/25/11
 Overlying Water: Site CAN 1.0
 Overlying Water Batch ID (GLC Number): 8900

<input checked="" type="checkbox"/> renewal time/Initials	renewal time/Initials
<input type="checkbox"/> renewal time/Initials	renewal time/Initials
Food: TFS# (4g/L)	<input checked="" type="checkbox"/> Feed 1.5 mL/replicate
Screens Cleaned:	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> n/a

Replicate	Temperature (23±1°C)*	pH ★	Dissolved Oxygen (mg/L)*	Specific ★	Hardness ★	Alkalinity ★	Ammonia (as N) *	Observations/ # surviving out of 10
1				144	126	0.15	0.15	10/10
2	22.3	7.1		25.0	18.5			10/10
3				21.4	12.3			10/10
4	22.3	7.4		21.4	12.3			10/10
5				26.0	Sample volume (mL): 50			10/10
6								10/10
7		7.72		332				10/10
8		7.67		333				10/10

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

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

Herd, Oak, Nutty: CompoSett sample all 8 steps*** pH, SL, Hard, Oxi, NH₄ all analyzed 2/24/11 - day 9 - new**

Chironomus dilutus WEIGHT DATA

TEST MATERIAL: CRM 35 Glue 8894

WEIGH DATE: 2/26/2011 TYPE/MODEL OF DRYING OVEN: BLUE M and Muffle

TEST NUMBER: 5069-02 TVA

TEST DATE: 2/15/2011- 2/25/2011

OVEN TEMPERATURE (°C): 60/550

TECHNICIAN'S INITIALS: AD

DRYING DURATION (HOURS): 24 HRS

34 min @ 60°C
overnight at a minimum of ~30 mins, until weighed
at 550°C then desiccation for a minimum of ~30 mins, until weighed

QC: AB

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	A-B/C	(A-B)/C BIOMASS WEIGHT (mg)
					TOTAL ASH-FREE DRY WEIGHT (g)	AVERAGE ASH-FREE DRY WEIGHT (mg)
1	0.82634	0.81840	0.00794	10	0.79400	0.79400
2	0.84408	0.83647	0.00701	10	0.70100	0.70100
3	0.84380	0.83642	0.00838	10	0.83800	0.83800
4	0.84500	0.83589	0.00911	10	0.91100	0.91100
5	0.83558	0.82790	0.00788	10	0.70800	0.70800
6	0.83913	0.83145	0.00768	10	0.76800	0.76800
7	0.83933	0.83216	0.00717	10	0.71700	0.71700
8	0.85913	0.849819	0.00994	10	0.99400	0.99400

Sample ID: CRM 35

GLC#: 8894

Reviewed by 
ES

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test:10-Day Survival							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 3.5		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environment Sample Type:	-WHOLE SEDIMENT			
Sample Date:	2/18/2011	Protocol:	EPA 600/R-99/064	Test Species:			
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch River Water						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	1.0000	1.0000	0.9000	0.9000	1.0000	1.0000	0.9000
-CRS + CRW	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
CRM 3.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Conc-	Transform: Arcsin Square Root						Rank	1-Tailed
	Mean	N-Mean	Mean	Min	Max	Cv%		
-LCS + CRW	0.9375	0.9375	1.3128	1.1071	1.4120	8.821	8	*
-CRS + CRW	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	8	
CRM 3.5	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	8	68.00 51.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	1	0.887		
Equality of variance cannot be confirmed				
The control means are significantly different ($p = 0.03$)	2.42359	2.14479		
Hypothesis Test (1-tail, 0.05)				
Wilcoxon Two-Sample Test indicates no significant differences				
Treatments vs -CRS + CRW				

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth (AFDW)							
	Start Date:	Test ID:	Sample ID:				
Comments:	CRM=Clinch River	GLEC-Great Lakes Environn Sample Type:	-CRM 3.5				
Start Date:	2/15/2011	Lab ID:	-WHOLE SEDIMENT				
End Date:	2/25/2011	Protocol: EPA 600/R-99/064	CDIL-Chironomus dilutus				
Sample Date:	2/8/2011	Test Species:	CRW=Clinch River Water				
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Control Sed; CRW=Reference Sed; CRM=Clinch River Water						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	0.8230	1.0160	0.9600	0.9867	1.0570	1.1070	0.8378
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220	0.6140
CRM 3.5	0.7940	0.7610	0.8380	0.9110	0.7680	0.7680	0.7170
							0.9940

Conc-	Transform: Untransformed						1-Tailed			
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	Critical	MSD
-LCS + CRW	0.9969	1.2799	0.9669	0.8230	1.1875	12.544	8			
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*		
CRM 3.5	0.8189	1.0514	0.8189	0.7170	0.9940	11.216	8	-0.716	1.761	0.0984

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.96029	0.887	0.16238	-0.8874
F-Test indicates equal variances ($p = 0.39$)	1.9611	8.88539		
The control means are significantly different ($p = 4.01E-03$)	3.43722	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSB	MSE
Homoscedastic t Test indicates no significant differences	0.09841	0.12635	0.0064	0.01249
Treatments vs -CRS + CRW				0.48584
				1, 14

Chironomus dilutus 10-day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass (AFDW)							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 3.5		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:	-WHOLE SEDIMENT			
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch River Water						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	0.8230	1.0160	0.8640	0.8880	1.0570	1.1070	0.7540
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220	0.6140
CRM 3.5	0.7940	0.7610	0.8380	0.9110	0.7680	0.7680	0.7170

Conc-	Transform: Untransformed					1-Tailed				
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	Critical	MSD
-LCS + CRW	0.9324	1.1971	0.9324	0.7540	1.1070	13.058	8			
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*		
CRM 3.5	0.8189	1.0514	0.8189	0.7170	0.9940	11.216	8	-0.716	1.761	0.0984

Auxiliary Tests		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)		0.96029	0.887	0.16238	-0.8874
F-Test Indicates equal variances (p = 0.39)		1.9611	8.88539		
The control means are significantly different (p = 0.03)		2.45154	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.09841	0.12635	0.0064	0.01249	0.48584 1, 14
Treatments vs -CRS + CRW					

TVA: 5069-1

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

GLC#:	8895	Test Photoperiod:	16:8
Sample ID:	CRM 4.0	Test System:	175mL Manual Delivery
Test Species:	<i>Chironomus dilutus</i>	Test Temperature:	23± 1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	ABSI 11-12 days
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11

Test Day:	Day 10
Date:	2/25/11
Overlying Water: Site:	CAN 1, 3
Overlying Water Batch ID (GLC Number):	8900

Number Daily Renewals:	4
✓ C 70P renewal time/Initials	/ renewal time/Initials
□ renewal time/Initials	/ renewal time/Initials
Food: TFS# (4g/L)	/ Feed 1.5 mL/replicate
Screens Cleaned:	□ yes <input checked="" type="checkbox"/> no <input type="checkbox"/> n/a

Replicate	Temperature (23± 1 °C)*	pH ★	Dissolved Oxygen (mg/L)*	Specific (μmhos/cm) ★	Hardness	Alkalinity	Ammonia (as N) *	Observations/ # surviving out of 10
1	22.9	7.1	4.1	13.0	11.0	9	0.075 0.075	10/10
2	22.9	7.1	3.6	28.3	24.3	3	0.075 0.075	5/10
3	22.7	7.1	3.6	25.0	18.5	3	0.075 0.075	10/10
4	22.7	7.1	3.6	Titrant used (mL): 3.3	5.8	3	0.075 0.075	10/10
5				Sample 25 to volume (mL): 50	50	3	0.075 0.075	10/10
6								10/10
7		7.67	3.6	31.6	32.1	2	0.075 0.075	10/10
8		7.58	3.6				0.075 0.075	9/10

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

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

All samples are 8 steps

② RP should be < 15%
RP Recovery = 8.3%
Titrant used = 47.4 mL

All unchanged after 11 days for alkalinity

Alkalinity = 130

J: Between moi (0.04) and mo (0.10)

Chironomus dilutus WEIGHT DATA

TEST MATERIAL: CRM 4.0 GLC# 8895

WEIGH DATE: 2/26 < 3/27/11 TYPE/MODEL OF DRYING OVEN: BLUE M and Muffle

TEST NUMBER: 5069-02 TVA

TEST DATE: 2/15/2011- 2/25/2011 OVEN TEMPERATURE (EC): 60/550

TECHNICIAN'S INITIALS: AB JMW

DRYING DURATION (HOURS): ~~48~~ 24 HRS @ 60°^C TEST SPECIES: *C. dilutus*
Bath 60° in desiccator
for a minimum of 30 mins

AC: AS

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	A-B TOTAL ASH-FREE DRY WEIGHT (g)	C NUMBER OF ORGANISMS WEIGHED	A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)	(A-B)/ BIOMASS WEIGHT (mg)
1	0.82175	0.81677	0.00498	10	0.49800	0.49800	
2	0.83052	0.82677	0.00375	5	0.75000	0.37500	
3	0.84470	0.83978	0.00492	10	0.49200	0.49200	
4	0.80888	0.80362	0.00526	10	0.52600	0.52600	
5	0.82897	0.82233	0.00664	10	0.66400	0.66400	
6	0.83400	0.82874	0.00526	10	0.52600	0.52600	
7	0.84418	0.83975	0.00443	10	0.44300	0.44300	
8	0.83847	0.83377	0.00570	9	0.63333	0.57000	

Sample ID: CRM 4.0

GLC#: 8895

Reviewed by: ES

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 4.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	1.0000	1.0000	0.9000	0.9000	1.0000	0.9000
-CRS + CRW	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
CRM 4.0	1.0000	0.5000	1.0000	1.0000	1.0000	0.9000

Conc-	Transform: Arcsin Square Root					t-Tailed
	Mean	N-Mean	Max	Cv%	N	
-LCS + CRW	0.9375	0.9375	1.3128	1.1071	1.4120	8.821
-CRS + CRW	1.0000	1.0000	1.4120	1.4120	0.000	8
CRM 4.0	0.9250	0.9250	1.3133	0.7854	1.4120	16.813
						*
						1.264
						1.895
						0.1479

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)	0.56382	0.887	-3.1443	11.3541
Equality of variance cannot be confirmed				
The control means are significantly different ($p = 0.03$)	2.42359	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD_U	MSD_P	MSE	F-Prob
Heteroscedastic t Test indicates no significant differences	0.06614	0.06784	0.03897	0.02438
Treatments vs -CRS + CRW			0.22677	1, 14

Reviewed by: 
5

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth (AFDW)

Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 4.0
End Date:	2/26/2011	Lab ID:	GLEC-Great Lakes Environn Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed; CRW=Clinch River Water				
Conc-	1	2	3	4	5
-LCS + CRW	0.8230	1.0160	0.9600	0.9867	1.0570
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580
CRM 4.0	0.4980	0.7500	0.4920	0.5260	0.6640

Conc-	Transform: Untransformed					1-Tailed				
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	Critical	MSD
-LCS + CRW	0.9969	1.2799	0.9969	0.8230	1.1875	12.544	8			
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*		
*CRM 4.0	0.5665	0.7274	0.5665	0.4430	0.7500	18.443	8	3.624	1.761	0.1032

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.94883	0.887	0.14157	-1.1385
F-Test indicates equal variances ($p = 0.60$)	1.51521	8.88539		
The control means are significantly different ($p = 4.01E-03$)	3.43722	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD_U	MSD_D	MSE	F-Prob
Homoscedastic t Test indicates significant differences	0.10319	0.13248	0.18034	0.01373
Treatments vs -CRS + CRW				0.00276
				1, 14

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass (AFDW)						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 4.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus	
Comments:	CRM=Clinch River Mile Sediment, LCS=Lab Control Sed; CRS=Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	0.8230	1.0160	0.8640	0.8880	1.0570	1.1070
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220
CRM 4.0	0.4980	0.3750	0.4920	0.5260	0.6640	0.5260

Conc-	Transform: Untransformed					1-Tailed			MSD
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	
-LCS + CRW	0.9324	1.1971	0.9324	0.7540	1.1070	13.053	8		
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*	
*CRM 4.0	0.5118	0.6570	0.5118	0.3750	0.6640	16.677	8	4.895	1.761
									0.0961

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96085	0.887	-0.072	-0.7889
F-Test indicates equal variances (p = 0.30)	2.27109	8.88539		
The control means are significantly different (p = 0.03)	2.45154	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE
Homoscedastic t Test indicates significant differences	0.09612	0.12341	0.28542	0.01191
Treatments vs -CRS + CRW				2.4E-04
				1, 14

TVA: 5069-1

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

GLC#:	8896	Test Photoperiod:	16:8
Sample ID:	CRM 4.5	Test System:	175mL Manual Delivery
Test Species:	<i>Chironomus dilutus</i>	Test Temperature:	23± 1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	ABS/ 11-12 days
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11
Test Day:	Day 10	Number Daily Renewals:	2
Date:	2/25/11	renewal time/Initials	/
Overlying Water:	Site CRN 10	renewal time/Initials	/
Overlying Water Batch ID (GLC Number):	9900	Food: TFS# (4g/L)	/
		Feed 1.5 mL/replicate	
		Screens Cleaned: <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> n/a	

Replicate	Temperature (23± 1 °C)*	pH	Dissolved Oxygen (mg/L)*	Specific (umhos/cm)*	Hardness *	Alkalinity *	Ammonia (as N) *	Observations/ # surviving out of 10
1				140 ①	120 ②	0.00 ③	NAV	10 /10
2	27.3	7.7			31.8	30.3		10 /10
3				28.3	start: 34.3			10 /10
4	28.1	7.7			Titration used (mL): 3.5	Titrant used (mL): 6.0		10 /10
5				25.0	Sample volume (mL): 50	Sample volume (mL): 50		10 /10
6					2nd duplicate			10 /10
7		7.56		323	35.1 mL used 315 140			9 /10
8		7.57		327	misread not 315 mL & not spotted			9 /10

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

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

Hand Calc. NAV: Composite Sample 2nd & Reps

& pH, SG, Hard, Conc, NH4 all analyzed 2/24/11 - day 9

② RP < 15%

J. Between MOL(0.01) and 20(0.00)

Chironomus dilutus WEIGHT DATA

TEST MATERIAL CRM 4.5 GLC# 8896

TEST NUMBER: 5069-02 TVA

TECHNICIAN'S INITIALS: AD

GLC: 15

WEIGH DATE: 2/26 2/27/11

TEST DATE: 2/15/2011- 2/25/2011

DRYING DURATION (HOURS): 24-HRS

TYPE/MODEL OF DRYING OVEN: BLUE M and Muffle

OVEN TEMPERATURE (°C): 60/550

TEST SPECIES: C. dilutus

TEST INSTRUCTIONS: dess. can for minimum 8-30 minutes until weighed
at 250°C then desiccated for a minimum of ~30 minutes until weighed

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B ASHED WEIGHT OF PAN AND ORGANISMS (g)	A-B TOTAL ASH-FREE DRY WEIGHT (g)	C NUMBER OF ORGANISMS WEIGHED	A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)	(A-B)/C BIOMASS WEIGHT (mg)
	1	0.85302	0.84371	0.00931	10	0.93100	0.93100
	2	0.85069	0.84193	0.00876	10	0.87600	0.87600
	3	0.84095	0.83397	0.00698	10	0.69800	0.69800
	4	0.83402	0.82676	0.00726	10	0.72600	0.72600
	5	0.83276	0.82528	0.00748	10	0.74800	0.74800
	6	0.83253	0.82620	0.00633	10	0.63300	0.63300
	7	0.83407	0.826230	0.00777	9	0.86333	0.77700
	8	0.84731	0.84144	0.00587	9	0.65222	0.58700

Sample ID: CRM 4.5

GLC#: 8896

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 4.5		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:	WHOLE SEDIMENT			
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:			
Comments:	CRM=Clinch River Mile Sediment, LCS=Lab Control Sed, CRS=Clinch Reference Sed; CRW=Clinch River Water						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	1.0000	1.0000	0.9000	0.9000	1.0000	1.0000	0.9000
-CRS + CRW	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
CRM 4.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000

Transform: Arcsin Square Root							
Conc-	Mean	N-Mean	Mean	Min	Max	CV%	N
-LCS + CRW	0.9375	0.9375	1.3128	1.1071	1.4120	8.821	8
-CRS + CRW	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	8
CRM 4.5	0.9750	0.9750	1.3713	1.2490	1.4120	5.501	8

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.67657	0.887	-1.807	2.82967
Equality of variance cannot be confirmed				
The control means are significantly different (p = 0.03)	2.42359	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSE	F-Prob df
Heteroscedastic t' Test indicates no significant differences	0.01818	0.01864	0.00664	0.00285 0.1489 1, 14
Treatments vs -CRS + CRW				

Chironomus dilutus 10 day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth (AFDW)							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 4.5		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn Sample Type:	-WHOLE SEDIMENT			
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:			CDIL-Chironomus dilutus
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed; CRW=Clinch River Water						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	0.8230	1.0160	0.9600	0.9867	1.0570	1.1070	0.8378
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220	0.6140
CRM 4.5	0.9310	0.8760	0.6980	0.7260	0.7480	0.6330	0.8633
							0.6522

Conc-	Transform: Untransformed						1-Tailed Critical	MSD
	Mean	N-Mean	Mean	Min	Max	CV%		
-LCS + CRW	0.9969	1.2799	0.9969	0.8230	1.1875	12.544	8	
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*
CRM 4.5	0.7659	0.9834	0.7659	0.6330	0.9310	14.470	8	0.215 1.761 0.1057

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.93577	0.887	0.02939	-1.4048
F-Test indicates equal variances (p = 0.70)	1.34672	8.88539		
The control means are significantly different (p = 4.01E-03)	3.43722	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSB	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.10572	0.13574	0.00067	0.01441 0.83255 1, 14
Treatments vs -CRS + CRW				

Chironomus dilutus 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass (AFDW)							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 4.5		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn	Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	CDIL-Chironomus dilutus		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch River Water						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	0.8230	1.0160	0.8640	0.8880	1.0570	1.1070	0.7540
-CRS + CRW	0.8050	0.8910	0.8540	0.6710	0.9580	0.6220	0.6140
CRM 4.5	0.9310	0.8760	0.6980	0.7260	0.7480	0.6330	0.7770

Conc-	Transform: Untransformed						t-Stat	Critical	MSD
	Mean	N-Mean	Mean	Min	Max	Cv%			
-LCS + CRW	0.9324	1.1971	0.9324	0.7540	1.1070	13.058	8		
-CRS + CRW	0.7789	1.0000	0.7789	0.6140	0.9580	16.513	8	*	
CRM 4.5	0.7470	0.9591	0.7470	0.5870	0.9310	15.417	8	0.522	1.761
								0.1075	

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.93867	0.887	0.03487	-1.1563
F-Test indicates equal variances ($p = 0.78$)	1.24728		8.88539	
The control means are significantly different ($p = 0.03$)	2.45154	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE F-Prob df
Homoscedastic t Test indicates no significant differences	0.10751	0.13803	0.00406	0.0149 0.60968 1, 14
Treatments vs -CRS + CRW				

Appendix D
Hyalella azteca
10-Day Statistical Data

- Survival
- Weight

TVA: 5069-02***Hyalella azteca* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	Site water with Boardman Sediment Lab Control	LGS + CRM
Sample ID:	--	CRM 7.0
Test Species:	<i>Hyalella azteca</i>	
Date Addition of Sediment:	2/14/11	
Test Initiation Date:	2/15/11	

Test Day:	Day 10
Date:	2/25/11
Overlying Water: Site	CRM 7.0
Overlying Water Batch ID (GLC Number):	8900

Number Daily Renewals: 1

- 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

Replicate	Temperature (23+ 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness	Alkalinity	Ammonia (as N)	NAV # surviving out of 10
1					130	130	0.0605 diss.	10 / 10
2	22.8	4.3			11.3	17.3	/	9 / 10
3	22.8	4.7			start: 8.0	10.7	/	9 / 10
4	22.8	4.7			Titrant: 3.3	Titrant used (mL): 6.6	/	10 / 10
5					Sample 250 volume (mL):	50	/	10 / 10
6					Sample volume (mL):		/	9 / 10
7		7.78					/	10 / 10
8		7.65					/	10 / 10

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

* Contact Laboratory Coordinator if Dissolved Oxygen level is < 2.5 mg/L or Temperature is out of range:
 MOU = 0.04
 EL = 0.10

AV, NAV, FOV: Composite Sample of all 8 reps

PT, SU Hard, Out, NAV: Unchanged on Day 10 - max 2 days

J: Between mo and pt taken on 02/24/2011

Site water w/BD sed. Lab con

Hyalella azteca WEIGHT DATA

TEST MATERIAL: CRM 7.0 LCS & RW WEIGH DATE: 2/8/11

TEST NUMBER: 5069-02 TVA

TEST DATE: 2/15/2011-2/25/2011

OPEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: AD / MWS
QC: AB

DRYING DURATION (HOURS): 24 HRS (minus Hyalella TEST SPECIES: H. azteca)

Hyalella azteca, ~30 minute unit, weighed

Sample ID	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	C NUMBER OF ORGANISMS WEIGHED	A-B TOTAL DRY WEIGHT OF ORGANISMS (g)	AVERAGE WEIGHT (mg)	Biomass WEIGHT (mg) (A-B)/C /0.001 mg/mg
1	0.79155	0.79062	0.00093	10	0.00093	0.09300	0.09300
2	0.793878	0.79252	0.00126	9	0.00126	0.14000	0.12600
3	0.80707	0.80628	0.00079	9	0.00079	0.08778	0.07900
4	0.800234	0.80125	0.00109	10	0.00109	0.10900	0.10900
5	0.80105	0.79983	0.00122	10	0.00122	0.12200	0.12200
6	0.79527	0.79401	0.00126	9	0.00126	0.14000	0.12600
7	0.79550	0.79451	0.00099	10	0.00099	0.09900	0.09900
8	0.78970	0.78855	0.00115	10	0.00115	0.11500	0.11500

Sample ID: CRM 7.0

GLC #: Site H2O
w/BD Sed
Lab con.

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	GLW, LCS +GLW, LCS +CRW	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn Sample Type:	AMB1-Ambient water		
Sample Date:		Protocol:	EPA 600/R-99/064	Test Species:	HYALELLA A	
Comments:	GLW=Lab water; LCS=Lab Control Sediment; CRW=Clinch River Water					
Conc-%	1	2	3	4	5	6
-GLW	1.0000	1.0000	0.9000	1.0000	1.0000	1.0000
-LCS + GLW	1.0000	1.0000	0.8000	1.0000	1.0000	1.0000
LCS + CRW	1.0000	0.9000	0.9000	1.0000	0.9000	1.0000

Conc-%	Transform: Arcsin Square Root						
	Mean	N-Mean	Mean	Min	Max	CV%	N
-GLW	0.9750	1.0000	1.3713	1.2490	1.4120	5.501	8
-LCS + GLW	0.9750	1.0000	1.3739	1.1071	1.4120	7.845	8
LCS + CRW	0.9625	0.9872	1.3509	1.2490	1.4120	6.244	8

Auxiliary TestsShapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)F-Test indicates equal variances ($p = 0.53$)The control means are not significantly different ($p = 0.96$)**Hypothesis Test (1-tail, 0.05)**

Homoscedastic t Test indicates no significant differences

Treatments vs -LCS + GLW

Statistic	Critical	Skew	Kurt
0.6655	0.887	-1.9226	3.4247
1.6331	8.88539		
0.05663	2.14479		
MSD _u	MSD _p	MSE	F-Prob
0.03923	0.0408	0.00212	0.00937
		0.64182	1, 14

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	GLW, LCS+GLW, LCS+CRW		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environ	Sample Type:	AMB1-Ambient water		
Sample Date:		Protocol:	EPA 600/R-99/064	Test Species:	HYALELLA A		
Comments:	GLW=Lab water; LCS=Lab Control Sediment; CRW=Clinch River Water						
Conc-%	1	2	3	4	5	6	7
-GLW	0.0640	0.0560	0.0467	0.0390	0.0620	0.0420	0.0390
-LCS + GLW	0.1780	0.1010	0.0912	0.1540	0.1080	0.0960	0.1770
LCS + CRW	0.0930	0.1400	0.0878	0.1090	0.1220	0.1400	0.0990

Conc-%	Mean	N-Mean	Transform: Unitransformed				t-Stat	1-Tailed Critical	MSD
			Mean	Min	Max	CV%			
-GLW	0.0505	0.3962	0.0505	0.0390	0.0640	20.096	8		
-LCS + GLW	0.1275	1.0000	0.1275	0.0912	0.1780	28.501	8	*	
LCS + CRW	0.1132	0.8878	0.1132	0.0878	0.1400	17.635	8	0.976	1.761
								0.0258	

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.91211	0.887	0.57751	-0.9221
F-Test indicates equal variances ($p = 0.14$)	3.31372	8.88539		
The control means are significantly different ($p = 4.84E-05$)	5.77121	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSE	df
Homoscedastic t Test indicates no significant differences	0.02582	0.20249	0.00082	0.34566
Treatments vs -LCS + GLW				1, 14

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	GLW, LCS+GLW, LCS+CRW	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environ Sample	Type:	AMB1-Ambient water	
Sample Date:		Protocol:	EPA 600/R-99/064	Test Species:	HYALELLA A	
Comments:	GLW=Lab water, LCS=Lab Control Sediment, CRW=Clinch River Water					
Conc-%	1	2	3	4	5	6
-GLW	0.0640	0.0560	0.0420	0.0390	0.0620	0.0420
-LCS + GLW	0.1780	0.1010	0.0730	0.1540	0.1080	0.0960
LCS + CRW	0.0930	0.1260	0.0790	0.1090	0.1220	0.1260

Conc-%	Mean	N-Mean	Mean	Transform: Untransformed			t-Stat	Critical	MSD
				Min	Max	Cv%			
-GLW	0.0493	0.3932	0.0493	0.0390	0.0640	20.898	8	0.887	0.31241
-LCS + GLW	0.1253	1.0000	0.1253	0.0730	0.1780	31.453	8	8.88539	-0.3036
LCS + CRW	0.1086	0.8673	0.1086	0.0790	0.1260	15.708	8	2.14479	

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9664	0.887	0.31241	-0.3036
F-Test indicates equal variances (p = 0.04)	5.3308	8.88539		
The control means are significantly different (p = 1.16E-04)	5.27941	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSE	F-Prob df
Homoscedastic t-Test indicates no significant differences	0.02673	0.21344	0.00111	0.00092 0.29187 1, 14
Treatments vs -LCS + GLW				

TVA: 50(22

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

GLC#: Dechlor water with Boardman Sediment Lab Control

Sample ID: -- Boardman Sediment Lab Control

Test Species: *Hyalella azteca*

Date Addition of Sediment: 2/14/11

Test Initiation Date: 2/15/11

GLC#:	Dechlor water with Boardman Sediment Lab Control	Test Photoperiod: 16:8
Sample ID:	-- Boardman Sediment Lab Control	Test System: 175mL Manual Delivery
Test Species:	<i>Hyalella azteca</i>	Test Temperature: 23± 1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age: In house 2/4/2011 (1-2 day) 12-13
Test Initiation Date:	2/15/11	Test Termination Date: 2/25/11

Test Day:	Day 10	Number Daily Renewals: 1
Date:	2/25/11	renewal time/Initials <input checked="" type="checkbox"/> renewal time/Initials <input type="checkbox"/>
Overlying Water:	Dechlor	renewal time/Initials <input checked="" type="checkbox"/> renewal time/Initials <input type="checkbox"/>
Overlying Water Batch ID (GLC Number): N/A		Food: YTC# <input checked="" type="checkbox"/> Feed 1.0 mL/replicate
		Screens Cleaned: <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> n/a

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness	Alkalinity	Ammonia (as N)	Observations/ # surviving out of 10
1				140	116	0	0/10	mult 10 /10
2	22.2	9.3		end: 47	42.5			10 /10
3				start: 1.2	36.4			8 /10
4	22.2	9.1		Tritrant 3.5 used (mL): 5.8			1/10	
5				Sample 35.50 volume (mL): 50			10 /10	
6								10 /10
7		7.49						10 /10
8		7.60						10 /10

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

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

Taken on 02/24/2011

J: Between mid (0.24) and EC(0.16)

PH, SC, Hard, Out, NH₃ all analyzed 2/24/2011 - day 9
 Hard, Out, NH₃. Composite Sample goes 8 reps - max 35%

***Hyalella azteca* WEIGHT DATA**

TEST MATERIAL: CON Bd Sed Lab WEIGH DATE: 2/26/11

TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 50669-02 TVA LCS & GLC TEST DATE: 2/15/2011-2/25/2011

OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: AD | msl

DRYING DURATION (HOURS): 24 HRS - 4/24/11 TEST SPECIES: *H. azteca*

Item indicated for minima ~30 mins until weighed

Sample ID	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	A-B TOTAL DRY WEIGHT OF ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	AVERAGE WEIGHT (mg)	Biomass WEIGHT (mg)
					(A-B)/C	(A-B) / ^{± 0.7} mg	(A-B) / ^{± 0.7} mg
1	0.79619	0.79441	0.00178	10	0.17800	0.17800	0.17800
2	0.790611	0.78910	0.00101	10	0.10100	0.10100	0.10100
3	0.79724	0.796581	0.00073	8	0.09125	0.09125	0.09125
4	0.80007	0.79853	0.00154	10	0.15400	0.15400	0.15400
5	0.78821	0.78713	0.00108	10	0.10800	0.10800	0.10800
6	0.81405	0.81309	0.00096	10	0.09600	0.09600	0.09600
7	0.79220	0.79043	0.00177	10	0.17700	0.17700	0.17700
8	0.78302	0.78187	0.00115	10	0.11500	0.11500	0.11500

Sample ID: CON
GLC #: Bd Sed
GLC #: Lab CON

TVA: 5069***Hyalella azteca* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#: Dechlor water with nylon screen

6WW

Sample ID: Water only exposure

Test Species: *Hyalella azteca*

Date Addition of Sediment: 2/14/11

Test Initiation Date: 2/15/11

Test Day: Day 10

Date: 2/25/11

Overlying Water: Dechlor

Overlying Water Batch ID (GLC Number): N/A

Test Photoperiod: 16:8

Test System: 175mL Manual Delivery

Test Temperature: 23± 1°C

Test Organism Source/Age: In house 2/4/2011 (1-2 day) 12-13

Test Termination Date: 2/25/11

Number Daily Renewals: 6/1

 renewal time/Initials renewal time/Initials renewal time/Initials renewal time/InitialsFood: YT/C# Feed 1.0 mL/replicateScreens Cleaned: yes no n/a

Replicate	Temperature (23+ 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness	Alkalinity	Ammonia	Observations/ # surviving out of 10
1				*	132	112	0.128	10/10
2	22.2	6.3			8.0	47.8		10/10
3	22.2	6.1			4.7	42.3		9/10
4	22.2	7.1			Titrant used (mL): 3.3	Titrant used (mL): 5.6		10/10
5					Sample volume (mL): 25.5	Sample volume (mL): 50		10/10
6								10/10
7		7.92			307			10/10
8		7.92			309			9/10

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

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

AV, NAV, FOV: Sample of all 8 Reps

pH, SC, Hard, Alk, N/A: Sample of all 8 Reps
all analyzed 2/25/11 - day 9 - must analysis

* Taken on 02/24/2011

Hyalella azteca WEIGHT DATA

GLW

TEST MATERIAL: Decklow / water only

WEIGH DATE: 2/30/11

TEST NUMBER: 5069-02 TVA

TYPE/MODEL OF DRYING OVEN: BLUE M

TEST DATE: 2/15/2011-2/25/0211

OVEN TEMPERATURE (°C): 60

DRYING DURATION (HOURS): 24 HRS / 24 hrs

TEST SPECIES: *H. azteca*

TEST CONDITIONS: 30 min. until weighed

Then desiccation for a minimum of 30 min. until weighed

Sample ID	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	C NUMBER OF ORGANISMS WEIGHED	AVERAGE WEIGHT (mg)	Biomass WEIGHT (mg) (A-B)/C
1	0.78315	0.78251	0.00064	10	0.00400	0.00400
2	0.79891	0.79835	0.00056	10	0.00000	0.05600
3	0.79098	0.79056	0.00042	9	0.04467	0.04400
4	0.79346	0.79307	0.00039	10	0.03900	0.03900
5	0.79376	0.79314	0.00042	10	0.00300	0.00300
6	0.77859	0.77817	0.00042	10	0.04200	0.04200
7	0.77967	0.77958	0.00039	10	0.03900	0.03900
8	0.79186	0.79136	0.00050	9	0.05556	0.05000

Sample ID: Decklow / water only

GLC #:

GLW

TVA: 5069-02***Hyalella azteca* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	8897	Test Photoperiod:	16:8
Sample ID:	Clinch Reference CRS + C&W	Test System:	175mL Manual Delivery
Test Species:	<i>Hyalella azteca</i>	Test Temperature:	23± 1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	In house 2/4/2011 (1-2 day) 12-13
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11

Test Day:	Day 10	Number Daily Renewals:	✓ 1
Date:	2/25/11	renewal time/Initials	✓ renewal time/Initials
Overlying Water:	Site CPN 1Q	renewal time/Initials	✓ renewal time/Initials
Overlying Water Batch ID (GLC Number):	84100	Food: YTC#	✓ Feed 1.0 mL/replicate
Screens Cleaned:	□ yes ✓ no □ n/a		

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (μhos/cm)	Hardness	Alkalinity	Ammonia (as N)	Observations/ # surviving out of 10
1	27.7	7.0	4.0	133	120	0.04	0/10	
2	27.7	6.5	4.0	42.8	39.0	0.04	0/10	
3	27.7	6.5	4.0	start: 39.5	32.7	0.04	8/10	
4	27.7	6.5	4.0	Titrant 3.3 used (mL): used (mL):	6.3	0.04	9/10	
5				Sample 25.0 volume (mL):	50	Sample volume (mL):	9/10	
6							10/10	
7		7.83		323			10/10	
8		7.85		325			10/10	

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

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

** Hand (ark, Nut). Composted Sample all 8 Reps pH, SC, Hard, Alk, NH4 analyzed 2/26/11 - day 9 - must

* taken on 2/24/2011

Hyalella azteca WEIGHT DATA

Loc # 8897

TEST MATERIAL: Clinch Ref. CRS WEIGH DATE: 2/26/11
CLOW

TEST NUMBER: 5069-02 TVA

TECHNICIAN'S INITIALS: AD | myus
PC: AS

TEST DATE: 2/15/2011-2/25/2011

DRYING DURATION (HOURS): 24 HRS

TEST SPECIES: *H. azteca*

When indicated by minima, do 3 minima, not 1 repeat

Sample ID	REP. NUMBER	DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	A-B TOTAL DRY WEIGHT OF ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	AVERAGE WEIGHT (mg)	Biomass WEIGHT (mg) (A-B) * 0.049 (A-B) / C
1	0.811210	0.81016	0.00104	10	0.10400	0.10400	
2	0.82697	0.82539	0.00158	10	0.15800	0.15800	
3	0.83216	0.83129	0.00087	8	0.10875	0.08700	
4	0.83515	0.83438	0.00077	9	0.08556	0.07700	
5	0.83212	0.83126	0.00086	9	0.09556	0.08600	
6	0.83116	0.83018	0.00098	10	0.09800	0.09800	
7	0.83265	0.831521	0.00114	10	0.11400	0.11400	
8	0.81748	0.81670	0.00078	10	0.07800	0.07800	

Sample ID: Clinch Ref.
GLC #: 8897

TVA: 5069-02(***Hyalella azteca* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	8888	Test Photoperiod:	16:8
Sample ID:	CRM 0.0	Test System:	175mL Manual Delivery
Test Species:	<i>Hyalella azteca</i>	Test Temperature:	23±1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	In house 2/4/2011 (1-2 day) 12-13
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11
Test Day:	Day 10	Number Daily Renewals:	1 {
Date:	2/25/11	<input checked="" type="checkbox"/> renewal time/Initials	/ renewal time/Initials
Overlying Water:	Site CRM 1.0	<input type="checkbox"/> renewal time/Initials	/ renewal time/Initials
Overlying Water Batch ID (GLC Number):	8900	<input checked="" type="checkbox"/> Food: YTC#	/ Feed 1.0 mL/replicate
Screens Cleaned:	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> n/a		

Replicate	Temperature (23±1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness	Alkalinity	Ammonia (as N)	Observations/ # surviving out of 10
1	22.7	5.1		152	138	0.9	5	10 /10
2	22.7	5.1		151	24.2	1000	0	0 /10
3	22.7	5.4		11.3	17.3			10 /10
4				Titrant used (mL): 3.8	Titrant used (mL): 0.9	200	10	10 /10
5				Sample volume (mL): 25.0	Sample volume (mL): 50	11/13	10	10 /10
6						1000	10	10 /10
7		8.42	349					10 /10
8		8.43	345					4 /10

Replicate	Temperature (23±1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness	Alkalinity	Ammonia (as N)	Observations/ # surviving out of 10
1	22.7	5.1		152	138	0.9	5	10 /10
2	22.7	5.1		151	24.2	1000	0	0 /10
3	22.7	5.4		11.3	17.3			10 /10
4				Titrant used (mL): 3.8	Titrant used (mL): 0.9	200	10	10 /10
5				Sample volume (mL): 25.0	Sample volume (mL): 50	11/13	10	10 /10
6						1000	10	10 /10
7		8.42	349					10 /10
8		8.43	345					4 /10

Key: AV: Animals Visible NAV: No Animals Visible FOV: Foreign Organism Visible J = Between min range * taken on 2/24/2011

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

Hard, Wet, Dry, Compacted sample & dry & up, pH, Si, Hard, alk, NH₄ all analyzed 24 hr - day of next appt/11

GLC# 8888

Hyalella azteca WEIGHT DATA

TEST MATERIAL: CRM 0.0

WEIGH DATE: 2/26/11

TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 5069-02 TVA

TEST DATE: 2/15/2011-2/25/2011

OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: AD JMSR AS

DRYING DURATION (HOURS): 24 HRS

TEST SPECIES: *H. azteca*TEST CONDITIONS: An amount of *H. azteca* was weighed and dried for ~30 mins in a m

Sample ID	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	A-B TOTAL DRY WEIGHT OF ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	AVERAGE WEIGHT (mg)	Biomass WEIGHT (mg) (A-B)/C
1	0.81409	0.81296	0.00113	10	0.11300	0.11300	
2	0.81379	0.81282	0.00097	10	0.09700	0.09700	
3	0.80521	0.80422	0.00099	10	0.09900	0.09900	
4	0.80088 0.81500	0.79975 0.81405	0.00113	10	0.11300	0.11300	
5	0.80526	0.80397	0.00129	10	0.12900	0.12900	
6	0.81631	0.81512	0.00119	10	0.11900	0.11900	
7	0.82000	0.81931	0.00069	10	0.06900	0.06900	
8	0.82375	0.82291	0.00084	10	0.08400	0.08400	

Reviewed by: M.L.

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 0.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca	
Comments:	CRM=Clinch River Miles Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	1.00000	0.90000	0.90000	1.00000	0.90000	1.00000
-CRS + CRW	1.00000	1.00000	0.80000	0.90000	1.00000	1.00000
CRM 0.0	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

Transform: Arcsin Square Root						
Conc-	Mean	N-Mean	Mean	Min	Max	CV%
-LCS + CRW	0.9625	1.0132	1.3509	1.2490	1.4120	6.244
-CRS + CRW	0.9500	1.0000	1.3332	1.1071	1.4120	8.799
CRM 0.0	1.0000	1.0526	1.4120	1.4120	1.4120	0.000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.78822	0.887	-1.5228	3.30524
Equality of variance cannot be confirmed				
The control means are not significantly different (p = 0.73)	0.34723	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSE	F-Prob df
Heteroscedastic t test indicates no significant differences	0.04128	0.04371	0.02487	0.00688 0.07805 1, 14
Treatments vs -CRS + CRW				

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

Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 0.0			
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environment Sample Type:	-WHOLE SEDIMENT				
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca			
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference; sed; Clinch River Water							
Conc-	1	2	3	4	5	6	7	8
-LCS + CRW	0.0930	0.1400	0.0878	0.1090	0.1220	0.1400	0.0990	0.1150
-CRS + CRW	0.1040	0.1580	0.1088	0.0856	0.0956	0.0980	0.1140	0.0780
CRM 0.0	0.1130	0.0970	0.0990	0.1130	0.1290	0.1190	0.0690	0.0840

Conc-	Transform: Untransformed					1-Tailed			MSD
	Mean	N	Mean	Min	Max	CV%	N	t-Stat	
-LCS + CRW	0.1132	1.0759	0.1132	0.0878	0.1400	17.635	8		
-CRS + CRW	0.1052	1.0000	0.1052	0.0780	0.1580	23.138	8	*	
CRM 0.0	0.1029	0.9776	0.1029	0.0690	0.1290	19.094	8	0.213	1.761
									0.0195

Auxiliary Tests

Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	Statistic	Critical	Skew	Kurt
F-Test indicates equal variances ($p = 0.58$)	0.95988	0.887	0.75549	1.29214
The control means are not significantly different ($p = 0.48$)	1.53651	8.88539		
0.71766	2.14479			
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSB	F-Prob
Homoscedastic t Test indicates no significant differences	0.01948	0.18512	2.2E-05	0.00049
Treatments vs -CRS + CRW				0.83428
				1, 14

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 0.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water			-Hyalella azteca		
Conc-	1	2	3	4	5	6
-LCS + CRW	0.0930	0.1260	0.0790	0.1090	0.1220	0.1260
-CRS + CRW	0.1040	0.1580	0.0870	0.0770	0.0860	0.0980
CRM 0.0	0.1130	0.0970	0.0990	0.1130	0.1290	0.1190

Conc-	Transform: Untransformed					1-Tailed		
	Mean	N-Mean	Mean	Min	Max	t-Stat	Critical	MSD
-LCS + CRW	0.1086	1.0835	0.1086	0.0790	0.1260	15.708	8	
-CRS + CRW	0.1003	1.0000	0.1003	0.0770	0.1580	26.546	8	*
CRM 0.0	0.1029	1.0262	0.1029	0.0690	0.1290	19.094	8	-0.224
							1.761	0.0206

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.9445	0.887	0.95552	1.55347
F-Test indicates equal variances ($p = 0.44$)	1.83552	8.88539		
The control means are not significantly different ($p = 0.47$)	0.74933	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSB	MSE	F-Prob
Homoscedastic t Test indicates no significant differences	0.0206	0.20546	2.8E-05	0.00055
Treatments vs -CRS + CRW				0.82564
				1, 14

TVA: 5069-02(***Hyalella azteca* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	8889	Test Photoperiod:	16:8
Sample ID:	CRM 1.5	Test System:	175mL Manual Delivery
Test Species:	<i>Hyalella azteca</i>	Test Temperature:	23±1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	In house 2/4/2011 (1-2 day) 12-13
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11

Test Day:	Day 10	Number Daily Renewals:	✓ 1
Date:	2/25/11	renewal time/Initials	<input checked="" type="checkbox"/> renewal time/Initials
Overlying Water: Site	CRM 7.0	renewal time/Initials	<input type="checkbox"/> renewal time/Initials
Overlying Water Batch ID (GLC Number):	8900	Food: YTC#	<input checked="" type="checkbox"/> Feed 1.0 mL/replicate
Screens Cleaned:	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> n/a		

Replicate	Temperature (23±1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness	Alkalinity	Ammonia (as N) *	Observations/
1				128	132	①	0.0284 u	
2	22.8	6.9		128	132	②	0.0284 u	
3				18.3	dup 113 end: 30.3		0.0284 u	
4	22.8	7.1		15.1	start: 24.2		0.0284 u	
5				3.0	Titration used (mL): 6.1		0.0284 u	
6				25.5	Sample 50 volume (mL):		0.0284 u	
7		7.97	318				0.0284 u	
8		7.94	317				0.0284 u	

Key: AV: Animals Visible NAV: No Animals Visible FOV: Foreign Organism Visible u: Below MDL *: taken on 02/24/2011

* Contact Laboratory Coordinator if Dissolved Oxygen level is < 2.5 mg/L or Temperature is out of range. MDL = 0.04

①, ② Hard Calc. Ndy all analyzed 2/24/11 - day duplicate for Alkalinity

Hard calc. Ndy: Compositus dup of all 8 reps - nur ② Rep Should be < 15%.
Rep all: 7.97 ± 0.5%.

Alkalinity = 5.6
Titrant used = 5.5
Titrant used = 4.1.1
S: 35.5

GLC# 8889

***Hyalella azteca* WEIGHT DATA**

TEST MATERIAL: CRM 1.5

WEIGH DATE: 2/26/11

TEST NUMBER: 5069-02 TVA

TEST DATE: 2/15/2011-2/25/0211

OVEN/MODEL OF DRYING OVEN: BLUE M

TECHNICIAN'S INITIALS: AD/mws
RC AS

DRYING DURATION (HOURS): 24 HRS

TEST SPECIES: *H. azteca*
then dissolved until 'dissolved' at least ~30 minutes

Sample ID	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	A-B TOTAL DRY WEIGHT OF ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	AVERAGE WEIGHT (mg)	Biomass WEIGHT (mg) (A-B)/C (A-B)/(3 kmt units)
1	0.81932	0.81873	0.00059	10	0.05900	0.05900	
2	0.81796	0.81709	0.00087	10	0.08700	0.08700	
3	0.81019	0.80941	0.00078	10	0.07800	0.07800	
4	0.80893	0.80804	0.00089	10	0.08900	0.08900	
5	0.81007	0.80928	0.00079	10	0.07900	0.07900	
6	0.81918	0.81810	0.00108	10	0.10800	0.10800	
7	0.81312	0.81240	0.00072	10	0.07200	0.07200	
8	0.81351	0.81283	0.00068	9	0.07556	0.06800	

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 1.5	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn Sample Type:		-WHOLE SEDIMENT	
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	1.0000	0.9000	0.9000	1.0000	0.9000	1.0000
-CRS + CRW	1.0000	1.0000	0.8000	0.9000	1.0000	1.0000
CRM 1.5	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000

Conc-	Transform: Arcsin Square Root					1-Tailed			MSD
	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	
-LCS + CRW	0.9625	1.0132	1.3509	1.2490	1.4120	6.244	8		
-CRS + CRW	0.9500	1.0000	1.3332	1.1071	1.4120	8.799	8	*	
CRM 1.5	0.9875	1.0395	1.3916	1.2490	1.4120	4.140	8	-1.266	1.761
									0.0814

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)	0.79417	0.887	-1.4053	1.49391
F-Test indicates equal variances ($p = 0.08$)	4.14481	8.88639		
The control means are not significantly different ($p = 0.73$)	0.34723	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.04295	0.04547	0.01368	0.00854 0.22631 1, 14
Treatments vs -CRS + CRW				

Hyalinella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 1.5	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environmental Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalinella azteca	
Comments:	CRM=Clinch River Mite Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	0.0930	0.1400	0.0878	0.1090	0.1220	0.1400
-CRS + CRW	0.1040	0.1580	0.1088	0.0856	0.0956	0.0980
*CRM 1.5	0.0590	0.0870	0.0780	0.0890	0.0790	0.1080

Conc-	Mean	N-Mean	Transform: Untransformed				1-Tailed		
			Mean	Min	Max	CV%	N	t-Stat	Critical
-LCS + CRW	0.1132	1.0759	0.1132	0.0878	0.1400	17.635	8		
-CRS + CRW	0.1052	1.0000	0.1052	0.0780	0.1580	23.138	8	*	
*CRM 1.5	0.0809	0.7692	0.0809	0.0590	0.1080	17.698	8	2.432	1.761
									0.0176

Auxiliary Tests		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test	Indicates normal distribution ($p > 0.05$)	0.89462	0.887	1.35281	2.93614
F-Test	Indicates equal variances ($p = 0.19$)	2.88867	8.88839		
The	control means are not significantly different ($p = 0.48$)	0.71766	2.14479		
Hypothesis Test (1-tail, 0.05)		MSDu	MSDP	MSE	F-Prob df
Homoscedastic t Test	Indicates significant differences	0.01739	0.16717	0.00236	0.0004 0.02905
Treatments vs -CRS + CRW					1, 14

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 1.5	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; CRW=Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	0.0930	0.1260	0.0790	0.1090	0.1220	0.1260
-CRS + CRW	0.1040	0.1580	0.0870	0.0770	0.0860	0.0980
*CRM 1.5	0.0590	0.0870	0.0780	0.0890	0.0790	0.1080

Conc-	Transform: Untransformed					t-Stat	Critical	MSD
	Mean	N-Mean	Mean	Min	Max			
-LCS + CRW	0.1086	1.0835	0.1086	0.0790	0.1260	15.708	8	
-CRS + CRW	0.1003	1.0000	0.1003	0.0770	0.1580	26.546	8	*
*CRM 1.5	0.0800	0.7980	0.0800	0.0590	0.1080	18.708	8	1.876
							1.761	0.0190

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)	0.87788	0.887		
F-Test indicates equal variances ($p = 0.15$)	3.16167	8.888539		
The control means are not significantly different ($p = 0.47$)	0.74933	2.14479		
Hypothesis Test (1-tail) 0.05	MSDu	MSDp	MSE	F-Prob df
Homoscedastic t Test indicates significant differences	0.01901	0.18966	0.00164	0.00047 0.08167 1, 14
Treatments vs -CRS + CRW				

TVA: 5069-02(***Hyalella azteca* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	8891	Test Photoperiod:	16:8
Sample ID:	CRM 2.0	Test System:	175mL Manual Delivery
Test Species:	<i>Hyalella azteca</i>	Test Temperature:	23± 1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	In house 2/4/2011 (1-2 day)
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11

Test Day:	Day 10	Number Daily Renewals:	1 / 1
Date:	2/25/11	renewal time/initials	<input checked="" type="checkbox"/> renewal time/initials
Overlying Water:	Site CRM 742	renewal time/initials	<input checked="" type="checkbox"/> renewal time/initials
Overlying Water Batch ID (GLC Number):	8100	Food: YTC#	<input checked="" type="checkbox"/> Feed 1.0 mL/replicate
Screens Cleaned:	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> n/a		

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (μmhos/cm)	Hardness	Alkalinity	Ammonia (as N)	Observations/ # surviving out of 10
1				4	132	103	0.0384	No animals
2	22.2	6.2	6.2		end: 21.6	35.4	0.0384	T.E. added 0/10
3	22.2				start: 18.3	30.3		MLL 10/10
4	22.2	7.0	7.0		Titrant 3.3	5.1		10/10
5					used (mL): 20.3	20.3		10/10
6					Sample 25+50 volume (mL): 50	50		10/10
7		7.93						10/10
8		7.96						10/10

Key: AV: Animals Visible NAV: No Animals Visible FOV: Foreign Organism Visible U: Below MDC & taken on 02/24/2011

* Contact Laboratory Coordinator if Dissolved Oxygen level is < 2.5 mg/L or Temperature is out of range. mDC = 0.34

T.E. - Tech error; 2 en recovered animals no animals added.

Hrd, Alk, NH4: Composite Sample of all 8 reps pH, Sc, Hard, all analyzed 3/3/11 - 8/29 - new



Hyalella azteca WEIGHT DATA

TEST MATERIAL: CRM 2.0
WEIGH DATE: 2/26/11

TYPE/MODEL OF DRYING OVEN: BLUE M
OVEN TEMPERATURE (°C): 60

TEST NUMBER: 5069-02 TVA
TEST DATE: 2/15/2011-2/25/0211

TECHNICIAN'S INITIALS: AD | *Muss*
QC: AB

DRYING DURATION (HOURS): 24 HRS. *new 4/2011*
then deacidified for a minimum ~ 30 mins before assigned

Sample ID	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	A-B TOTAL DRY WEIGHT OF ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	AVERAGE WEIGHT (mg)	(A-B)/C (A-B)/(g of C) % test initia	Biomass WEIGHT (mg)
1	—	—	—	—	—	—	—	—
2	0.80825 0.814760	0.80745	0.00080	10	0.08000	0.08000	—	—
3	0.81146	0.81055	0.00091	10	0.09100	0.09100	—	—
4	0.81487	0.81400	0.00087	10	0.08700	0.08700	—	—
5	0.80901	0.80822	0.00079	10	0.07900	0.07900	—	—
6	0.79541	0.79453	0.00088	10	0.08800	0.08800	—	—
7	0.80835	0.807354	0.00101	10	0.10100	0.10100	—	—
8	0.81969	0.81870	0.00699	10	0.09900	0.09900	—	—

T.E. Tech Error; No animals added, no animals recovered - must bin

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	1.0000	0.9000	0.9000	1.0000	0.9000	1.0000
-CRS + CRW	1.0000	1.0000	0.8000	0.9000	1.0000	1.0000
CRM 2.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Conc-	Transform: Arcsin Square Root					t-Stat	Critical	MSD
	Mean	N-Mean	Mean	Min	Max			
-LCS + CRW	0.9625	1.0132	1.3509	1.2490	1.4120	6.244	8	
-CRS + CRW	0.9500	1.0000	1.3332	1.1071	1.4120	8.799	8	*
CRM 2.0	1.0000	1.0526	1.4120	1.4120	1.4120	0.000	7	-1.901
							1.895	0.0786

Auxiliary Tests

Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)

Equality of variance cannot be confirmed

The control means are not significantly different ($p = 0.73$)

Hypothesis Test (1-tail, 0.05)

Heteroscedastic t Test indicates no significant differences

Treatments vs -CRS + CRW

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water			-Hyalella azteca		
Conc-	1	2	3	4	5	6
-LCS + CRW	0.0930	0.1400	0.0878	0.1090	0.1220	0.1400
-CRS + CRW	0.1040	0.1580	0.1088	0.0856	0.0956	0.0980
CRM 2.0	0.0800	0.0910	0.0870	0.0790	0.0880	0.1010
						0.0990
						0.1150
						0.0780

Conc-	Transform: Untransformed						1-Tailed Critical	MSD
	Mean	N-Mean	Mean	Min	Max	CV%		
-LCS + CRW	0.1132	1.0759	0.1132	0.0878	0.1400	17.635	8	
-CRS + CRW	0.1052	1.0000	0.1052	0.0780	0.1580	23.138	8	*
CRM 2.0	0.0893	0.8485	0.0893	0.0790	0.1010	9.519	7	1.641 1.771 0.0172

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.85492	0.881	1.65805	4.96296
F-Test indicates equal variances (p = 0.02)	8.20682	10.7859		
The control means are not significantly different (p = 0.48)	0.71766	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDP	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.01721	0.16354	0.00095	0.12476 1, 13
Treatments vs -CRS + CRW				

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	0.0930	0.1260	0.0790	0.1090	0.1220	0.1260
-CRS + CRW	0.1040	0.1580	0.0870	0.0770	0.0860	0.0980
CRM 2.0	0.0800	0.0910	0.0870	0.0790	0.0830	0.1010
						0.0990

Conc-	Transform: Untransformed				1-Tailed					
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	Critical	MSD
-LCS + CRW	0.1086	1.0835	0.1086	0.0790	0.1260	15.708	8			
-CRS + CRW	0.1003	1.0000	0.1003	0.0770	0.1580	26.546	8	*		
CRM 2.0	0.0893	0.8906	0.0893	0.0790	0.1010	9.519	7	1.040	1.771	0.0187

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p < 0.05$)	0.84061	0.881	1.82222	4.98661
F-Test indicates equal variances ($p = 0.01$)	9.80389	10.7859		
The control means are not significantly different ($p = 0.47$)	0.74933	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDP	MSE	F-Prob df
Homoscedastic t test indicates no significant differences	0.01866	0.18618	0.00045	0.00041 0.31715 1, 13
Treatments vs -CRS + CRW				

TVA: 5069-02(***Hyalella azteca* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	8892	Test Photoperiod:	16:8
Sample ID:	CRM 2.5	Test System:	175mL Manual Delivery
Test Species:	<i>Hyalella azteca</i>	Test Temperature:	23± 1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	In house 2/4/2011 (1-2 day) 12-13
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11

Test Day:	Day 10
Date:	2/25/11
Overlying Water: Site	CRM 7.0
Overlying Water Batch ID (GLC Number):	8900

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness	Alkalinity	Ammonia (as N)	Observations/ # surviving out of 10
1				136	124	0.08ppu		10/10
2	22.3	6.1						10/10
3								10/10
4	22.3	6.9						10/10
5								10/10
6								10/10
7		7.93						10/10
8		7.96						10/10

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

* Contact Laboratory Coordinator if Dissolved Oxygen level is < 2.5 mg/L or Temperature is out of range. m_{ov} = 0.04Hard, alk, nitr: Composite Sample w/ 8 m_{ps} pH, SC, Hard, alk, Nitr analyzed 3/24/11 - day 9 - mustU: Below m_o taken on 02/24/2011

GLC# 258692

***Hyalella azteca* WEIGHT DATA**

TEST MATERIAL: CRM 2.5

WEIGH DATE: 2/26/11

TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 5069-02 TVA

TEST DATE: 2/15/2011-2/25/2011

OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: AD

AD

DRYING DURATION (HOURS): 24 hrs

TEST SPECIES: *H. azteca*

Then desiccated for a minimum of ~30 mins before weighed

Sample ID	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	A-B TOTAL DRY WEIGHT OF ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	AVERAGE WEIGHT (mg)	Biomass WEIGHT (mg) (A-B)/C of oven initial
1	0.78933	0.78860	0.00073	10	0.07300	0.07300	
2	0.82723	0.82653	0.00070	10	0.07000	0.07000	
3	0.80038	0.79961	0.00077	10	0.07100	0.07100	
4	0.80154	0.80069	0.00085	10	0.08500	0.08500	
5	0.80170	0.80187	0.00083	10	0.08300	0.08300	
6	0.81268	0.81176	0.00092	10	0.09200	0.09200	
7	0.81587	0.81488	0.00099	10	0.09900	0.09900	
8	0.79441	0.79334	0.00101	10	0.10100	0.10100	

Sample ID: CRM 2.5

GLC #: 8891Q

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.5	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environmental Sample Type:		-WHOLE SEDIMENT	
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	- <i>Hyalella azteca</i>	
Comments:	CRM=Clinch River Mille Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					

Conc-	Transform: Arcsin Square Root						1-Tailed Critical	MSD
	Mean	N-Mean	Mean	Min	Max	CV%		
-LCS + CRW	0.9625	1.0132	1.3509	1.2490	1.4120	6.244	8	
-CRS + CRW	0.9500	1.0000	1.3332	1.1071	1.4120	8.799	8	*
CRM 2.5	1.0000	1.0526	1.4120	1.4120	1.4120	0.000	8	-1.901 1.895 0.0786

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p \leq 0.05$)	0.78822	0.887	-1.5228	3.30524
Equality of variance cannot be confirmed				
The control means are not significantly different ($p = 0.73$)	0.34723	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSE	F-Prob df
Heteroscedastic t Test indicates no significant differences	0.04128	0.04371	0.02487	0.00688 0.07805 1, 14
Treatments vs -CRS + CRW				

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.5	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	0.0930	0.1400	0.0878	0.1090	0.1220	0.1400
-CRS + CRW	0.1040	0.1580	0.1088	0.0856	0.0956	0.0980
*CRM 2.5	0.0730	0.0700	0.0770	0.0850	0.0830	0.0920

Conc-	Transform: Untransformed					1-Tailed				
	Mean	N	Mean	Min	Max	Cv%	N	t-Stat	Critical	MSD
-LCS + CRW	0.1132	1.0759	0.1132	0.0878	0.1400	17.635	8			
-CRS + CRW	0.1052	1.0000	0.1052	0.0780	0.1580	23.138	8	*		
*CRM 2.5	0.0857	0.8149	0.0857	0.0700	0.1070	15.022	8	2.000	1.761	0.0172

Auxiliary Tests		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)		0.90543	0.887	1.41831	3.28438
F-Test indicates equal variances (p = 0.11)		3.57289	8.88539		
The control means are not significantly different (p = 0.48)		0.71766	2.14479		
Hypothesis Test (1-tail, 0.05)		MSDu	MSDP	MSE	F-Prob df
Homoscedastic t Test indicates significant differences		0.01715	0.163	0.00152	0.00038 0.06523 1, 14
Treatments vs -CRS + CRW					

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test:10-Day Biomass						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 2.5	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/7/2011	Protocol:	EPA 600/R-99/064	Test Species:		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water			-Hyalella azteca		
Conc-	1	2	3	4	5	6
-LCS + CRW	0.0930	0.1260	0.0790	0.1090	0.1220	0.0990
-CRS + CRW	0.1040	0.1580	0.0870	0.0770	0.0860	0.0980
CRM 2.5	0.0730	0.0700	0.0770	0.0850	0.0830	0.0920

Conc-	Transform: Untransformed					1-Tailed				
	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
-LCS + CRW	0.1086	0.0835	0.1086	0.0790	0.1260	15.708	8			
-CRS + CRW	0.1003	0.0000	0.1003	0.0770	0.1580	26.546	8	*		
CRM 2.5	0.0857	0.8554	0.0857	0.0700	0.1070	15.022	8	1.387	1.761	0.0184

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)	0.87086	0.887	1.58992	3.53465
F-Test indicates equal variances ($p = 0.07$)	4.26819	8.88539		
The control means are not significantly different ($p = 0.47$)	0.74933	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.01841	0.18365	0.00084	0.00044 0.18709 1, 14
Treatments vs -CRS + CRW				

TVA: 5069-02***Hyalella azteca* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	8893	Test Photoperiod:	16:8
Sample ID:	CRM 3.0	Test System:	175mL Manual Delivery
Test Species:	<i>Hyalella azteca</i>	Test Temperature:	23±1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	In house 2/4/2011 (1-2 day)
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11
Test Day:	Day 10	Number Daily Renewals:	1 /
Date:	2/25/11	Renewal time/Initials	✓ renewal time/Initials
Overlying Water:	Site C22m T10	Renewal time/Initials	✓ renewal time/Initials
Overlying Water Batch ID (GLC Number):	89100	Food: YTC#	✓ Feed 1.0 mL/replicate
Screens Cleaned:	□ yes X no □ n/a		

Replicate	Temperature (23±1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness	Alkalinity	Ammonia (as N)	Observations/	
								# surviving out of 10	
1				156	130	0.0445	②	9	/10
2	22.3	3.8		28.9	13.0	0.055	10	10	
3	22.3	4.3		25.0	start: 13.0 titrant: 3.9 used (mL): 6.8	3.3 3.5 3.7 3.9 4.1 4.3 4.5 4.7 4.9 5.1	8	10	/10
4	22.3	4.3		25.0	sample volume (mL): 50			10	/10
5								10	/10
6								10	/10
7		8.33	347					10	/10
8		8.44	349					10	/10

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

* Contact Laboratory Coordinator if Dissolved Oxygen level is < 2.5 mg/L or Temperature is out of range. MOU: 0.05 ± 0.10

Hyd. over NH₄: Composit Sample all 8 reps PH, SC, Hard, Alk, NH₄ analyzed 2/24/11 - day 9 - n/a
 ② RP should be = 15%
 N/A because of "start" "5"

***Hyalella azteca* WEIGHT DATA**

GLC # 8893

TEST MATERIAL: CRM 3.0

WEIGH DATE: 2/26/11

TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 5069-02 TVA

OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: AD / MWS

TEST DATE: 2/15/2011-2/25/2011

DRYING DURATION (HOURS): 24 HRS. ^{overnight}

dedicated bin in minimum of 30 min. dust free

TEST SPECIES: *H. azteca*

O.C.: FS

Sample ID	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	A-B TOTAL DRY WEIGHT OF ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	AVERAGE WEIGHT (mg)	Biomass WEIGHT (mg) $(A-B)/C$
	1	0.820728	0.81948	0.00080	9	0.08889	0.08000
Sample ID: CRM 3.0	2	0.816881	0.816171	0.00070	10	0.07000	0.07000
GLC #: 8893	3	0.81774	0.81679	0.00095	10	0.001500	0.001500
	4	0.82434	0.823768	0.00064	8	0.08250	0.000600
	5	0.82304	0.82184	0.00120	10	0.12000	0.12000
	6	0.80727	0.80631	0.00096	10	0.09600	0.09600
	7	0.80783	0.80696	0.00087	10	0.08700	0.08700
	8	0.81275	0.81193	0.00082	10	0.08200	0.08200

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 3.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; CRW=Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	1.0000	0.9000	0.9000	1.0000	0.9000	1.0000
-CRS + CRW	1.0000	1.0000	0.8000	0.9000	0.9000	1.0000
CRM 3.0	0.9000	1.0000	1.0000	0.8000	1.0000	1.0000

Conc-	Transform: Arcsin Square Root					1-Tailed t-Stat	Critical	MSD
	Mean	N	Mean	Min	Max			
-LCS + CRW	0.9625	1.0132	1.3509	1.2490	1.4120	6.244	8	
-CRS + CRW	0.9500	1.0000	1.3332	1.1071	1.4120	8.799	8	*
CRM 3.0	0.9625	1.0132	1.3535	1.1071	1.4120	8.476	8	-0.351

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)	0.71133	0.887	-1.3624	0.56876
F-Test indicates equal variances ($p = 0.95$)	1.04535	8.88539		
The control means are not significantly different ($p = 0.73$)	0.34723	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.05568	0.053895	0.00166	0.7307 1, 14
Treatments vs -CRS + CRW				

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth							
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 3.0		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm	Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/28/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; CRW=Clinch River Water						
Conc-	1	2	3	4	5	6	7
-LCS + CRW	0.0930	0.1400	0.0878	0.1090	0.1220	0.1400	0.0990
-CRS + CRW	0.1040	0.1580	0.1088	0.0856	0.0956	0.0980	0.1140
CRM 3.0	0.0889	0.0700	0.0950	0.0825	0.1200	0.0960	0.0870
							0.0820

Conc-	Transform: Untransformed					1-Tailed			MSD
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	
-LCS + CRW	0.1132	1.0759	0.1132	0.0878	0.1400	17.635	8		
-CRS + CRW	0.1052	1.0000	0.1052	0.0780	0.1580	23.138	8	*	
CRM 3.0	0.0902	0.8569	0.0902	0.0700	0.1200	16.186	8	1.500	1.761
									0.0177

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.88041	0.887	1.42227	2.93921
F-Test indicates equal variances (p = 0.20)	2.78285	8.88539		
The control means are not significantly different (p = 0.48)	0.71766	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.01768	0.16799	0.00091	0.0004 0.15572
Treatments vs -CRS + CRW				1, 14

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

Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 3.0
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environment Sample Type:		-WHOLE SEDIMENT
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	- <i>Hyalella azteca</i>
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water				
Conc-	1	2	3	4	5
-LCS + CRW	0.0930	0.1260	0.0790	0.1090	0.1220
-CRS + CRW	0.1040	0.1580	0.0870	0.0770	0.0860
CRM 3.0	0.0800	0.0700	0.0950	0.0660	0.1200

Conc-	Transform: Untransformed					t-Stat	1-Tailed Critical	MSD
	Mean	N-Mean	Mean	Min	Max			
-LCS + CRW	0.1086	1.0835	0.1086	0.0790	0.1260	15.708	8	
-CRS + CRW	0.1003	1.0000	0.1003	0.0770	0.1580	26.546	8	*
CRM 3.0	0.0870	0.8678	0.0870	0.0660	0.1200	19.613	8	1.185 1.761 0.0197

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)	0.87707	0.887	1.42959	2.356888
F-Test indicates equal variances ($p = 0.26$)	2.43253	8.88539		
The control means are not significantly different ($p = 0.47$)	0.74933	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD_p	MSB	MSE	F-Prob
Homoscedastic \dagger Test indicates no significant differences	0.01969	0.19637	0.0007	0.0005 0.25555 1, 14
Treatments vs -CRS + CRW				

TVA: 5069-01

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

GLC#:	8894
Sample ID#:	CRM 3.5
Test Species:	<i>Hyalella azteca</i>
Date Addition of Sediment:	2/14/11
Test Initiation Date:	2/15/11
Test Day:	Day 10
Date:	2/25/11
Overlying Water: Site	CRM 76
Overlying Water Batch ID (GLC Number):	8900

Number Daily Renewals:	1
Renewal time/Initials	<u>10 min</u>
Renewal time/Initials	<u>10 min</u>
Food: YTC#	<u>✓</u>
Feed 1.0 ml/replicate	<u>✓</u>
Screens Cleaned:	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> n/a

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Conductance (µmhos/cm)	Specific Hardness	Alkalinity	Ammonia (as N) *	Observations/
1	22.2	5.0	0.00	148	147	0.00	MLL	9 /10
2	22.2	5.0	0.00	148	20.1	0.00	MLL	0 /10
3	22.2	5.1	0.00	28.9	start: 13.0	0.00	MLL	10 /10
4	22.2	5.1	0.00	3.7	Titration used (mL): 7.1	0.00	MLL	10 /10
5				Sample 25.70 volume (mL): 50	Sample volume (mL): 50	0.00	live may be present	10 /10
6				(2nd) Duplicate 42.6 and mL	33.9 Standard	0.00	MLL	10 /10
7		8.55	3.47	3.1 48	3.1 48	0.00	MLL	10 /10
8		8.55	3.47	3.1 48	3.1 48	0.00	MLL	10 /10

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

* Dissolved Oxygen level is < 2.5 mg/L or Temperature is out of range. MDC: 0.04

Hatch, Hatch, NH4: Composite Sample all 8 Reps

(2) RP should be 15°/o

Test Photoperiod: 16:8

Test System: 175mL Manual Delivery

Test Temperature: 23± 1°C

Test Organism Source/Age: In house 2/4/2011 (1-2 day) 12-13

Test Termination Date: 2/25/11

PH, SC, Hard, Oxi, NH4 analyzed 3/20/11 - day 9 - must


 GLC # 8894

***Hyalella azteca* WEIGHT DATA**
TEST MATERIAL: Cpm 3.5WEIGH DATE: 2/26/11TYPE/MODEL OF DRYING OVEN: BLUE MTEST NUMBER: 5069-02 TVATEST DATE: 2/15/2011-2/25/2011OVEN TEMPERATURE (°C): 60TECHNICIAN'S INITIALS: AD /mwsDRYING DURATION (HOURS): 24 hrs. max - 4/24"TEST SPECIES: H. azteca
4 min dissolution for a minimum of ~30 mins total weighed

Sample ID	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	A-B TOTAL DRY WEIGHT OF ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	AVERAGE WEIGHT (mg)	Biomass WEIGHT (mg)
<i>(A-B)/C</i>							
1	0.81825	0.81743	0.00082	9	0.09111	0.08300	<i>(A-B)/C</i>
2	0.81770	0.81666	0.00104	10	0.10400	0.10400	<i>(A-B)/C</i>
3	0.81377	0.81291	0.00086	10	0.08600	0.08600	<i>(A-B)/C</i>
4	0.80936	0.80838	0.00098	10	0.09800	0.09800	<i>(A-B)/C</i>
5	0.80500	0.80389	0.00111	10	0.11100	0.11100	<i>(A-B)/C</i>
6	0.79528	0.79434	0.00094	10	0.09400	0.09400	<i>(A-B)/C</i>
7	0.79553	0.79465	0.00088	10	0.08800	0.08800	<i>(A-B)/C</i>
8	0.81963	0.81881	0.00082	10	0.08200	0.08200	<i>(A-B)/C</i>

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 3.5	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environn	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca	
Comments:	CRM=Clinch River Mille Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					
Conc.	1	2	3	4	5	6
-LCS + CRW	1.0000	0.9000	0.9000	1.0000	0.9000	1.0000
-CRS + CRW	1.0000	1.0000	0.8000	0.9000	0.9000	1.0000
CRM 3.5	0.9000	1.0000	1.0000	1.0000	1.0000	1.0000

Conc.	Mean	N-Mean	Transform: Arcsin Square Root			t-Stat	1-Tailed Critical	MSD
			Mean	Min	Max			
-LCS + CRW	0.9625	1.0132	1.3509	1.2490	1.4120	6.244	8	
-CRS + CRW	0.9500	1.0000	1.3332	1.1071	1.4120	8.799	8	*
CRM 3.5	0.9875	1.0395	1.3916	1.2490	1.4120	4.140	8	-1.266 1.761 0.0814

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p \leq 0.05$)	0.79417	0.887	-1.4053	1.49391
F-test indicates equal variances ($p = 0.08$)	4.14481	8.88539		
The control means are not significantly different ($p = 0.73$)	0.34723	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSE	F-Prob df
Homoscedastic t test indicates no significant differences	0.04295	0.04547	0.01368	0.00854 0.22631 1, 14
Treatments vs -CRS + CRW				

Hyalinella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 3.5	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environ	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalinella azteca	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	0.0930	0.1400	0.0878	0.1090	0.1220	0.1400
-CRS + CRW	0.1040	0.1580	0.1088	0.0856	0.0956	0.0980
CRM 3.5	0.0911	0.1040	0.0860	0.0980	0.1110	0.0940

Conc-	Transform: Untransformed					t-Stat	Critical	MSD
	Mean	N-Mean	Mean	Min	Max			
-LCS + CRW	0.1132	1.0759	0.1132	0.0878	0.1400	17.635	8	
-CRS + CRW	0.1052	1.0000	0.1052	0.0780	0.1580	23.138	8	*
CRM 3.5	0.0943	0.8958	0.0943	0.0820	0.1110	10.276	8	1.184
							1.761	0.0163

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.87252	0.887		
F-Test indicates equal variances (p = 0.03)	6.31849	8.88539		
The control means are not significantly different (p = 0.48)	0.71766	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.01632	0.15507	0.00048	0.25615 1, 14
Treatments vs -CRS + CRW				

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Biomass						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 3.5	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:		-WHOLE SEDIMENT	
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	0.0930	0.1260	0.0790	0.1090	0.1220	0.1260
-CRS + CRW	0.1040	0.1580	0.0870	0.0770	0.0860	0.0980
CRM 3.5	0.0820	0.1040	0.0860	0.0980	0.1110	0.0940

Conc-	Transform: Untransformed				1-Tailed					
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	Critical	MSD
-LCS + CRW	0.1086	1.0835	0.1086	0.0790	0.1260	15.708	8			
-CRS + CRW	0.1003	1.0000	0.1003	0.0770	0.1580	26.546	8	*		
CRM 3.5	0.0931	0.9289	0.0931	0.0820	0.1110	11.385	8	0.703	1.761	0.0178

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.85868	0.887	1.73138	4.38823
F-Test indicates equal variances (p = 0.03)	6.30024	8.88539		
The control means are not significantly different (p = 0.47)	0.74933	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.01784	0.17794	0.0002	0.00041 0.49329 1, 14
Treatments vs -CRS + CRW				

TVA: 5069-02***Hyalella azteca* 10-Day Survival and Growth Whole Sediment Toxicity Test**

GLC#:	8895	Test Photoperiod:	16:8
Sample ID:	CRM 4.0	Test System:	175mL Manual Delivery
Test Species:	<i>Hyalella azteca</i>	Test Temperature:	23± 1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	In house 2/4/2011 (1-2 day) 12-13
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11

Test Day:	Day 10	Number Daily Renewals:	✓ /
Date:	2/25/11	renewal time/Initials	✓ renewal time/Initials
Overlying Water:	Site CRM 7.0	renewal time/Initials	✓ renewal time/Initials
Overlying Water Batch ID (GLC Number):	8900	Food: YTC#	✓ Feed 1.0 mL/replicate
Screens Cleaned:	✓ yes X no □ n/a	Screens Cleaned:	✓ yes X no □ n/a

Replicate	Temperature (23± 1°C)*	pH	Dissolved Oxygen (mg/L)*	Conductance (µmhos/cm)	Specific Hardness	Alkalinity	Ammonia (as N) ✓	Observations/ # surviving out of 10
1	27.3	8.4	10.4	136	136	✓	0.0	7 /10
2	27.3	8.4	10.4	136	136	✓	0.0	7 /10
3	27.3	8.4	10.4	136	136	✓	0.0	7 /10
4	27.3	8.4	10.4	136	136	✓	0.0	7 /10
5				25.0	50	✓	0.0	7 /10
6				25.0	50	✓	0.0	7 /10
7				25.0	50	✓	0.0	7 /10
8				25.0	50	✓	0.0	7 /10

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

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

Hard, Alkaline NH₄: Composite Sample all 8 repspH, Sc, Hard, Alkaline NH₄ analyzed 2/24/11 - day 9 - muss

taken on 2/24/2011

U: Below mol (or ox)

X: foul odor, thick mucky overlying H₂O.

***Hyalella azteca* WEIGHT DATA**

GLC 88915

TEST MATERIAL: CRW 4.0WEIGH DATE: 2/26/11TYPE/MODEL OF DRYING OVEN: BLUE MTEST NUMBER: 5069-02 TVAOVEN TEMPERATURE (°C): 60TECHNICIAN'S INITIALS: AD /mwsTEST DATE: 2/15/2011-2/25/0211DRYING DURATION (HOURS): 24 HRSTEST SPECIES: *H. azteca*4 hrs dry in oven & min 30 mins until weighed

Sample ID	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	A-B TOTAL DRY WEIGHT OF ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	AVERAGE WEIGHT (mg)	Biomass WEIGHT (mg) * over (A-B)/C
1	0.82766	0.82710	0.00056	7	0.08000	0.05600	
2	0.82434	0.82347	0.00087	10	0.08700	0.08700	
3	0.81693	0.81601	0.00092	10	0.09300	0.09300	
4	0.81500 0.79952	0.81405	0.00095	10	0.09500	0.09500	
5	0.81126	0.81002	0.00124	10	0.12400	0.12400	
6	0.81393	0.81284	0.00109	10	0.10900	0.10900	
7	0.81185	0.81070	0.00115	10	0.11500	0.11500	
8	0.79902	0.79892	0.00010	3	0.03333	0.01000	

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 4.0	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:		-WHOLE SEDIMENT	
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca	
Comments:	CRM=Clinch River Mile; Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					
Conc.	1	2	3	4	5	6
-LCS + CRW	1.0000	0.90000	0.90000	1.00000	0.90000	1.00000
-CRS + CRW	1.0000	1.00000	0.80000	0.90000	1.00000	1.00000
CRM 4.0	0.7000	1.00000	1.00000	1.00000	1.00000	0.30000

Conc.	Transform: Arcsin Square Root				1-Tailed					
	Mean	N-Mean	Mean	Min	Max	Cv%	N	t-Stat	Critical	MSD
-LCS + CRW	0.9625	1.0132	1.3509	1.2490	1.4120	6.244	8			
-CRS + CRW	0.9500	1.0000	1.3332	1.1071	1.4120	8.799	8	*		
CRM 4.0	0.8750	0.9211	1.2554	0.5796	1.4120	24.711	8	0.664	1.761	0.2065

Auxiliary Tests		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)		0.72109	0.887	-2.0584	4.60523
F-Test indicates equal variances (p = 0.02)		6.99364	8.88539		
The control means are not significantly different (p = 0.73)		0.34723	2.14479		
Hypothesis Test (1-tail, 0.05)		MSDu	MSDP	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences		0.12923	0.13681	0.02421	0.055 0.51777 1, 14
Treatments vs -CRS + CRW					

Hyalinella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Growth						
	Start Date:	Test ID:	Sample ID:			
Start Date:	2/15/2011	5069-00		-CRM4.0		
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:	-WHOLE SEDIMENT		
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:		
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed; CRW=Clinch River Water		Hyalinella azteca			
Conc-	1	2	3	4	5	6
-LCS + CRW	0.0930	0.1400	0.0878	0.1090	0.1220	0.1400
-CRS + CRW	0.1040	0.1580	0.1088	0.0856	0.0956	0.0980
CRM 4.0	0.0800	0.0870	0.0920	0.0950	0.1240	0.1090

Conc-	Transform: Untransformed					t-Stat	1-Tailed Critical	MSD
	Mean	N	Mean	Min	Max			
-LCS + CRW	1.0759	0.1132	0.0878	0.1400	17.635	8		
-CRS + CRW	1.052	1.0000	0.1052	0.0780	0.1580	23.138	*	
CRM 4.0	0.0919	0.8735	0.0919	0.0333	0.1240	30.389	8	1.016
							1.761	0.0231

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.96818	0.887	-0.1597	1.55651
F-Test indicates equal variances ($p = 0.73$)	1.31611	8.88539		
The control means are not significantly different ($p = 0.48$)	0.71766	2.14479		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDP	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences	0.02307	0.21928	0.00071	0.32668 1, 14
Treatments vs -CRS + CRW				

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

Start Date:	2/15/2011	Test ID:	5069-00	Sample ID:	-CRM4.0
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	Hyalella azteca
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sed; CRS=Clinch Reference Sed; CRW=Clinch River Water				
Conc-	1	2	3	4	5
-LCS + CRW	0.0930	0.1260	0.0790	0.1090	0.1220
-CRS + CRW	0.1040	0.1580	0.0870	0.0770	0.0860
CRM 4.0	0.0560	0.0870	0.0920	0.0950	0.1240

Conc-	Transform: Untransformed					t-Stat	Critical	MSD
	Mean	N-Mean	Mean	Min	Max			
-LCS + CRW	0.1086	1.0835	0.1086	0.0790	0.1260	15.708	8	
-CRS + CRW	0.1003	1.0000	0.1003	0.0770	0.1580	26.546	8	
CRM 4.0	0.0860	0.8579	0.0860	0.0100	0.1240	43.079	8	0.0284

Auxiliary Tests		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)		0.96852	0.887	-0.5216	1.47102
F-Test indicates equal variances (p = 0.40)		1.93807	8.88539		
The control means are not significantly different (p = 0.47)		0.74933	2.14479		
Hypothesis Test (1-tail, 0.05)		MSDu	MSDP	MSE	F-Prob df
Homoscedastic t Test indicates no significant differences		0.02841	0.28335	0.00081	0.00104 0.39184 1, 14
Treatments vs -CRS + CRW					

TVA: 5069-07*Hyalella azteca* 10-Day Survival and Growth Whole Sediment Toxicity Test

GLC#:	8896	Test Photoperiod:	16:8
Sample ID:	CRM 4.5	Test System:	175mL Manual Delivery
Test Species:	<i>Hyalella azteca</i>	Test Temperature:	23±1°C
Date Addition of Sediment:	2/14/11	Test Organism Source/Age:	In house 2/4/2011 (1-2 day) 12-13
Test Initiation Date:	2/15/11	Test Termination Date:	2/25/11
Test Day:	Day 10	Number Daily Renewals:	1
Date:	2/25/11	renewal time/Initials	/ renewal time/Initials
Overlying Water:	Site CRM 70	renewal time/Initials	/ renewal time/Initials
Overlying Water Batch ID (GLC Number):	8G00	Food: YTC#	/ Feed 1.0 mL/replicate
		Screens Cleaned:	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> n/a

Replicate	Temperature (23±1°C)*	pH	Dissolved Oxygen (mg/L)*	Specific Conductance (µmhos/cm)	Hardness	Alkalinity	Ammonia (as N)†	Observations/ # surviving out of 10
1				140	124	124	0.03	ML 10 /10
2	27.3	9.9		39.5	32.7	26.5	0.03	ML 10 /10
3	27.3	6.0		34.0	start: 34.0 Titrant: 3.5 used (mL): 6.7	26.5		ML 10 /10
4				Sample 25 to volume (mL): 50	Sample 50 volume (mL): 50	26.5	5/10	ML 10 /10
5								ML 10 /10
6								ML 10 /10
7		7.85	324					ML 10 /10
8		7.87	325					ML 10 /10

Key: A:V: Animals Visible NAV: No Animals Visible FOV: Foreign Organism Visible

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

† NH₃, NH₄, NH₄⁺: Compositely Sample all 8 reps

↓: Below mol (0.04)

↑: Taken on 02/24/2011

pH, SL, Hard, Alk, NH₃ analyzed 2/24/11 - day of - muss



Hyalella azteca WEIGHT DATA

GLC#: 889b

CRM 4.6

TEST MATERIAL: WEIGH DATE: 2/26/11TYPE/MODEL OF DRYING OVEN: BLUE MTEST NUMBER: 5069-02

TVA

OVEN TEMPERATURE ($^{\circ}$ C): 60TECHNICIAN'S INITIALS: ABTEST SPECIES: *H. azteca*TEST DATE: 2/15/2011-2/25/2011DRYING DURATION (HOURS): 24 HRSTEST DURATION (HOURS): 24 HRS (at 60 $^{\circ}$ C)

Then decrease to minimum 6~30 min until weight

Sample ID	REP. NUMBER	A DRY WEIGHT OF PAN AND ORGANISMS (g)	B DRY WEIGHT OF PANS (g)	A-B TOTAL DRY WEIGHT OF ORGANISMS (g)	C NUMBER OF ORGANISMS WEIGHED	AVERAGE WEIGHT (mg)	Biomass WEIGHT (mg)
<u>(A-B)/C</u>							
1	0.81387	0.81396	0.00091	10	0.09100	0.09100	
2	0.83024	0.82950	0.00074	10	0.07400	0.07400	
3	0.83352	0.83254	0.00098	10	0.09800	0.09800	
4	0.806488	0.80602	0.00086	10	0.08600	0.08600	
5	0.80708	0.80620	0.00088	10	0.08800	0.08800	
6	0.80795	0.80715	0.00080	10	0.08000	0.08000	
7	0.81235	0.81150	0.00085	10	0.08500	0.08500	
8	0.80690	0.80607	0.00083	10	0.08300	0.08300	

Sample ID: CRM 4.5

GLC #: 889b

Hyalella azteca 10day Survival and Growth Whole Sediment Toxicity Test-10-Day Survival						
Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 4.5	
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environ	Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	-Hyalella azteca	
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water					
Conc-	1	2	3	4	5	6
-LCS + CRW	1.0000	0.9000	0.9000	1.0000	0.9000	1.0000
-CRS + CRW	1.0000	1.0000	0.8000	0.9000	0.9000	1.0000
CRM 4.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Conc-	Transform: Arcsin Square Root					1-Tailed
	Mean	N-Mean	Mean	Min	Max	
-LCS + CRW	0.9625	1.0132	1.3509	1.2490	1.4120	6.244
-CRS + CRW	0.9500	1.0000	1.3332	1.1071	1.4120	8.799
CRM 4.5	1.0000	1.0526	1.4120	1.4120	1.4120	*

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)	0.78822	0.887	-1.5228	3.30524
Equality of variance cannot be confirmed				
The control means are not significantly different ($p = 0.73$)	0.34723	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD _U	MSD _P	MSE	F-Prob
Heteroscedastic t Test indicates no significant differences	0.04128	0.04371	0.02487	0.07805
Treatments vs -CRS + CRW				1, 14

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

Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 4.5
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:		-WHOLE SEDIMENT
Sample Date:	2/8/2011	Protocol:	EPA 600/R-99/064	Test Species:	- <i>Hyalella azteca</i>
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water				
Conc-	1	2	3	4	5
-LCS + CRW	0.0930	0.1400	0.0878	0.1090	0.1220
-CRS + CRW	0.1040	0.1580	0.1088	0.0856	0.0956
CRM 4.5	0.0910	0.0740	0.0980	0.0860	0.0880

Conc-	Transform: Untransformed					1-Tailed			MSD
	Mean	N	Mean	Min	Max	Cv%	N	t-Stat	
-LCS + CRW	0.1132	1.0759	0.1132	0.0878	0.1400	17.635	8		
-CRS + CRW	0.1052	1.0000	0.1052	0.0780	0.1580	23.138	8	*	
*CRM 4.5	0.0856	0.8137	0.0856	0.0740	0.0980	8.397	8	2.184	1.860
									0.0167

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)	0.84109	0.887	1.73568	5.66733
F-Test indicates unequal variances ($p = 4.64E-03$)	11.4678	8.88539		
The control means are not significantly different ($p = 0.48$)	0.71766	2.14479		
Hypothesis Test (1-tail, 0.05)	MSD_U	MSD_P	MSE	F-Prob
Heteroscedastic t Test indicates significant differences	0.01669	0.15861	0.00154	0.04643
Treatments vs -CRS + CRW			0.00032	1, 14

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

Start Date:	2/15/2011	Test ID:	5069-02	Sample ID:	-CRM 4.5
End Date:	2/25/2011	Lab ID:	GLEC-Great Lakes Environm Sample Type:	-WHOLE SEDIMENT	
Sample Date:	2/28/2011	Protocol:	EPA 600/R-99/064	Test Species:	- <i>Hyalella azteca</i>
Comments:	CRM=Clinch River Mile Sediment; LCS=Lab Control Sediment; CRS=Clinch Reference sed; Clinch River Water				
Conc-	1	2	3	4	5
-LCS + CRW	0.0930	0.1260	0.0790	0.1090	0.1220
-CRS + CRW	0.1040	0.1580	0.0870	0.0770	0.0860
CRM 4.5	0.0910	0.0740	0.0980	0.0860	0.0880

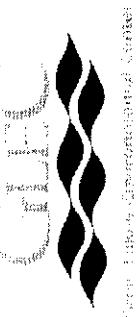
Conc-	Transform: Untransformed					1-Tailed				
	Mean	N-Mean	Mean	Min	Max		Critical	Critical	MSD	
-LCS + CRW	0.1086	1.0835	0.1086	0.0790	0.1260	15.708	8			
-CRS + CRW	0.1003	1.0000	0.1003	0.0770	0.1580	26.546	8	*		
CRM 4.5	0.0856	0.8541	0.0856	0.0740	0.0980	8.397	8	1.501	1.860	0.0181

Auxiliary Tests:

Shapiro-Wilk's Test indicates non-normal distribution ($p <= 0.05$)	0.82784	Critical	Skew	Kurt
F-Test indicates unequal variances ($p = 2.67E-03$)	13.6995	0.887	1.90227	5.64906
The control means are not significantly different ($p = 0.47$)	0.74933	8.88539		
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSE	F-Prob
Heteroscedastic t Test indicates no significant differences	0.01812	0.18078	0.00086	0.15568
Treatments vs -CRS + CRW				1, 14

Appendix E

Reference Toxicant Data



Chironomus dilutus Survival

NaCl Reference Toxicant data

2007-2011

