January 16, 2007

WATER DIVISION

JAN 2 2 2007

ENFORCEMENT

ProgressiveAE

Ms. Karen Rae Boase
Michigan Department of Environmental Quality
Water Bureau
Constitution Hall
P.O. Box 30473
Lansing, MI 48909

Re: Spring Lake – Lake Board Work Plan

Dear Ms. Boase:

Per your telephone conversation on January 12, 2007, with Mr. Tony Groves of my office, I am sending you a work plan that combines the elements stated in our letters to Mr. David Timm on October 17, 2006, and to you on December 21, 2006, relative to the November 2005 alum spill in Spring Lake.

On behalf of the Spring Lake – Lake Board, Progressive AE proposes to collect sediment and water samples once during spring turnover each year for four years at three locations in Spring Lake (Figure 1). Site 1 will be located at Prospect Point and serve as a reference site; Sites 2 and 3 will be located in the vicinity of the alum release.

Temperature will be measured in a vertical profile using an YSI Model 550A probe. Water samples will be collected from the surface, mid-depth, and bottom at Sites 1 and 3, and from the surface and bottom at Site 2 with a Kemmerer or VanDorn bottle to be analyzed for dissolved oxygen content, pH, total aluminum, and dissolved aluminum. Dissolved oxygen samples will be fixed in the field and then transported to Progressive AE for analysis using the modified Winkler method (Standard Methods Procedure 4500-O C). pH will be measured in the field using an YSI EcoSense pH10 meter. Total aluminum and dissolved aluminum samples will be placed on ice and transported to Trace Analytical for analysis using EPA Procedures 6010B and 6020, respectively.

Sediment samples will be collected using a petite Ponar sampler and analyzed by Trace Analytical[1] for percent total solids and aluminum using ASTM D2974 and EPA Procedure 6010B, respectively.

Additional sediment will be collected from each of the three locations for use in *Chironomus tentans* and *Hyalella azteca* ten-day acute whole sediment toxicity tests to be analyzed by Great Lakes Environmental Center[2] using EPA Method EPA/600/R-99/064.

Progressive AE
1811 4 Mile Road, NE
Grand Rapids, MI 49525 2442
616 361 2664 VOICE
616 361 1493 FAX
www.progressiveae.com

[1] Trace Analytical Laboratories, Inc., 2241 Black Creek Road, Muskegon, MI 49444-2673. Certifications: National Environmental Laboratory Accreditation Program; MDEQ for microbiology and inorganic chemistry.

[2] Great Lakes Environmental Center, 739 Hastings Street, Traverse City, MI 49686.

Annual reports will be submitted to the Chief of the Surface Water Assessment Section by December 1 of each year beginning in 2007 and ending in 2010. A final report shall contain:

- An introduction section that includes the description and details of the incident that includes the date, circumstances, and extent of the spill.
- A method section that includes details and a description of the sampling and techniques used, the USEPA sampling method numbers, the laboratory analysis and credentials of the laboratory used.
- A result section that contains an organized summary of tables and graphs, if applicable, the collected data and a narrative statement summarizing the data.
- A discussion and conclusion section that includes a comparison of reference to non-reference sites, and arguments for or against the need for site remediation.

If you have any questions about the information contained herein, please call me at 616/447-3377.

Sincerely,

PROGRESSIVE ARCHITECTURE ENGINEERING

Pamela J. Tyning
Water Resources Department

PJT/kmb
54060102/002
Enclosures
cc: Spring Lake – Lake Board – John Nash
X:\WGEN5\54060102\2007\pt0116l.doc

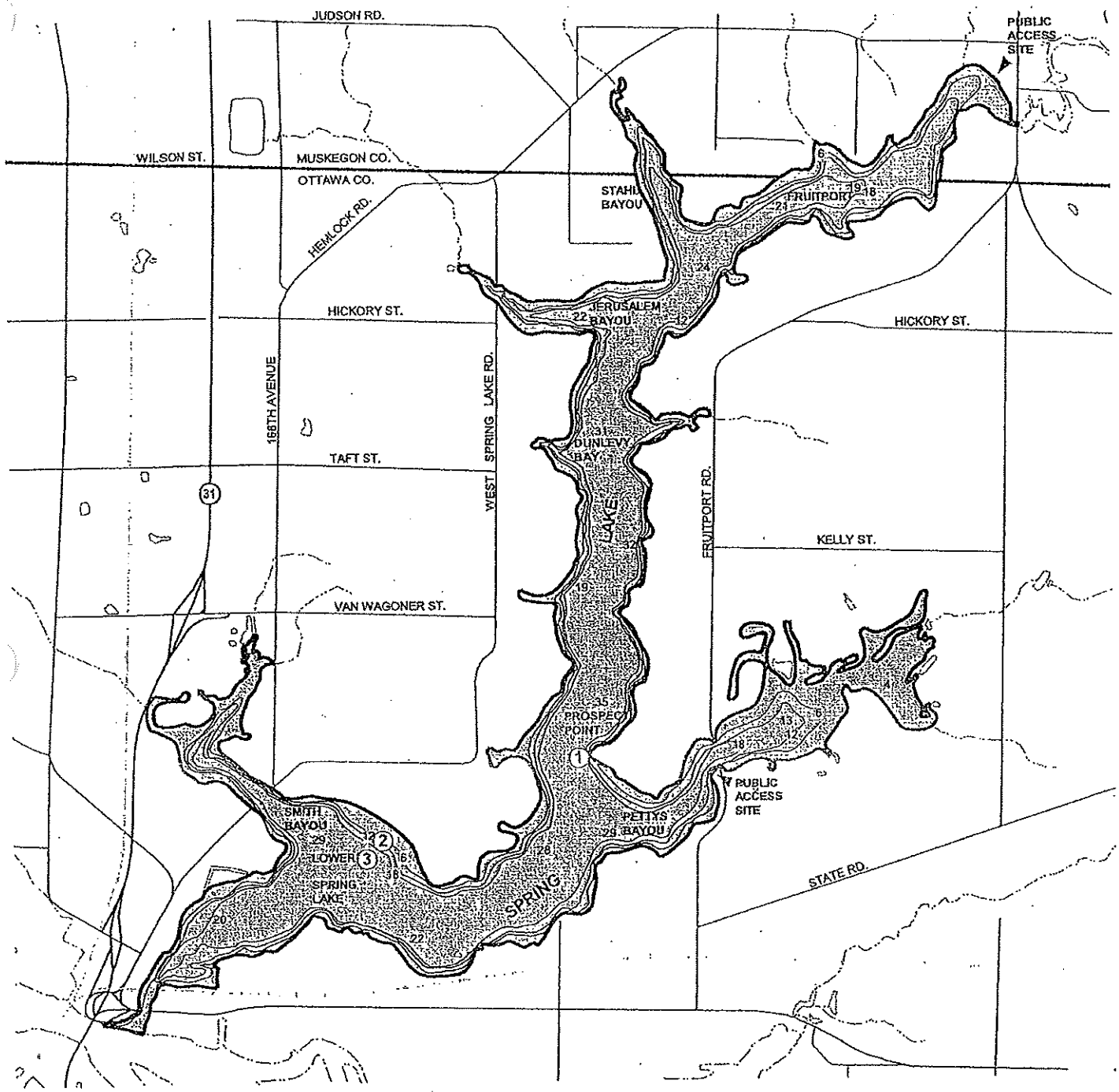

FIGURE 1 - SPRING LAKE SAMPLING LOCATION MAP

Appendix B

Sediment Toxicity Results

Great Lakes Environmental Center

Applied Environmental Sciences
www.glec-online.com

Traverse City Operations
739 Hastings St.
Traverse City
MI 49686

231 941-2230
231 941-2240 fax

Columbus Operations
1295 King Ave.
Columbus
OH 43212

614 487-1040
614 487-1920 fax

July 3, 2008

Paul Hausler
Water Resources Department
Civil Engineering Division
Progressive AE
1811 4 Mile Road, NE
Grand Rapids, MI 49525-2442

RE: FINAL REPORT: *HYALELLA AZTECA* AND *CHIRONOMUS DILUTUS* WHOLE SEDIMENT TOXICITY TESTING RESULTS FOR PROGRESSIVE AE SAMPLES

Dear Paul:

Great Lakes Environmental Center has completed our analysis of the *Chironomus dilutus (tentans)* and *Hyalella azteca* 10-day whole sediment survival and growth toxicity tests performed with three sediment samples, collected by Progressive AE personnel for whole sediment toxicity assessment. The sample identification numbers, average percent survival and average dry weight test results are summarized in Tables 1 and 2 for the *C. dilutus* tests and in Tables 3 and 4 for the *H. azteca* tests. Water quality data for the overlying water is summarized for each sediment sample in Table 5 for the *C. dilutus* and Table 6 for the *H. azteca* test. A detailed summary of the overlying water quality measurements is provided in Appendix B. A summary of the statistical analyses conducted on the whole sediment toxicity test data is provided in Table 7 for the *C. dilutus* and Table 8 for the *H. azteca* tests. (The daily laboratory bench data sheets are kept on file at GLEC and can be provided to you upon your request.) Chain of Custody forms and reference toxicant data are provided in Appendix A and F, respectively.

METHODS

The sediment samples were analyzed at our 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 three Progressive AE sediment samples were shipped by Progressive AE personnel and were received at GLEC, where they were assigned a unique GLEC laboratory identification number and stored at 4°C until test initiation.

Sample I.D.	GLEC Number	Date Shipped	Date Received
SL-1	7342	April 28, 2008	April 30, 2008
SL-2	7343	April 28, 2008	April 30, 2008
SL-3	7344	April 28, 2008	April 30, 2008

The 10-day *C. dilutus* and *H. azteca* whole sediment toxicity tests were initiated on May 16, 2008.

Second instar *C. dilutus* (10 days old at test initiation) and *H. azteca* (7-8 days old at test initiation) were used to initiate the whole sediment toxicity tests. *C. dilutus* and *H. azteca* were continuously exposed for 10 days to each of the sediment samples and to a laboratory control sediment. There were eight replicate beakers for each sediment sample and laboratory control; each replicate contained 10 animals. The laboratory control sediment is a reference sediment collected locally from the Boardman River, a blue ribbon trout stream, located in the Pere Marquette State Forest.

The *C. dilutus* and *H. azteca* were exposed in 300 mL high form beakers, each containing 100 mL of whole sediment and 175 mLs of overlying water. Overlying water was supplied to each test chamber at least twice daily (once every 12-hour period) via a static-renewal water delivery system. The overlying water consisted of de-chlorinated municipal (Lake Michigan) water of moderate hardness (160-180 mg/L). The *C. dilutus* test chambers were fed 1.5 mL of Tetrafin® goldfish food slurry (4mg/mL dry solids) daily. The *H. azteca* test chambers were fed 1.0 mL of YTC (1800 mg/L solids) daily.

The test chambers were placed in a temperature controlled water bath under the specified conditions of 23±1°C; photoperiod of 16 hours light and 8 hours dark; and ambient lighting. Water temperature was monitored continuously in the water bath using an electronic data logger (Appendix E) while temperatures in the test chambers were measured daily in two alternating replicates for each test sample. Alkalinity, hardness, pH and total ammonia were measured at test initiation and at test termination (Tables 5 and 6). Observations on organism behavior were made daily in each test chamber and recorded on the laboratory bench data sheets. The number of organisms surviving was recorded at test termination (10 days) and a summary of the percent survival is provided in Tables 1 and 3. The average ash free dry weight (mg) for each *C. dilutus* replicate and the average dry weight (mg) for each *H. azteca* replicate was also determined at test termination and summarized in Tables 2 and 4, respectively.

A statistical analysis using TOXSTAT (3.5, 1996) and statistical guidelines provided in

the EPA/600/R-99/064 *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates,* Second Edition and ASTM 1706-95B, *Standard Test Methods for Measuring the Toxicity of Sediment Associated Contaminants with Freshwater Invertebrates* (ASTM 2000) were used to compare the 10-day survival and growth endpoints. Initially, all survival data were transformed using an arc sine-square root transformation prior to analysis. The transformed data were then tested for normality and homogeneity of variances. Next, an analysis of variance (ANOVA) was conducted using the most appropriate parametric or nonparametric *t* test. If the data failed to meet the assumptions of normality or homogeneity, then the nonparametric tests were used to analyze the data. The investigative sample was considered statistically different when the percent survival was significantly lower (P= 0.05) than in the control sediments.

RESULTS

Chironomus dilutus

The laboratory control sediment organisms exceeded the minimum survival (70 percent or greater) and growth (0.48 mg or greater AFDW at test termination) criteria for an acceptable control for the *C. dilutus* test (Tables 1 and 2). The acceptable requirements for survival and growth for the *C. dilutus* can be found in the EPA /600/R-99/064 manual, Table 12.1. The overlying water quality measurements (Table 5) were also within the acceptable limits following the EPA testing protocol (i.e., daily mean temperatures were within ± 1°C of 23°C; the dissolved oxygen (D.O.) was maintained above 2.5 mg/L in the overlying water; and there were no variations greater than 50% in hardness, alkalinity and ammonia measurements within each test type, in the overlying water). Consequently, the *C. dilutus* whole sediment toxicity tests were conducted following the standard protocols and are valid assessments of sediment toxicity, with the following exceptions. On May 22, 2008, the dissolved oxygen in the laboratory control sediment and in two investigative sediments; SL-1, SL-2, and SL-3, fell below 2.5 mg/L, and in response, a third overlying water renewal was added to all of the controls and investigative test sediments. The brief drop in DO was unlikely to have affected the test results (see EPA /600/R-99/064 manual, section 15.3.8.2.3). All test chambers were checked daily to assess organism behavior and no unusual observations were noted with the test organisms.

There was a no statistically significant (P=0.05) reduction in *C. dilutus* survival for the three investigative samples (SL-1, SL-2, and SL-3) after 10 days of exposure, when compared to the laboratory control sediment (Table 1). Growth (measured as ash free dry weight in mg) was not significantly reduced in any of three samples tested when compared to the laboratory control sediment (Table 2).

A summary of the survival and growth statistical analysis data for the *C. dilutus* whole sediment toxicity tests are provided in Table 7 and Appendix C.

Hyalella azteca

The laboratory control sediment organisms used for the *H. azteca* sediment tests exceeded the minimum survival (80%) criteria and had measurable growth relative to the weight of organisms at test initiation (Tables 3 and 4). The acceptable requirements for survival and growth for the *H. azteca* can be found in the EPA/600/R-99/064 manual, Table 11.2. The overlying water quality measurements (Table 6) were also within the acceptable limits following the EPA testing protocol (i.e., daily mean temperatures were within ± 1 °C of 23°C; the D.O. was maintained above 2.5 mg/L in the overlying water; and there were no variations greater than 50% in hardness, alkalinity and ammonia measurements within each test type, in the overlying water). All test chambers were checked daily to assess organism behavior and no unusual observations were noted. Consequently, the *H. azteca* whole sediment toxicity tests are valid assessments of sediment toxicity.

There was a statistically significant reduction (P=0.05) in *H. azteca* survival after 10-days of exposure in one of the three investigative samples (SL-2) when compared to the laboratory control sediment (Table 3). However, *H. azteca* growth (measured as average dry weight in mg) was not significantly reduced in any of the three investigative samples when compared to the laboratory control sediment (Table 4).

A summary of the survival and growth statistical analysis data for the *H. azteca* whole sediment toxicity tests are provided in Table 8 and Appendix D.

If you have any questions, or if you would like additional information, please contact either me or Dennis McCauley at (231) 941-2230. Thank you for the opportunity to provide this service Progressive AE and we look forward to continuing to provide environmental services to you in the future.

Sincerely,

Mailee W. Garton

Mailee W. Garton
Laboratory Coordinator

MWG:mg

GLEC

TABLE 1. Comparison of Percent Survival Between the Laboratory Control and Investigative Sediment Samples (SL-1, SL-2, and SL-3) for the Progressive AE *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted May 16-26, 2008

Number Test Organisms Surviving per Replicate[r]				
REPLICATE #	Laboratory Control	SL-1 GLC# 7342	SL-2 GLC# 7343	SL-31 GLC# 7344
1	10	9	10	10
2	10	9	10	10
3	10	10	10	10
4	10	10	10	10
5	10	10	10	10
6	10	9	10	9
7	9	10	8	10
8	9	10	10	10
10-Day Percent Survival	**97.5**	**96.3**	**97.5**	**98.8**

a-Significantly different (p= 0.05) from laboratory sediment control
r-Replicates initiated with 10 organisms

GLEC

TABLE 2. Comparison of Average Ash-Free Dry weight (mg) Between the Laboratory Control and Investigative Sediment Samples (SL-1, SL-2, and SL-3) for the Progressive AE *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted May 16-26, 2008

REPLICATE #	Laboratory Control	SL-1 GLC# 7342	SL-2 GLC# 7343	SL-31 GLC# 7344
1	1.065	1.669	1.473	1.762
2	1.063	1.801	1.363	1.710
3	1.333	1.710	1.533	1.624
4	1.020	1.545	1.514	1.327
5	1.134	1.593	1.276	1.425
6	1.130	1.761	1.464	1.836
7	1.344	1.597	1.566	1.626
8	1.117	1.483	1.688	1.666
Average Ash-Free Dry Weight (mg)	**1.151**	**1.645**	**1.485**	**1.622**
10-Day Percent Survival	**97.5**	**96.3**	**97.5**	**98.8**

a-Significantly different (p= 0.05) from laboratory sediment control
Average weight of *Chironomus dilutus* at day 0: 0.186 mg

GLEC

TABLE 3. Comparison of Percent Survival Between the Laboratory Control and Investigative Sediment Samples (SL-1, SL-2, and SL-3) for the Progressive AE *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted May 16-26, 2008

Number Test Organisms Surviving per Replicate[r]				
REPLICATE #	Laboratory Control	SL-1 GLC# 7342	SL-2 GLC# 7343	SL-31 GLC# 7344
1	8	9	9	10
2	9	9	7	10
3	6	8	5	10
4	10	9	5	10
5	10	8	4	10
6	10	10	4	8
7	8	8	5	10
8	10	9	7	10
10-Day Percent Survival	88.8	87.5	57.5 [a]	97.5

a-Significantly different (p= 0.05) from laboratory sediment control
r-Replicates initiated with 10 organisms

GLEC

TABLE 4. Comparison of Average Dry weight (mg) Between the Laboratory Control and Investigative Sediment Samples (SL-1, SL-2, and SL-3) for the Progressive AE *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted May 16-26, 2008

REPLICATE #	Laboratory Control	SL-1 GLC# 7342	SL-2 GLC# 7343	SL-31 GLC# 7344
1	0.121	0.066	0.101	0.111
2	0.083	0.072	0.124	0.079
3	0.115	0.081	0.072	0.086
4	0.080	0.098	0.116	0.070
5	0.084	0.087	0.172	0.076
6	0.067	0.092	0.090	0.099
7	0.124	0.088	0.122	0.086
8	0.063	0.093	0.090	0.079
Average Dry Weight (mg)	**0.092**	**0.085**	**0.111**	**0.086**
10-Day Percent Survival	**88.8**	**87.5**	**57.5** [a]	**97.5**

a-Significantly different (p= 0.05) from laboratory sediment control
Average weight of H. azteca at day 0: 0.021 mg

TABLE 5. **Summary of Mean Water Quality Parameters of Overlying Water Samples Collected Just Prior to Renewal for the Progressive AE *Chironomus dilutus* 10-Day Whole Sediment Toxicity Tests Conducted May 16-26, 2008.**

Sample ID GLC #	Temperature °C *n=22*	pH (s.u.) *n=4*	Dissolved Oxygen (mg/L) *n=21*	Specific Conductivity (µmhos) *n=4*	Alkalinity (mg/L $CaCO_3$) *n=2*	Hardness (mg/L $CaCO_3$) *n=2*	Total Ammonia (mg/L) *n=2*
Laboratory Control	22.8 (22.3-23.8)	7.61	4.8 (0.8-6.9)	299.0	126.0	134.0	1.04
SL-1 GLC# 7342	22.8 (22.2-23.8)	7.71	4.8 (1.6-7.6)	323.8	117.0	150.0	0.40
SL-2 GLC# 7343	22.8 (22.3-23.8)	7.82	5.3 (2.2-7.9)	308.5	118.0	170.0	0.32
SL-3 GLC# 7344	22.8 (22.3-23.8)	7.74	4.8 (1.5-7.1)	327.5	116.0	158.0	0.30

TABLE 6. **Summary of Mean Water Quality Parameters of Overlying Water Samples Collected Just Prior to Renewal for the Progressive AE *Hyalella azteca* 10-Day Whole Sediment Toxicity Tests Conducted May 16-26, 2008.**

Sample ID GLC #	Temperature °C *n=22*	pH (s.u.) *n=4*	Dissolved Oxygen (mg/L) *n=21*	Specific Conductivity (µmhos) *n=4*	Alkalinity (mg/L $CaCO_3$) *n=2*	Hardness (mg/L $CaCO_3$) *n=2*	Total Ammonia (mg/L) *n=2*
Laboratory Control	22.8 (22.3-23.8)	7.75	5.9 (4.0-6.7)	301.5	123.0	138.0	0.70
SL-1 GLC# 7342	22.8 (22.1-23.8)	7.98	6.2 (5.1-6.7)	317.3	113.0	136.0	0.11
SL-2 GLC# 7343	22.8 (22.2-23.8)	7.92	6.5 (5.0-7.9)	302.8	114.0	170.0	0.11
SL-3 GLC# 7344	22.8 (22.3-23.8)	8.05	6.2 (4.9-7.0)	319.8	118.0	154.0	0.13

TABLE 7. **Survival and Growth Summaries of Statistically Significant Differences (p=0.05) Between the Investigative Sediment Samples and the Laboratory Control Sediment for the Progressive AE 10-day *Chironomus dilutus* Sediment Toxicity Tests**

Test Material	GLC #	Survival with Laboratory Control	Growth with Laboratory Control
SL-1	7342		
SL-2	7343		
SL-3	7344		

X-Significantly different from control sediment (alpha=0.05)

TABLE 8. **Survival and Growth Summaries of Statistically Significant Differences (p=0.05) Between the Investigative Sediment Samples and the Laboratory Control Sediment for the Progressive AE 10-day *Hyalella azteca* Sediment Toxicity Tests**

Test Material	GLC #	Survival with Laboratory Control	Growth with Laboratory Control
SL-1	7342		
SL-2	7343	X	
SL-3	7344		

X-Significantly different from control sediment (alpha=0.05)

Appendix A
Chain of Custodies

Proj # 1102.03

Lakes Environmental Center

CHAIN OF CUSTODY RECORD
(TO BE COMPLETED ONSITE AND SUBMITTED WITH SAMPLES)

Hastings Street
Traverse City, MI 49686
Phone: (231) 941-2230
(231) 941-2240

Facility: PROGRESSIVE AE
Location: 1814 MILE RD. NE, G.R. MI 49525
Contact Person: PAM TENING
Phone Number: 616-361-2664

Collector: PJH, PDT
Date: 4-28-08
Witness:
Date:

LAB NUMBER (LAB ID)	SAMPLE ID	DATE/TIME OF SAMPLE*	VOLUME COLLECTED	SAMPLE CONTAINER	DESCRIPTION (Type of sample, source, physical characteristics)	PRESERVATION	ANALYSES REQUIRED	Additional Parameters Measured at Collection	
								Ammonia mg/L	Chlorine mg/L
342	SL-1	4/28/08	GALLON	BUCKET	SEDIMENT	NONE	10-DAY TOXICITY		
343	SL-2	↓	↓	↓	↓	↓	↓		
344	SL-3								

* For 24-Hour Composite samples, please indicate times and dates the sampling started and ended.

TRANSFER OF SAMPLES:
(First signature is sampler, last signature is authorized laboratory representative.)

	SHIPPER	RECEIVER	DATE	TIME	TEMPERATURE
1.					
2.					

☐ Received on Ice

Condition of Sample Upon Receipt: good Maile W. Horton 4/30/08 1015

51 LBS 1 OF 1

PRINTROOM
(616) 361-2664
PROGRESSIVE AE
1811 4 MILE ROAD, NE
GRAND RAPIDS MI 49525-2442

SHIP TO:
MS. MAILEE GARTON
GREAT LAKES ENVIRONMENTAL CENTER
739 HASTINGS STREET
TRAVERSE CITY MI 49686

MI 496 1-01

UPS NEXT DAY AIR 1

TRACKING #: 1Z 461 746 01 5152 8445

BILLING: P/P

REF 1:54060102-002

WS 18.0.41 LP2442 72.0A 10/2007

Appendix B
Overlying Water Quality Summaries

Progressive AE: 1962-00 *Chironomus dilutus* 10 Day
Control

Date	Test Day	Temperatur (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (µmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)
16-May-08	0	23.8	7.64	6.10	302.0	132.0	132.0	0.86
		23.8	7.55	6.20	303.0			
17-May-08	1	23.1		6.80				
		23.0		6.60				
18-May-08	2	22.9		6.70				
		23.0		6.60				
19-May-08	3	22.7		6.80				
		22.9		6.90				
20-May-08	4	22.8		6.80				
		22.8		6.50				
21-May-08	5	22.7		1.50				
		22.7		1.40				
22-May-08	6	22.7		0.80				
		22.5		0.80				
23-May-08	7	22.3		4.40				
		22.3		4.40				
24-May-08	8	22.5		4.00				
		22.4		4.20				
25-May-08	9	22.8		3.90				
		22.6		4.40				
26-May-08	10	22.8	7.62	3.90	294.0	120.0	136.0	1.2
		22.8	7.74		297.0			

MEAN		22.8	7.61	4.75	299.00	126.00	134.00	1.04
N=		22.0	4.0	21.0	4.0	2.0	2.0	2.0
Max #		23.80	7.74	6.90	303.00	132.00	136.00	1.22
Min #		22.30	7.54	0.80	294.00	120.00	132.00	0.86

10 Day Stats

REP #	1	2	3	4	5	6	7	8	
									% Survival
# SURVIVING	10	10	10	10	10	10	9	9	97.5
									avg weight
weight (mg)	1.065	1.063	1.333	1.020	1.134	1.130	1.344	1.117	1.151

Progressive AE: 1962-00 *Chironomus dilutus* 10 Day
SL-1 GLC# 7342

Date	Test Day	Temperatur (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (µmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)
16-May-08	0	23.8	7.74	6.50	331.0	110.0	152.0	0.17
		23.8	7.70	6.50	338.0			
17-May-08	1	23.0		6.60				
		23.0		6.80				
18-May-08	2	23.0		6.60				
		22.9		6.70				
19-May-08	3	22.8		7.00				
		22.8		6.80				
20-May-08	4	22.9		6.90				
		22.8		7.00				
21-May-08	5	22.6		2.60				
		22.8		2.00				
22-May-08	6	22.4		1.60				
		22.3		1.60				
23-May-08	7	22.2		2.50				
		22.2		2.60				
24-May-08	8	22.4		3.90				
		22.4		4.10				
25-May-08	9	22.8		4.00				
		22.6		4.10				
26-May-08	10	22.8	7.67	3.80	314.0	124.0	148.0	0.6
		22.8	7.72		312.0			

MEAN	22.8	7.71	4.77	323.75	117.00	150.00	0.40
N=	22.0	4.0	21.0	4.0	2.0	2.0	2.0
Max #	23.80	7.74	7.00	338.00	124.00	152.00	0.62
Min #	22.20	7.67	1.60	312.00	110.00	148.00	0.17

10 Day Stats

REP #	1	2	3	4	5	6	7	8	
									% Survival
# SURVIVING	9	9	10	10	10	9	10	10	96.3
									avg weight
weight (mg)	1.669	1.801	1.710	1.545	1.593	1.761	1.597	1.483	1.645

Progressive AE: 1962-00 *Chironomus dilutus* 10 Day
SL-2 GLC# 7343

Date	Test Day	Temperatur (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (µmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)
16-May-08	0	23.8	7.82	7.90	307.0	114.0	200.0	0.17
		23.8	7.85	7.20	308.0			
17-May-08	1	22.9		6.60				
		23.0		6.50				
18-May-08	2	22.8		6.50				
		22.9		6.60				
19-May-08	3	22.7		7.10				
		22.9		6.80				
20-May-08	4	22.8		6.60				
		22.9		6.90				
21-May-08	5	22.7		3.40				
		22.8		2.60				
22-May-08	6	22.5		2.40				
		22.4		2.20				
23-May-08	7	22.5		4.00				
		22.5		4.20				
24-May-08	8	22.3		4.50				
		22.3		4.70				
25-May-08	9	22.6		4.70				
		22.6		5.10				
26-May-08	10	22.8	7.78	4.90	307.0	122.0	140.0	0.5
		22.8	7.84		312.0			

MEAN	22.8	7.82	5.30	308.50	118.00	170.00	0.32
N=	22.0	4.0	21.0	4.0	2.0	2.0	2.0
Max #	23.80	7.85	7.90	312.00	122.00	200.00	0.46
Min #	22.30	7.78	2.20	307.00	114.00	140.00	0.17

10 Day Stats

REP #	1	2	3	4	5	6	7	8	
									% Survival
# SURVIVING	10	10	10	10	10	10	8	10	97.5
									avg weight
weight (mg)	1.473	1.363	1.533	1.514	1.276	1.464	1.566	1.688	1.485

Progressive AE: 1962-00 *Chironomus dilutus* 10 Day
SL-3 GLC# 7344

Date	Test Day	Temperatur (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (µmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)
16-May-08	0	23.8	7.73	7.00	331.0	110.0	160.0	0.03
		23.8	7.77	7.00	333.0			
17-May-08	1	23.0		7.00				
		22.9		6.70				
18-May-08	2	22.9		6.90				
		22.9		6.80				
19-May-08	3	22.9		6.90				
		23.0		6.90				
20-May-08	4	22.9		7.10				
		22.9		6.80				
21-May-08	5	22.8		2.30				
		22.9		2.60				
22-May-08	6	22.3		1.50				
		22.3		1.60				
23-May-08	7	22.5		2.30				
		22.5		2.20				
24-May-08	8	22.4		3.90				
		22..3		3.90				
25-May-08	9	22.6		3.90				
		22.6		3.70				
26-May-08	10	22.8	7.70	4.20	321.0	122.0	156.0	0.6
		22.8	7.76		325.0			

MEAN	22.8	7.74	4.82	327.50	116.00	158.00	0.30
N=	21.0	4.0	21.0	4.0	2.0	2.0	2.0
Max #	23.80	7.77	7.10	333.00	122.00	160.00	0.56
Min #	22.30	7.70	1.50	321.00	110.00	156.00	0.03

10 Day Stats

REP #	1	2	3	4	5	6	7	8	
									% Survival
# SURVIVING	10	10	10	10	10	9	10	10	98.8
									avg weight
weight (mg)	1.762	1.710	1.624	1.327	1.425	1.836	1.626	1.666	1.622

Progressive AE: 1962-00 *Hyallela azteca* 10 Day Control

Date	Test Day	Temperature (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (µmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)
16-May-08	0	23.8	7.54	6.10	302.0	132.0	132.0	0.86
		23.8	7.55	6.20	303.0			
17-May-08	1	23.0		6.50				
		23.0		6.60				
18-May-08	2	23.0		6.50				
		23.0		6.70				
19-May-08	3	22.8		6.60				
		22.9		6.70				
20-May-08	4	22.9		6.60				
		22.8		6.60				
21-May-08	5	22.6		5.20				
		22.6		4.60				
22-May-08	6	22.3		4.10				
		22.3		4.00				
23-May-08	7	22.3		4.70				
		22.3		5.80				
24-May-08	8	22.4		5.20				
		22.3		6.00				
25-May-08	9	22.8		6.30				
		22.8		6.70				
26-May-08	10	23.0	8.01	6.40	305.0	114.0	144.0	0.5
		22.8	7.91		296.0			

MEAN	22.8	7.75	6.91	301.50	123.00	138.00	0.70
N=	22.0	4.0	21.0	4.0	2.0	2.0	2.0
Max #	23.80	8.01	6.70	305.00	132.00	144.00	0.86
Min #	22.30	7.54	4.00	296.00	114.00	132.00	0.53

10 Day Stats

REP #	1	2	3	4	5	6	7	8	
# SURVIVING	8	9	6	10	10	10	8	10	% Survival 88.8
weight (mg)	0.121	0.083	0.115	0.080	0.084	0.067	0.124	0.063	avg weight 0.092

Progressive AE: 1962-00 *Hyallela azteca* 10 Day
SL-1 GLC# 7342

Date	Test Day	Temperatur (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (µmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)
16-May-08	0	23.8	7.74	6.50	331.0	110.0	152.0	0.09
		23.8	7.70	6.50	336.0			
17-May-08	1	23.0		6.30				
		22.9		6.70				
18-May-08	2	23.1		6.30				
		23.2		6.10				
19-May-08	3	22.9		6.50				
		22.9		6.50				
20-May-08	4	22.9		6.50				
		23.0		6.60				
21-May-08	5	22.6		5.90				
		22.4		5.60				
22-May-08	6	22.2		5.10				
		22.2		5.30				
23-May-08	7	22.1		6.30				
		22.2		6.50				
24-May-08	8	22.3		6.60				
		22.3		6.50				
25-May-08	9	22.8		5.70				
		22.6		5.90				
26-May-08	10	22.8	8.23	6.70	301.0	116.0	120.0	0.1
		22.8	8.26		299.0			

MEAN	22.8	7.98	6.22	317.25	113.00	136.00	0.11
N=	22.0	4.0	21.0	4.0	2.0	2.0	2.0
Max #	23.80	8.26	6.70	336.00	116.00	152.00	0.13
Min #	22.10	7.70	5.10	299.00	110.00	120.00	0.09

10 Day Stats

REP #	1	2	3	4	5	6	7	8	
# SURVIVING	9	9	8	9	8	10	8	9	% Survival 87.5
weight (mg)	0.066	0.072	0.081	0.098	0.087	0.092	0.088	0.093	avg weight 0.085

Progressive AE: 1962-00 *Hyallela azteca* 10 Day
SL-2 GLC# 7343

Date	Test Day	Temperatur (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (µmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)
16-May-08	0	23.8	7.82	7.90	307.0	114.0	200.0	0.17
		23.8	7.85	7.20	308.0			
17-May-08	1	22.9		6.90				
		22.9		6.80				
18-May-08	2	22.9		6.70				
		23.0		6.90				
19-May-08	3	22.8		6.80				
		22.9		6.60				
20-May-08	4	22.9		6.70				
		22.9		6.50				
21-May-08	5	22.6		5.70				
		22.8		6.30				
22-May-08	6	22.3		5.00				
		22.3		5.60				
23-May-08	7	22.2		6.40				
		22.3		6.50				
24-May-08	8	22.3		6.00				
		22.3		6.10				
25-May-08	9	22.8		6.70				
		22.6		6.60				
26-May-08	10	22.8	8.03	6.00	302.0	114.0	140.0	0.0
		22.8	7.97		294.0			

MEAN	22.8	7.92	6.47	302.75	114.00	170.00	0.11
N=	22.0	4.0	21.0	4.0	2.0	2.0	2.0
Max #	23.80	8.03	7.90	308.00	114.00	200.00	0.17
Min #	22.20	7.82	5.00	294.00	114.00	140.00	0.04

10 Day Stats

REP #	1	2	3	4	5	6	7	8	
# SURVIVING	9	7	5	5	4	4	5	7	% Survival 57.5
weight (mg)	0.101	0.124	0.072	0.116	0.172	0.090	0.122	0.090	avg weight 0.111

Progressive AE: 1962-00 *Hyallela azteca* 10 Day
SL-3 GLC# 7344

Date	Test Day	Temperatur (°C)	pH (s.u.)	D.O. (mg/L)	Conductivity (µmos)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)
16-May-08	0	23.8	7.73	7.00	331.0	110.0	160.0	0.25
		23.8	7.77	7.00	333.0			
17-May-08	1	22.9		6.60				
		23.0		6.40				
18-May-08	2	23.0		6.50				
		22.9		6.50				
19-May-08	3	22.9		6.90				
		22.9		6.70				
20-May-08	4	23.0		6.80				
		22.9		6.50				
21-May-08	5	22.7		6.00				
		22.7		5.90				
22-May-08	6	22.3		5.00				
		22.3		4.90				
23-May-08	7	22.5		5.60				
		22.5		5.50				
24-May-08	8	22.3		5.80				
		22.3		6.20				
25-May-08	9	22.8		6.40				
		22.6		6.00				
26-May-08	10	22.8	8.38	6.40	309.0	126.0	148.0	0.0
		22.7	8.30		306.0			

MEAN	22.8	8.05	6.22	319.75	118.00	154.00	0.13
N=	22.0	4.0	21.0	4.0	2.0	2.0	2.0
Max #	23.80	8.38	7.00	333.00	126.00	160.00	0.25
Min #	22.30	7.73	4.90	306.00	110.00	148.00	0.00

10 Day Stats

REP #	1	2	3	4	5	6	7	8	% Survival
# SURVIVING	10	10	10	10	10	8	10	10	97.5
weight (mg)	0.111	0.079	0.086	0.070	0.076	0.099	0.086	0.079	avg weight 0.086

Appendix C
Chironomus dilutus
10-Day Statistical Data

- Weight
- Survival

Great Lakes Environmental Center

Pr[illegible]ssive AE: 1962-00

Chironomus dilutus 10 Day Survival and Growth Test

TEST DAY: 10

WATERBATH 1

Date: Monday, May 26 2008
GLC#
Test Material: Lab Control
Test Species: *Chironomus dilutus*
Technician Initials: MW

Food: Tetrafin Slurry (4 g/L) Feed 1.5 ml ☐
Overlying Water: Dechlorinated municipal water
Daily Renewals: 2
☐ am renewal
☐ pm renewal

Test Photoperiod: 16:8
Test System: 175 mL Delivery System
Temperature (°C): 23 ± 1°C
Organisms Source/Age : ABS 10 days
Screens Cleaned:

Replicate	Temperature °C	pH	Dissolved Oxygen (mg/L)	Specific Conductance	Observations /Number Surviving	
1		7.62	3.9	294	10	Hardness 136
2					10	end: 40.6
3	22.8				10	start: 37.2
4					10	
5					10	120
6	22.8				10	Alkalinity 12.8
7					9	end: 6.8
8		7.74		297	9	start:
						Ammonia
						as N: 1.22

Survival 90%

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Pr[illegible]ssive AE: 1962-00

Chironomus dilutus 10 Day Survival and Growth Test

TEST DAY: 10

WATERBATH 1

Date: Monday, May 26 2008
GLC# 7342
Test Material: SL-1
Test Species: *Chironomus dilutus*
Technician Initials: MW

Food: Tetrafin Slurry (4 g/L) Feed 1.5 ml ☐
Overlying Water: Dechlorinated municipal water
Daily Renewals: 2
☐ am renewal
☐ pm renewal

Test Photoperiod: 16:8
Test System: 175 mL Delivery System
Temperature (°C): 23 ± 1°C
Organisms Source/Age : ABS 10 days
Screens Cleaned:

Replicate	Temperature °C	pH	Dissolved Oxygen (mg/L)	Specific Conductance	Observations /Number Surviving	
1		7.67	3.8	314	9	Hardness 148
2					9	end: 44.3
3	22.8				10	start: 40.6
4					10	
5					10	
6	22.8				9	Alkalinity 124
7					10	end: 19.0
8		7.72		312	10	start: 12.8
					Survival: 96%	
						Ammonia
						as N: 0.63

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Pr[redacted]ssive AE: 1962-00

Chironomus dilutus 10 Day Survival and Growth Test

TEST DAY: 10

WATERBATH 1

Date: Monday, May 26 2008
GLC# 7343
Test Material: SL-2
Test Species: *Chironomus dilutus*
Technician Initials: MMR

Food: Tetrafin Slurry (4 g/L) Feed 1.5 ml ☐
Overlying Water: Dechlorinated municipal water
Daily Renewals: 2
☐ am renewal
☐ pm renewal

Test Photoperiod: 16:8
Test System: 175 mL Delivery System
Temperature (°C): 23 ± 1°C
Organisms Source/Age : ABS 10 days
Screens Cleaned:

Replicate	Temperature °C	pH	Dissolved Oxygen (mg/L)	Specific Conductance	Observations /Number Surviving	
1		7.78	4.9	307	10	Hardness 140
2					10	end: 478
3	22.8				10	start: 443
4					10	
5					10	
6	22.8				10	Alkalinity 122
7					8	end: 25.1
8		7.84		312	10	start: 19.0
						Ammonia
						as N: 0.46

acidified 98%

Great Lakes Environmental Center

Pro[illegible]sive AE: 1962-00

Chironomus dilutus 10 Day Survival and Growth Test

[redacted]

TEST DAY: 10

WATERBATH 1

Date: Monday, May 26 2008
GLC# 7344
Test Material: SL-3
Test Species: *Chironomus dilutus*
Technician Initials: MWB

Food: Tetrafin Slurry (4 g/L) Feed 1.5 ml ☐
Overlying Water: Dechlorinated municipal water
Daily Renewals: 2
☐ am renewal
☐ pm renewal

Test Photoperiod: 16:8
Test System: 175 mL Delivery System
Temperature (°C): 23 ± 1°C
Organisms Source/Age : ABS 10 days
Screens Cleaned:

Replicate	Temperature °C	pH	Dissolved Oxygen (mg/L)	Specific Conductance	Observations /Number Surviving	
1		7.70	4.2	321	10	Hardness 156
2					10	end: 29.2
3	22.8				10	start: 25.3
4					10	
5					10	
6	22.8				9	Alkalinity 122
7					10	end: 31.2
8		7.76		325	10	start: 25.1
					Survival 99%	
						Ammonia
						as N: 0.56

Title: progressive AE c.dilutus survival may 16-26, 2008
File: cdilsur7342 Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.1942
W = 0.6914

Critical W = 0.9040 (alpha = 0.01 , N = 32)
W = 0.9300 (alpha = 0.05 , N = 32)

Data FAIL normality test (alpha = 0.01). Try another transformation.

Warning - The first three homogeneity tests are sensitive to non-normality and should not be performed with this data as is.

Title: progressive AE c.dilutus survival may 16-26, 2008
File: cdilsur7342 Transform: ARC SINE(SQUARE ROOT(Y))

Hartley's Test for Homogeneity of Variance

Calculated H statistic (max Var/min Var) = 3.4994

Table H statistic = 14.50 (alpha = 0.01)
8.44 (alpha = 0.05)

Used df = 7
Based on R (# groups) = 4

Data PASS homogeneity test (alpha = 0.01). Continue analysis.

Title: progressive AE c.dilutus survival may 16-26, 2008
File: cdilsur7342 Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 2.5983 (p-value = 0.4578)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 11.3449 (alpha = 0.01, df = 3)
= 7.8147 (alpha = 0.05, df = 3)

Title: progressive AE c.dilutus survival may 16-26, 2008
File: cdilsur7342 Transform: NO TRANSFORMATION
Number of Groups: 4

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	lab control	1	1.0000	1.0000
1	lab control	2	1.0000	1.0000
1	lab control	3	1.0000	1.0000
1	lab control	4	1.0000	1.0000
1	lab control	5	1.0000	1.0000
1	lab control	6	1.0000	1.0000
1	lab control	7	0.9000	0.9000
1	lab control	8	0.9000	0.9000
2	SL-1 GLC#7342	1	0.9000	0.9000
2	SL-1 GLC#7342	2	0.9000	0.9000
2	SL-1 GLC#7342	3	1.0000	1.0000
2	SL-1 GLC#7342	4	1.0000	1.0000
2	SL-1 GLC#7342	5	1.0000	1.0000
2	SL-1 GLC#7342	6	0.9000	0.9000
2	SL-1 GLC#7342	7	1.0000	1.0000
2	SL-1 GLC#7342	8	1.0000	1.0000
3	SL-2 GLC# 7343	1	1.0000	1.0000
3	SL-2 GLC# 7343	2	1.0000	1.0000
3	SL-2 GLC# 7343	3	1.0000	1.0000
3	SL-2 GLC# 7343	4	1.0000	1.0000
3	SL-2 GLC# 7343	5	1.0000	1.0000
3	SL-2 GLC# 7343	6	1.0000	1.0000
3	SL-2 GLC# 7343	7	0.8000	0.8000
3	SL-2 GLC# 7343	8	1.0000	1.0000
4	SL-3 GLC# 7344	1	1.0000	1.0000
4	SL-3 GLC# 7344	2	1.0000	1.0000
4	SL-3 GLC# 7344	3	1.0000	1.0000
4	SL-3 GLC# 7344	4	1.0000	1.0000
4	SL-3 GLC# 7344	5	1.0000	1.0000
4	SL-3 GLC# 7344	6	0.9000	0.9000
4	SL-3 GLC# 7344	7	1.0000	1.0000
4	SL-3 GLC# 7344	8	1.0000	1.0000

Title: progressive AE c.dilutus survival may 16-26, 2008
File: cdilsur7342 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	lab control	8	0.9000	1.0000	0.9750
2	SL-1 GLC#7342	8	0.9000	1.0000	0.9625
3	SL-2 GLC# 7343	8	0.8000	1.0000	0.9750
4	SL-3 GLC# 7344	8	0.9000	1.0000	0.9875

Title: progressive AE c.dilutus survival may 16-26, 2008
File: cdilsur7342 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	lab control	0.0021	0.0463	0.0164	4.7478
2	SL-1 GLC#7342	0.0027	0.0518	0.0183	5.3771
3	SL-2 GLC# 7343	0.0050	0.0707	0.0250	7.2524
4	SL-3 GLC# 7344	0.0013	0.0354	0.0125	3.5803

Title: progressive AE c.dilutus survival may 16-26, 2008
File: cdilsur7342 Transform: NO TRANSFORMATION

Steel's Many-One Rank Test - Ho: Control<Treatment

GROUP	IDENTIFICATION	MEAN IN ORIGINAL UNITS	RANK SUM	CRIT. VALUE	DF	SIG 0.05
1	lab control	0.9750				
2	SL-1 GLC#7342	0.9625	64.00	48.00	8.00	
3	SL-2 GLC# 7343	0.9750	71.00	48.00	8.00	
4	SL-3 GLC# 7344	0.9875	72.00	48.00	8.00	

Critical values are 1 tailed (k = 3)

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CHIRONOMUS DILUTUS WEIGHT DATA

TEST MATERIAL: Progressive AE WEIGH DATE: 05/27/08 TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 1962-00 TEST DATE: 5/16-26/08 OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: MW QC DRYING DURATION (HOURS): ≈24 HRS TEST SPECIES: *C. dilutus*

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND Organism (g)	B ASHED WEIGHT OF PAN AND Organism (g)	A-B TOTAL ASH- FREE DRY WEIGHT (g)	C NUMBER OF Organism WEIGHED	A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)
Laboratory Control	1	0.82374	0.81309	0.01065	10	1.065
	2	0.82523	0.81460	0.01063	10	1.063
	3	0.82173	0.80840	0.01333	10	1.333
	4	0.81423	0.80403	0.01020	10	1.020
	5	0.82092	0.80958	0.01134	10	1.134
	6	0.81582	0.80452	0.01130	10	1.130
	7	0.81602	0.80392	0.01210	9	1.344
	8	0.80969	~~0.8~~ 0.79964	0.01005	9	1.117
	9	0.81298	~~0.81298~~ 0.79814	0.01484	80	0.186
	10					
	11					
	12					

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CHIRONOMUS DILUTUS WEIGHT DATA

TEST MATERIAL: Progressive AE WEIGH DATE: 05/27/08 TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 1962-00 TEST DATE: 5/16/08-5/26/08 OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: MWK QC DRYING DURATION (HOURS): ≈24 HRS TEST SPECIES: *C. dilutus*

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND Organism (g)	B ASHED WEIGHT OF PAN AND Organism (g)	A-B TOTAL ASH- FREE DRY WEIGHT (g)	C NUMBER OF Organism WEIGHED	A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)
SL-1 GLC# 7342	1	0.82775	0.81273	0.01502	9	1.669
	2	0.83059	0.81438	0.01621	9	1.801
	3	0.83151	0.81441	0.01710	10	1.710
	4	0.83102	0.81557	0.01545	10	1.545
	5	0.82934	0.81341	0.01593	10	1.593
	6	0.82715	0.81130	0.01585	9	1.761
	7	0.82478	0.80881	0.01597	10	1.597
	8	0.82941	0.81458	0.01483	10	1.483
	9					
	10					
	11					
	12					

Great Lakes Environmental Center

CHIRONOMUS DILUTUS WEIGHT DATA

TEST MATERIAL: Progressive AE WEIGH DATE: 05/27/08 TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 1962-00 TEST DATE: 5/16-26/08 OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: MW QC SE DRYING DURATION (HOURS): ≈24 HRS TEST SPECIES: *C. dilutus*

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND Organism (g)	B ASHED WEIGHT OF PAN AND Organism (g)	A-B TOTAL ASH- FREE DRY WEIGHT (g)	C NUMBER OF Organism WEIGHED	A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)
SL-2 GLC# 7343	1	0.81238	0.79765	0.01473	10	1.473
	2	0.80734	0.79371	0.01363	10	1.363
	3	0.82315	0.80782	0.01533	10	1.533
	4	0.83480	0.81966	0.01514	10	1.514
	5	0.83552	0.82276	0.01276	10	1.276
	6	0.83967	0.82503	0.01464	10	1.464
	7	0.82716	0.81463	0.01253	8	1.566
	8	0.83700	0.82012	0.01688	10	1.688
	9					
	10					
	11					
	12					

Great Lakes Environmental Center

CHIRONOMUS DILUTUS WEIGHT DATA

TEST MATERIAL: Progressive AE WEIGH DATE: 05/27/08 TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 1962-00 TEST DATE: 5/16 - 20/08 OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: MWK QC SL DRYING DURATION (HOURS): ≈24 HRS TEST SPECIES: *C. dilutus*

TREATMENT LEVEL	REP. NUMBER	A DRY WEIGHT OF PAN AND Organism (g)	B ASHED WEIGHT OF PAN AND Organism (g)	A-B TOTAL ASH- FREE DRY WEIGHT (g)	C NUMBER OF Organism WEIGHED	A-B/C AVERAGE ASH-FREE DRY WEIGHT (mg)
SL-3 GIC# 7344	1	0.82865	~~0.80503~~ 0.81103 *	0.01762	10	1.762
	2	0.80503	0.78793	0.01710	10	~~1.71~~ 1.710
	3	0.83029	0.81405	0.01624	10	1.624
	4	0.80863	0.79536	0.01327	10	1.327
	5	0.81330	0.79905	0.01425	10	1.425
	6	0.82213	0.80561	0.01652	9	~~1.65~~ 1.836
	7	0.82167	0.80541	0.01626	10	1.626
	8	0.82804	0.81138	0.01666	10	1.666
	9					
	10					
	11					
	12					

*-TE Dup

Title: progressive ae c. dilutus growth may 16-26, 2008
File: cdilgrow7342 Transform: NO TRANSFORMATION
Number of Groups: 4

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	lab control	1	1.0650	1.0650
1	lab control	2	1.0630	1.0630
1	lab control	3	1.3330	1.3330
1	lab control	4	1.0200	1.0200
1	lab control	5	1.1340	1.1340
1	lab control	6	1.1300	1.1300
1	lab control	7	1.3440	1.3440
1	lab control	8	1.1170	1.1170
2	SL-1 GLC# 7342	1	1.6690	1.6690
2	SL-1 GLC# 7342	2	1.8010	1.8010
2	SL-1 GLC# 7342	3	1.7100	1.7100
2	SL-1 GLC# 7342	4	1.5450	1.5450
2	SL-1 GLC# 7342	5	1.5930	1.5930
2	SL-1 GLC# 7342	6	1.7610	1.7610
2	SL-1 GLC# 7342	7	1.5970	1.5970
2	SL-1 GLC# 7342	8	1.4830	1.4830
3	SL-2 GLC# 7343	1	1.4730	1.4730
3	SL-2 GLC# 7343	2	1.3630	1.3630
3	SL-2 GLC# 7343	3	1.5330	1.5330
3	SL-2 GLC# 7343	4	1.5140	1.5140
3	SL-2 GLC# 7343	5	1.2760	1.2760
3	SL-2 GLC# 7343	6	1.4640	1.4640
3	SL-2 GLC# 7343	7	1.5660	1.5660
3	SL-2 GLC# 7343	8	1.6880	1.6880
4	SL-3 GLC# 7344	1	1.7620	1.7620
4	SL-3 GLC# 7344	2	1.7100	1.7100
4	SL-3 GLC# 7344	3	1.6240	1.6240
4	SL-3 GLC# 7344	4	1.3270	1.3270
4	SL-3 GLC# 7344	5	1.4250	1.4250
4	SL-3 GLC# 7344	6	1.8360	1.8360
4	SL-3 GLC# 7344	7	1.6260	1.6260
4	SL-3 GLC# 7344	8	1.6660	1.6660

Title: progressive ae c. dilutus growth may 16-26, 2008
File: cdilgrow7342 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	lab control	8	1.0200	1.3440	1.1508
2	SL-1 GLC# 7342	8	1.4830	1.8010	1.6449
3	SL-2 GLC# 7343	8	1.2760	1.6880	1.4846
4	SL-3 GLC# 7344	8	1.3270	1.8360	1.6220

Title: progressive ae c. dilutus growth may 16-26, 2008
File: cdilgrow7342 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	lab control	0.0149	0.1222	0.0432	10.6207
2	SL-1 GLC# 7342	0.0120	0.1094	0.0387	6.6536
3	SL-2 GLC# 7343	0.0157	0.1254	0.0443	8.4461
4	SL-3 GLC# 7344	0.0287	0.1694	0.0599	10.4453

Title: progressive ae c. dilutus growth may 16-26, 2008
File: cdilgrow7342 Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	3	1.2456	0.4152	23.2786
Within (Error)	28	0.4994	0.0178	
Total	31	1.7450		

(p-value = 0.0000)

Critical F = 4.5681 (alpha = 0.01, df = 3,28)
= 2.9467 (alpha = 0.05, df = 3,28)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: progressive ae c. dilutus growth may 16-26, 2008
File: cdilgrow7342 Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	lab control	1.1508	1.1508		
2	SL-1 GLC# 7342	1.6449	1.6449	-7.3998	
3	SL-2 GLC# 7343	1.4846	1.4846	-5.0000	
4	SL-3 GLC# 7344	1.6220	1.6220	-7.0573	

Dunnett critical value = 2.1700 (1 Tailed, alpha = 0.05, df [used] = 3,24)
(Actual df = 3,28)

Title: progressive ae c. dilutus growth may 16-26, 2008
File: cdilgrow7342 Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	lab control	8			
2	SL-1 GLC# 7342	8	0.1449	12.6	-0.4941
3	SL-2 GLC# 7343	8	0.1449	12.6	-0.3339
4	SL-3 GLC# 7344	8	0.1449	12.6	-0.4713

Title: progressive ae c. dilutus growth may 16-26, 2008
File: cdilgrow7342 Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.4994
W = 0.9782

Critical W = 0.9040 (alpha = 0.01 , N = 32)
W = 0.9300 (alpha = 0.05 , N = 32)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: progressive ae c. dilutus growth may 16-26, 2008
File: cdilgrow7342 Transform: NO TRANSFORMATION

Hartley's Test for Homogeneity of Variance

Calculated H statistic (max Var/min Var) = 2.3964

Table H statistic = 14.50 (alpha = 0.01)
8.44 (alpha = 0.05)

Used df = 7
Based on R (# groups) = 4

Data PASS homogeneity test (alpha = 0.01). Continue analysis.

Title: progressive ae c. dilutus growth may 16-26, 2008
File: cdilgrow7342 Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 1.4911 (p-value = 0.6843)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 11.3449 (alpha = 0.01, df = 3)
= 7.8147 (alpha = 0.05, df = 3)

Appendix D
Hyalella azteca
10-Day Statistical Data

- Weight
- Survival

Great Lakes Environmental Center

Pr[illegible]sive AE: 1962-00

Hyalella azteca 10 Day Survival and Growth Test

TEST DAY: 10

WATERBATH 1

Date: Monday, May 26 2008
GLEC#
Test Material: Lab control
Test Species: *Hyalella azteca*
Technician Initials: MWS

Food: YTC Batch # Feed 1 ml ☐
Overlying Water: Dechlorinated municipal water
Daily Renewals: 2
am renewal ☐
pm renewal ☐

Test System: 175 mL Delivery System
Photoperiod: 16:8
Temperature (°C): 23 ± 1°C
Organisms Source/Age : ABS 7-8 Days
Screens Cleaned:

Replicate	Temperature °C	pH	Dissolved Oxygen (mg/L)	Specific Conductance	Observations/ Number Surviving	
1		8.01	6.4	305	8	Hardness 144
2					9	end: 27.0
3	23.0				6	start: 23.4
4					10	Alkalinity: 114
5					10	end: 35.2
6	22.8				10	start: 29.5
7					8	Ammonia
8		7.91		296	10	as N: 0.53

Survival
89%

Great Lakes Environmental Center

Pr[illegible]sive AE: 1962-00

Hyalella azteca 10 Day Survival and Growth Test

TEST DAY: 10

WATERBATH 1

Date: Monday, May 26 2008
GLC# 7342
Test Material: SL-1
Test Species: *Hyalella azteca*
Technician Initials: Neb

Food: YTC Batch # Feed 1 ml ☐
Overlying Water: Dechlorinated municipal water
Daily Renewals: 2
am renewal ☐
pm renewal ☐

Test System: 175 mL Delivery System
Photoperiod: 16:8
Temperature (°C): 23 ± 1°C
Organisms Source/Age : ABS 7-8 Days
Screens Cleaned:

Replicate	Temperature °C	pH	Dissolved Oxygen (mg/L)	Specific Conductance	Observations/ Number Surviving	
1		8.23	6.7	301	9	Hardness 120
2					9	end: 30.0
3	22.8				8	start: 27.0
4					9	Alkalinity: 116
5					8	end: 41.0
6	22.8				10	start: 35.2
7					8	Ammonia
8		8.26		299	9	as N: 0.13

Survival 88%

Great Lakes Environmental Center

Pr[illegible]ive AE: 1962-00

Hyalella azteca 10 Day Survival and Growth Test

TEST DAY: 10

WATERBATH 1

[redacted]

Date: Monday, May 26 2008
GLC# 7343
Test Material: SL-2
Test Species: *Hyalella azteca*
Technician Initials: MW

Food: YTC Batch # Feed 1 ml ☐
Overlying Water: Dechlorinated municipal water
Daily Renewals: 2
am renewal ☐
pm renewal ☐

Test System: 175 mL Delivery System
Photoperiod: 16:8
Temperature (°C): 23 ± 1°C
Organisms Source/Age : ABS 7-8 Days
Screens Cleaned:

Replicate	Temperature °C	pH	Dissolved Oxygen (mg/L)	Specific Conductance	Observations/ Number Surviving	
1		8.03	6.0	302	9	Hardness 140
2					7	end: 33.5
3	22.8				5	start: 30.0
4					5	Alkalinity: 114
5					3 4	end: 46.7
6	22.8				4	start: 41.0
7					5	Ammonia
8		7.97		294	7	as N: 0.04

Survival
58%

Great Lakes Environmental Center

Pro ive AE: 1962-00

Hyalella azteca 10 Day Survival and Growth Test

TEST DAY: 10

WATERBATH 1

[redacted]

Date: Monday, May 26 2008
GLC# 7344
Test Material: SL-3
Test Species: *Hyalella azteca*
Technician Initials:

Food: YTC Batch # Feed 1 ml ☐
Overlying Water: Dechlorinated municipal water
Daily Renewals: 2
am renewal ☐
pm renewal ☐

Test System: 175 mL Delivery System
Photoperiod: 16:8
Temperature (°C): 23 ± 1°C
Organisms Source/Age : ABS 7-8 Days
Screens Cleaned:

Replicate	Temperature °C	pH	Dissolved Oxygen (mg/L)	Specific Conductance	Observations/ Number Surviving	
1		8.38	6.4	309	10	Hardness 148
2					10	end: 37.2
3	22.8				10	start: 33.5
4					10	Alkalinity: 126
5					10	end: 6.8
6	22.7				8	start: 0.5
7					10	Ammonia
8		8.30		306	10	as N: 0.0

survived
78%

Title: progressive AE h. azteca survival May 16-26, 2008
File: haztesur7342 Transform: ARC SINE(SQUARE ROOT(Y))
Number of Groups: 4

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	lab control	1	0.8000	1.1071
1	lab control	2	0.9000	1.2490
1	lab control	3	0.6000	0.8861
1	lab control	4	1.0000	1.4120
1	lab control	5	1.0000	1.4120
1	lab control	6	1.0000	1.4120
1	lab control	7	0.8000	1.1071
1	lab control	8	1.0000	1.4120
2	SL-1 GLC#7342	1	0.9000	1.2490
2	SL-1 GLC#7342	2	0.9000	1.2490
2	SL-1 GLC#7342	3	0.8000	1.1071
2	SL-1 GLC#7342	4	0.9000	1.2490
2	SL-1 GLC#7342	5	0.8000	1.1071
2	SL-1 GLC#7342	6	1.0000	1.4120
2	SL-1 GLC#7342	7	0.8000	1.1071
2	SL-1 GLC#7342	8	0.9000	1.2490
3	SL-2 GLC# 7343	1	0.9000	1.2490
3	SL-2 GLC# 7343	2	0.7000	0.9912
3	SL-2 GLC# 7343	3	0.5000	0.7854
3	SL-2 GLC# 7343	4	0.5000	0.7854
3	SL-2 GLC# 7343	5	0.4000	0.6847
3	SL-2 GLC# 7343	6	0.4000	0.6847
3	SL-2 GLC# 7343	7	0.5000	0.7854
3	SL-2 GLC# 7343	8	0.7000	0.9912
4	SL-3 GLC# 7344	1	1.0000	1.4120
4	SL-3 GLC# 7344	2	1.0000	1.4120
4	SL-3 GLC# 7344	3	1.0000	1.4120
4	SL-3 GLC# 7344	4	1.0000	1.4120
4	SL-3 GLC# 7344	5	1.0000	1.4120
4	SL-3 GLC# 7344	6	0.8000	1.1071
4	SL-3 GLC# 7344	7	1.0000	1.4120
4	SL-3 GLC# 7344	8	1.0000	1.4120

Title: progressive AE h. azteca survival May 16-26, 2008
File: haztesur7342 Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	lab control	8	0.8861	1.4120	1.2497
2	SL-1 GLC#7342	8	1.1071	1.4120	1.2162
3	SL-2 GLC# 7343	8	0.6847	1.2490	0.8696
4	SL-3 GLC# 7344	8	1.1071	1.4120	1.3739

Title: progressive AE h. azteca survival May 16-26, 2008
File: haztesur7342 Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.7011
W = 0.9640

Critical W = 0.9040 (alpha = 0.01 , N = 32)
W = 0.9300 (alpha = 0.05 , N = 32)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: progressive AE h. azteca survival May 16-26, 2008
File: haztesur7342 Transform: ARC SINE(SQUARE ROOT(Y))

Hartley's Test for Homogeneity of Variance

Calculated H statistic (max Var/min Var) = 3.5520

Table H statistic = 14.50 (alpha = 0.01)
8.44 (alpha = 0.05)

Used df = 7
Based on R (# groups) = 4

Data PASS homogeneity test (alpha = 0.01). Continue analysis.

Title: progressive AE h. azteca survival May 16-26, 2008
File: haztesur7342 Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 4.6545 (p-value = 0.1989)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 11.3449 (alpha = 0.01, df = 3)
= 7.8147 (alpha = 0.05, df = 3)

Great Lakes Environmental Center

Hyalella azteca WEIGHT DATA

TEST MATERIAL: Progressive AE

WEIGH DATE: 05/27/08

TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 1962-00

TEST DATE: 5/20-26/08

OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: MWB QC SR

DRYING DURATION (HOURS): ≈24 HRS

TEST SPECIES: *H. azteca*

TREATMENT LEVEL	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)
LABORATORY CONTROL	1	0.77874	0.77777	0.00097	8	0.121
	2	0.79338	0.79263	0.00075	9	0.083
	3	0.79692	0.79623	0.00069	6	0.115
	4	0.80286	0.80206	0.00080	10	0.080
	5	0.79490	0.79406	0.00084	10	0.084
	6	0.80305	0.80238	0.00067	10	0.067
	7	0.79789	0.79690	0.00099	8	0.124
	8	0.79815	0.79752	0.00063	10	0.063
	9	0.81204	0.81039	0.00165	80	0.021
	10					
	11					
	12					

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Great Lakes Environmental Center

Hyalella azteca WEIGHT DATA

TEST MATERIAL: Progressive AE | WEIGH DATE: 05/27/08 | TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 1962-00 | TEST DATE: 5/16/08-5/26/08 | OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: MW QC SL | DRYING DURATION (HOURS): ≈24 HRS | TEST SPECIES: *H. azteca*

TREATMENT LEVEL	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)
SL-1 GLC# 7342	1	0.81243	0.81184	0.00059	9	0.066
	2	0.81365	0.81300	0.00065	9	0.072
	3	0.80781	0.80716	0.00065	8	0.081
	4	0.81280	0.81192	0.00088	9	0.098
	5	0.80792	0.80722	~~0.00077~~ 0.00070 SL	8	~~0.088~~ SL 0.087
	6	0.80912	0.80820	0.00092	10	0.092
	7	0.80932	0.80862	0.00070	8	0.088
	8	0.79182	0.79098	0.00084	9	0.093
	9					
	10					
	11					
	12					

Great Lakes Environmental Center

Hyalella azteca WEIGHT DATA

TEST MATERIAL: Progressive AE

WEIGH DATE: 05/27/08

TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 1962-00

TEST DATE: 5/16-26/08

OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: MWS

DRYING DURATION (HOURS): ≈24 HRS

TEST SPECIES: *H. azteca*

TREATMENT LEVEL	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)
SL-2 GLC# 7343	1	0.81202	0.81111	0.00091	9	0.101
	2	0.81026	0.80939	0.00087	7	0.124
	3	0.80984	0.80948	0.00036	5	0.072
	4	0.81313	0.81255	0.00058	5	0.116
	5	0.81099	0.81030	0.00069	4	0.172
	6	0.79434	0.79398	0.00036	4	0.090
	7	0.79728	0.79667	0.00061	5	0.122
	8	0.80401	0.80338	0.00063	7	0.090

Great Lakes Environmental Center

Hyalella azteca WEIGHT DATA

TEST MATERIAL: Progressive AE | WEIGH DATE: 05/27/08 | TYPE/MODEL OF DRYING OVEN: BLUE M

TEST NUMBER: 1962-00 | TEST DATE: 5/16/08-5/26/08 | OVEN TEMPERATURE (°C): 60

TECHNICIAN'S INITIALS: QC SR MWS | DRYING DURATION (HOURS): ≈24 HRS | TEST SPECIES: *H. azteca*

TREATMENT LEVEL	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)
SL-3 GLC#-7344	1	0.81113	0.81002	0.00111	10	0.111 ~~1.110~~
	2	0.80455	0.80376	0.00079	10	0.079
	3	0.80795	0.80709	0.00086	10	0.086
	4	0.81299	0.81229	0.00070	10	0.070
	5	0.80780	0.80704	0.00076	10	0.076
	6	0.80670	0.80591	0.00079	8	0.099
	7	0.80638	0.80552	0.00086	10	0.086
	8	0.81140	0.81061	0.00079	10	0.079
	9					
	10					
	11					
	12					

Title: progressive ae h. azteca growth may 16-26, 2008
File: haztgrow7342 Transform: NO TRANSFORMATION
Number of Groups: 4

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	lab control	1	0.1210	0.1210
1	lab control	2	0.0830	0.0830
1	lab control	3	0.1150	0.1150
1	lab control	4	0.0800	0.0800
1	lab control	5	0.0840	0.0840
1	lab control	6	0.0670	0.0670
1	lab control	7	0.1240	0.1240
1	lab control	8	0.0630	0.0630
2	SL-1 GLC# 7342	1	0.0660	0.0660
2	SL-1 GLC# 7342	2	0.0720	0.0720
2	SL-1 GLC# 7342	3	0.0810	0.0810
2	SL-1 GLC# 7342	4	0.0980	0.0980
2	SL-1 GLC# 7342	5	0.0870	0.0870
2	SL-1 GLC# 7342	6	0.0920	0.0920
2	SL-1 GLC# 7342	7	0.0880	0.0880
2	SL-1 GLC# 7342	8	0.0930	0.0930
3	SL-2 GLC# 73430	1	0.1010	0.1010
3	SL-2 GLC# 73430	2	0.1240	0.1240
3	SL-2 GLC# 73430	3	0.0720	0.0720
3	SL-2 GLC# 73430	4	0.1160	0.1160
3	SL-2 GLC# 73430	5	0.1720	0.1720
3	SL-2 GLC# 73430	6	0.0900	0.0900
3	SL-2 GLC# 73430	7	0.1220	0.1220
3	SL-2 GLC# 73430	8	0.0900	0.0900
4	SL-3 GLC# 7344	1	0.1110	0.1110
4	SL-3 GLC# 7344	2	0.0790	0.0790
4	SL-3 GLC# 7344	3	0.0860	0.0860
4	SL-3 GLC# 7344	4	0.0700	0.0700
4	SL-3 GLC# 7344	5	0.0760	0.0760
4	SL-3 GLC# 7344	6	0.0990	0.0990
4	SL-3 GLC# 7344	7	0.0860	0.0860
4	SL-3 GLC# 7344	8	0.0790	0.0790

Title: progressive ae h. azteca growth may 16-26, 2008
File: haztgrow7342 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	lab control	8	0.0630	0.1240	0.0921
2	SL-1 GLC# 7342	8	0.0660	0.0980	0.0846
3	SL-2 GLC# 73430	8	0.0720	0.1720	0.1109
4	SL-3 GLC# 7344	8	0.0700	0.1110	0.0858

Title: progressive ae h. azteca growth may 16-26, 2008
File: haztgrow7342 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	lab control	0.0006	0.0243	0.0086	26.4264
2	SL-1 GLC# 7342	0.0001	0.0110	0.0039	12.9437
3	SL-2 GLC# 73430	0.0009	0.0306	0.0108	27.5657
4	SL-3 GLC# 7344	0.0002	0.0133	0.0047	15.5682

Title: progressive ae h. azteca growth may 16-26, 2008
File: haztgrow7342 Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	3	0.0035	0.0012	2.5863
Within (Error)	28	0.0128	0.0005	
Total	31	0.0163		

(p-value = 0.0730)

Critical F = 4.5681 (alpha = 0.01, df = 3,28)
= 2.9467 (alpha = 0.05, df = 3,28)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: progressive ae h. azteca growth may 16-26, 2008
File: haztgrow7342 Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	lab control	0.0921	0.0921		
2	SL-1 GLC# 7342	0.0846	0.0846	0.7022	
3	SL-2 GLC# 73430	0.1109	0.1109	-1.7556	
4	SL-3 GLC# 7344	0.0858	0.0858	0.5969	

Dunnett critical value = 2.1700 (1 Tailed, alpha = 0.05, df [used] = 3,24)
(Actual df = 3,28)

Title: progressive ae h. azteca growth may 16-26, 2008
File: haztgrow7342 Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	lab control	8			
2	SL-1 GLC# 7342	8	0.0232	25.2	0.0075
3	SL-2 GLC# 73430	8	0.0232	25.2	-0.0188
4	SL-3 GLC# 7344	8	0.0232	25.2	0.0064

Title: progressive ae h. azteca growth may 16-26, 2008
File: haztgrow7342 Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.0128
W = 0.9679

Critical W = 0.9040 (alpha = 0.01 , N = 32)
W = 0.9300 (alpha = 0.05 , N = 32)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: progressive ae h. azteca growth may 16-26, 2008
File: haztgrow7342 Transform: NO TRANSFORMATION

Hartley's Test for Homogeneity of Variance

Calculated H statistic (max Var/min Var) = 7.7855

Table H statistic = 14.50 (alpha = 0.01)
8.44 (alpha = 0.05)

Used df = 7
Based on R (# groups) = 4

Data PASS homogeneity test (alpha = 0.01). Continue analysis.

Title: progressive ae h. azteca growth may 16-26, 2008
File: haztgrow7342 Transform: NO TRANSFORMATION

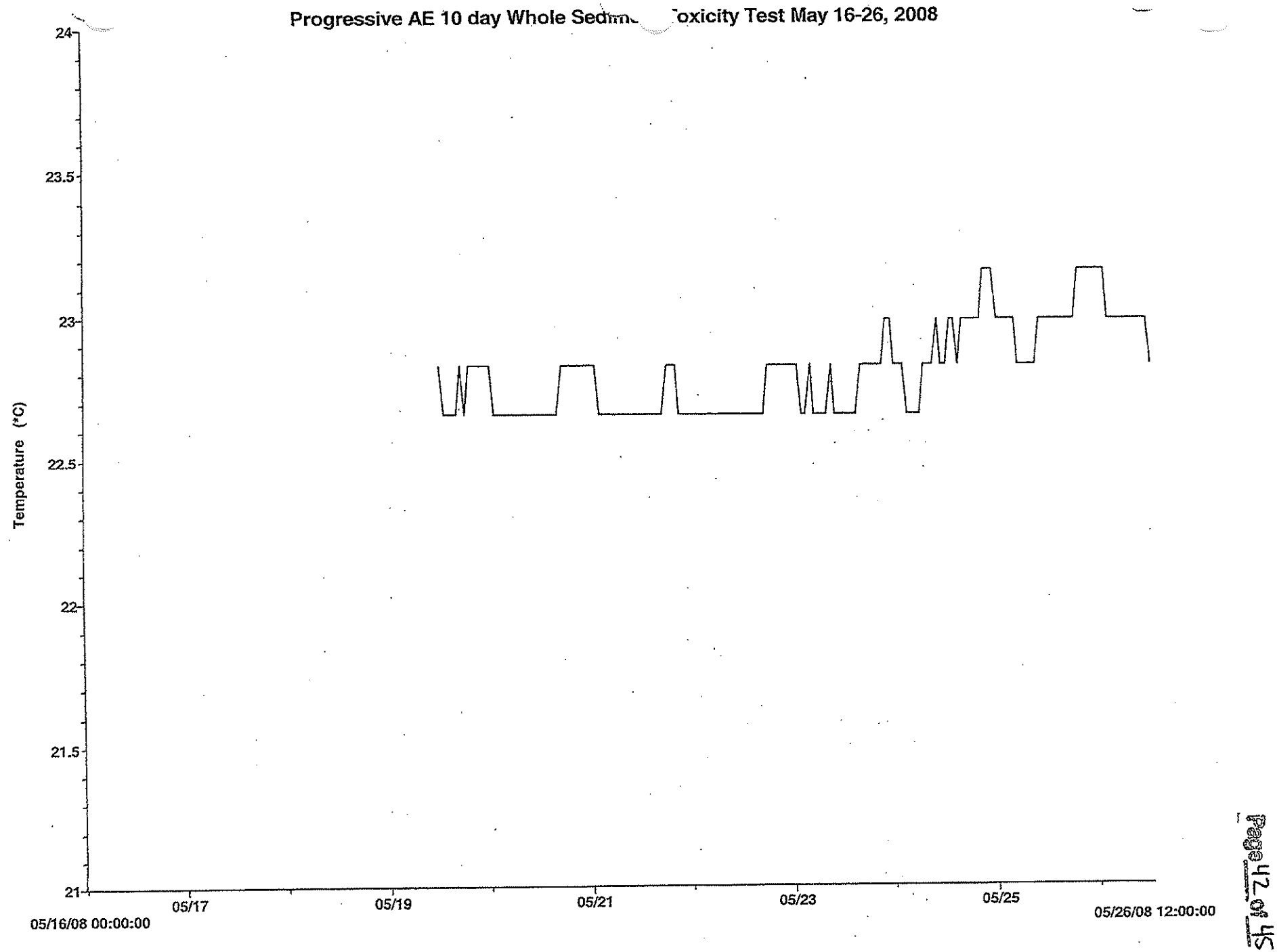
Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 8.5728 (p-value = 0.0355)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 11.3449 (alpha = 0.01, df = 3)
= 7.8147 (alpha = 0.05, df = 3)

Appendix E
Electronic Temperature Logger Data


Progressive AE 10 day Whole Sedim Toxicity Test May 16-26, 2008
Temperature (°C)
24
23.5
23
22.5
22
21.5
21
05/16/08 00:00:00
05/17
05/19
05/21
05/23
05/25
05/26/08 12:00:00

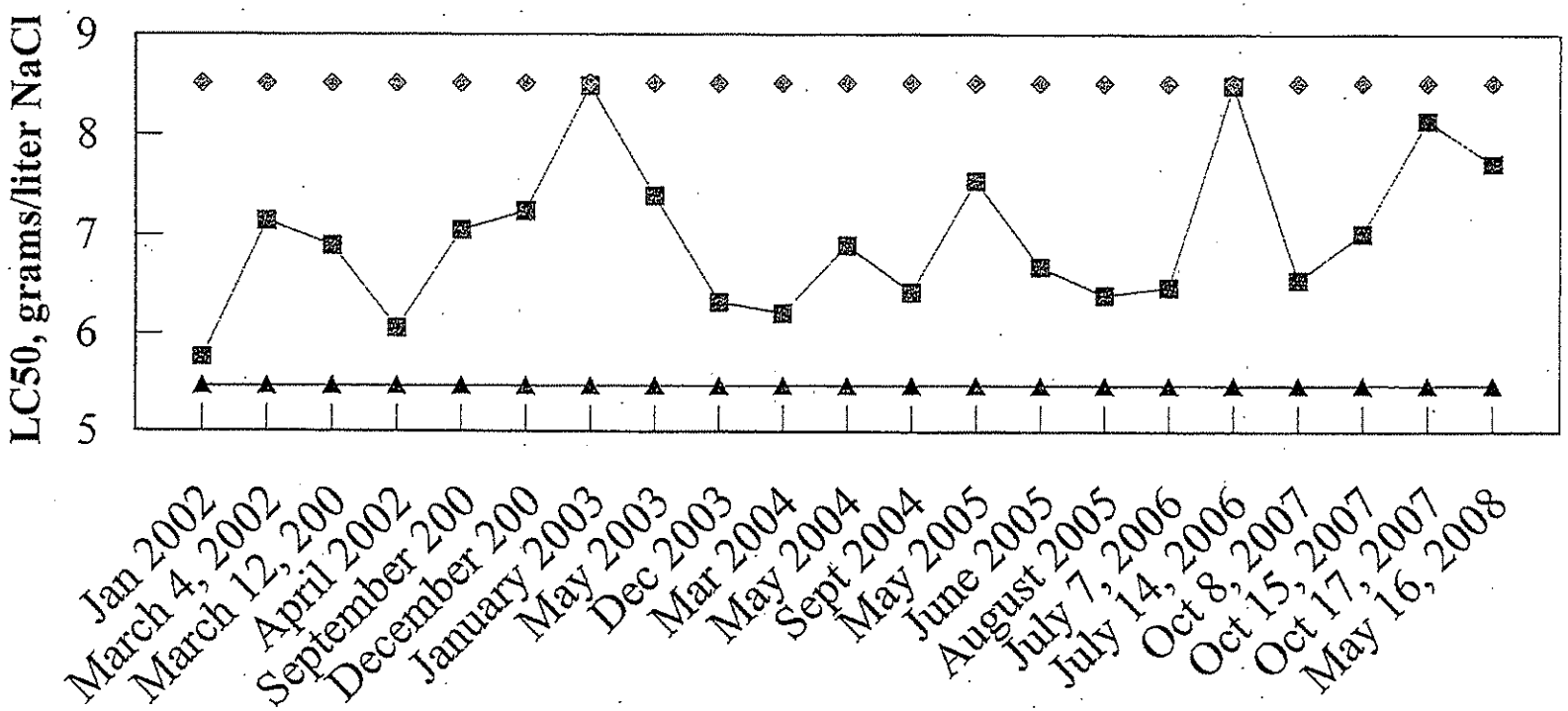
Appendix F
Reference Toxicant Data

Great Lakes Environmental Center

Chironomus tentans Survival

NaCl Reference Toxicant data

2002-2008



GLEC
Great Lakes Environmental Center

Hyalella azteca Survival

NaCl Reference Toxicant data

2002-2008