California Regional Water Quality Control Board
North Coast Region
Geoffrey M. Hales, Chairman

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Matt Rodriquez
Secretary for
Environmental Protection

Edmund G. Brown Jr.
Governor

August 11, 2011

Mr. Palmer Westbrook
Palmer Westbrook, Inc.
P.O. Box 138
Smith River, CA 95567

Dear Mr. Westbrook:

The letter contains a summary of the analytical results from the August 18, 2010 sampling event, in which the North Coast Regional Water Quality Control Board (Regional Water Board) staff collected surface water and sediment samples from four locations near commercial lily production facilities in Del Norte County. The event was a joint effort conducted by both the California Department of Fish and Game (CDFG) and the Regional Water Board.

Background

In response to questions/concerns expressed by a member of the public and a local environmental advocacy group regarding potential environmental effects associated with pesticides applied to lily farms, staff from both CDFG and the Regional Water Board developed a plan for a one-time sampling event to collect surface water and sediment samples from waterways flowing adjacent to lily farms, to test those samples for toxicity, and, in the water samples only, to measure copper concentrations. Copper was selected as a component of the sampling, as it is known that many fungicides used in lily bulb farming contain copper. With these objectives, staff proposed to identify six sampling sites; four sites in two separate drainages that enter the Smith River of which two sites would be located downstream of lily farms and two sites located upstream of the lily farms for comparison, and two sites in a water body adjacent to, but outside of the drainages flowing through the lily farm areas. The sampling team did not meet all the sampling objectives, as access was only available to two streams at the time of the sampling event.

On August 17, 2010, Regional Water Board staff Stormer Feiler, Rich Fadness, and Melinda Pope conducted field reconnaissance and identified four sample locations, and on August 18, 2010, Mr. Feiler, Mr. Fadness, and Mrs. Pope collected surface water and sediment samples from each of those sampling locations. Mr. Matt Westbrook of Palmer Westbrook Inc. allowed the sampling team access on Westbrook property to sample upstream of 30993DN. (Please refer to the attached map). On August 18, 2010, Regional Water Board staff shipped the samples to the CDFG Water Pollution Control Laboratory located in Rancho Cordova for copper and toxicity testing, as proposed.

Sediment Toxicity

Sediment toxicity tests were performed by exposing the amphipod *Hyallela azteca* to sediment from the four sites for ten days. The CDFG Aquatic Toxicology Laboratory (ATL) in Elk Grove performed these tests. The results of this testing revealed that the samples collected from all of the sites did not exhibit any mortality or reduced growth and development that was significantly different from that seen in the control site sample. (Table 1).

Aquatic Toxicity

Acute (four-day) and chronic (seven-day) aquatic toxicity tests were performed at ATL by exposing the cladoceran *Ceriodaphnia dubia* to water from the four sites. The tests found no acute toxicity at any site, but the organisms exposed to water from Site 30993DN showed evidence of chronic reproductive toxicity.

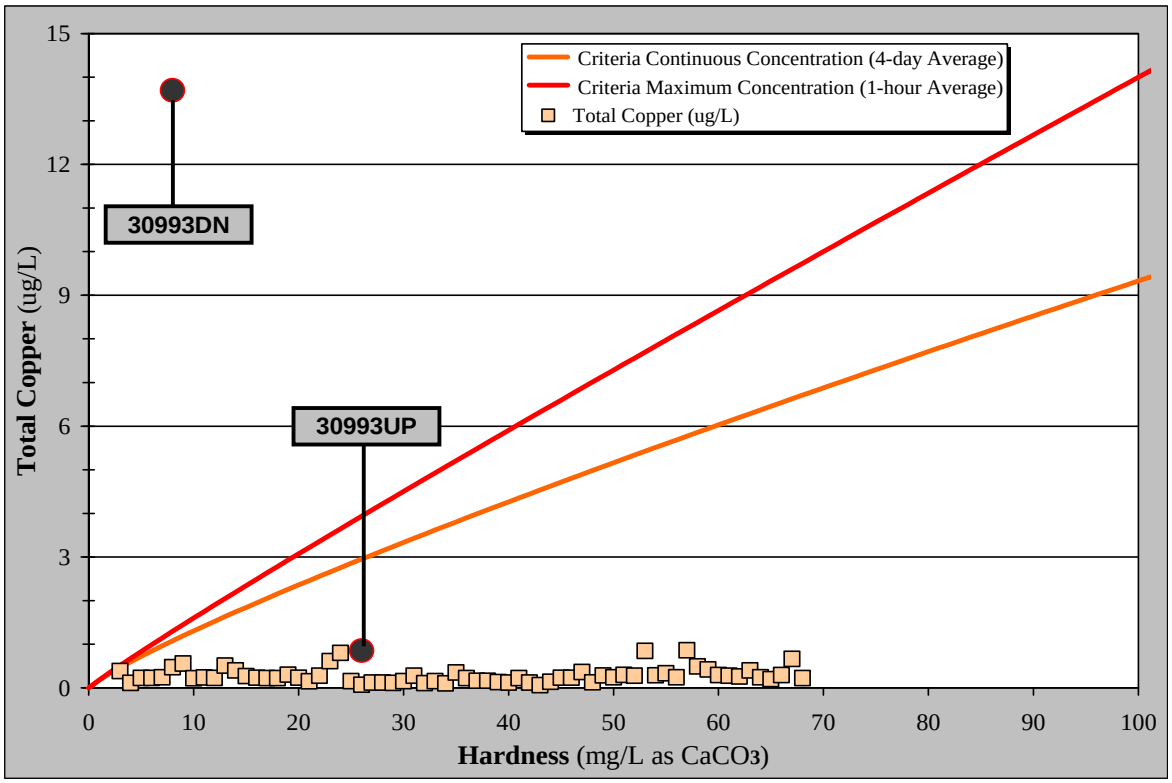
Copper Sampling

Water samples measured total and dissolved copper in water collected from all four sites. Copper toxicity in aquatic organisms is related primarily to dissolved copper (USGS 1997), however the California Toxics Rule (CTR) does take into consideration total copper when determining the freshwater criterion for the protection of aquatic life. The CTR criterion to protect freshwater aquatic life for copper is hardness dependent. Exceedance or compliance is determined through a calculation in which the total metals concentration and the hardness concentration are considered. As shown in the Table 1 below, copper concentrations in the water sample collected at Site 30993DN were significantly higher than the copper concentrations measured in the samples collected from the other three locations. Table 2 demonstrates the total copper concentrations of the samples collected when compared to the CTR criterion. The additional data points in Figure 1 are results from sampling efforts by the Regional Water Board's Surface Water Ambient Monitoring Program (SWAMP), which occurred at 3 locations in the Smith River watershed between 2001 and 2006.

Table 1. Toxicity and Water Quality Results.

Site	Total copper (μg/L)	Dissolved copper (μg/L)	pH	Hardness (mg/L)	Aquatic toxicity	Sediment toxicity
ROWDYUP	0.60	0.58	7.4	NA	No	No
ROWDYDN	0.94	0.53	7.4	NA	No	No
30993UP	0.85	0.36	7.2	26	No	No
30993DN	13.7	3.99	7.4	8	Reproductive	No

Figure 1. CTR Criterion for Freshwater Aquatic Life Protection and Results from Other Locations within the Smith River Watershed (SWAMP 2001-2006)



Conclusions

Acute toxicity to freshwater organisms was not observed in any of the samples collected above, below, or outside of the lily farms drainage areas. The sample collected in the downstream portion of the drainage located within the vicinity of the lily farms did demonstrate evidence of chronic reproductive toxicity. Ambient water collected from the downstream portion of the drainage located within the vicinity of the lily farms at the same time as the sediment samples also showed copper concentrations that were elevated in comparison to the upstream sample and when compared to samples collected at various locations in the Smith River watershed. The elevated copper concentration of the one sample exceeds the CTR criterion for the protection of freshwater aquatic life.

The reproductive toxicity effect observed in the 30993DN sample may be related to the elevated copper concentration, as reproductive effects have been observed in cladocerans at 10 g/L total copper at a hardness of 45 mg/L $CaCO_3$ (USEPA 1980). It is not known whether any additional toxicants may have caused the reproductive toxicity because the analysis was strictly limited to total and dissolved copper concentrations in the water column. In order to determine the cause of the reproductive toxicity in the sample collected at site 30993DN sample, it would be necessary to either 1) conduct a more thorough chemical analysis of the ambient water to determine if other toxic materials are present or 2) conduct a toxicity identification evaluation (TIE).

Item 1 above, a thorough chemical analysis, would include pesticides used on lily farms, as well as other pesticides used in the area, such as pesticides used on rights of way and for structural pest control. This list would include scans for organophosphates, carbamates, and pyrethroids, as well as analyses for captan, metalaxyl, glyphosate, napropamide, PCNB, thiram, and fipronil. These analyses would cost approximately $2300 per sample, not including analyses for thiram, captan, metalaxyl, and napropamide which would require method development.

Item 2 above, TIE, refers to a sequence of laboratory investigations used to help determine the cause of toxicity. This sequence includes laboratory methods to first characterize the general classes of toxicants present (e.g., metals, pesticides, etc.), then identify and confirm the specific constituents causing the effects (e.g., copper). This can be particularly helpful in discerning toxic effects caused by metals or those caused by non-polar organic pesticides such as organophosphates and synthetic pyrethroids. TIEs are performed on samples when they display toxicity and cost approximately $4500 per sample.

Recommendations

Monitoring results indicate that there may be invertebrate reproductive toxicity occurring in areas adjacent to lily farms in Del Norte County; however the limited nature of the sampling conducted by our staff does not provide information about the magnitude, extent, duration, and persistence throughout the seasons of such conditions.

The Water Quality Control Plan for the North Coast Region (Basin Plan) states as one of the water quality objectives for waters of the North Coast Region, that all waters shall be maintained free of toxic substances in concentrations that are toxic, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. While we do not at this time have additional resources available to devote to a comprehensive analysis of the presence and extent of toxic conditions within the Smith River plain we are in the process of developing a region wide waiver/permit for agricultural discharges, and anticipate that this effort will address a number of pollutants associated with agricultural runoff through discharge monitoring and implementation of appropriate management practices to ensure that agricultural runoff does not contain pollutants at levels that will or may lead to adverse effects to water quality and beneficial uses.

Thank you for your interest and participation in this effort. If you have questions about the sampling event or the results reported herein, please contact Stormer Feiler at (707) 543-7128 or Rich Fadness at (707) 576-6718. For questions about our agricultural waiver program, currently under development, please contact Ben Zabinsky at (707) 576-6750.

Sincerely,

Catherine Kuhlman
Executive Officer

110811_SRF_Smith_River

References:

U.S, Environmental Protection Agency. 2000. Ambient Water Quality Criteria for Copper. USEPA 440/5-80-036.
U.S. Geological Survey. 1997. Copper Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. USGS/BRD/BSR—1977-0002.

Enclosure: Sampling Results: P-2612, 27137-40Ha, L-514-10

cc: Greg King, P.O. Box 4209, Arcata, CA 95518 gking@asis.com
Jane Vorpagel, California Department of Fish and Game JVorpage@dfg.ca.gov
Stella McMillin, California Department of Fish and Game
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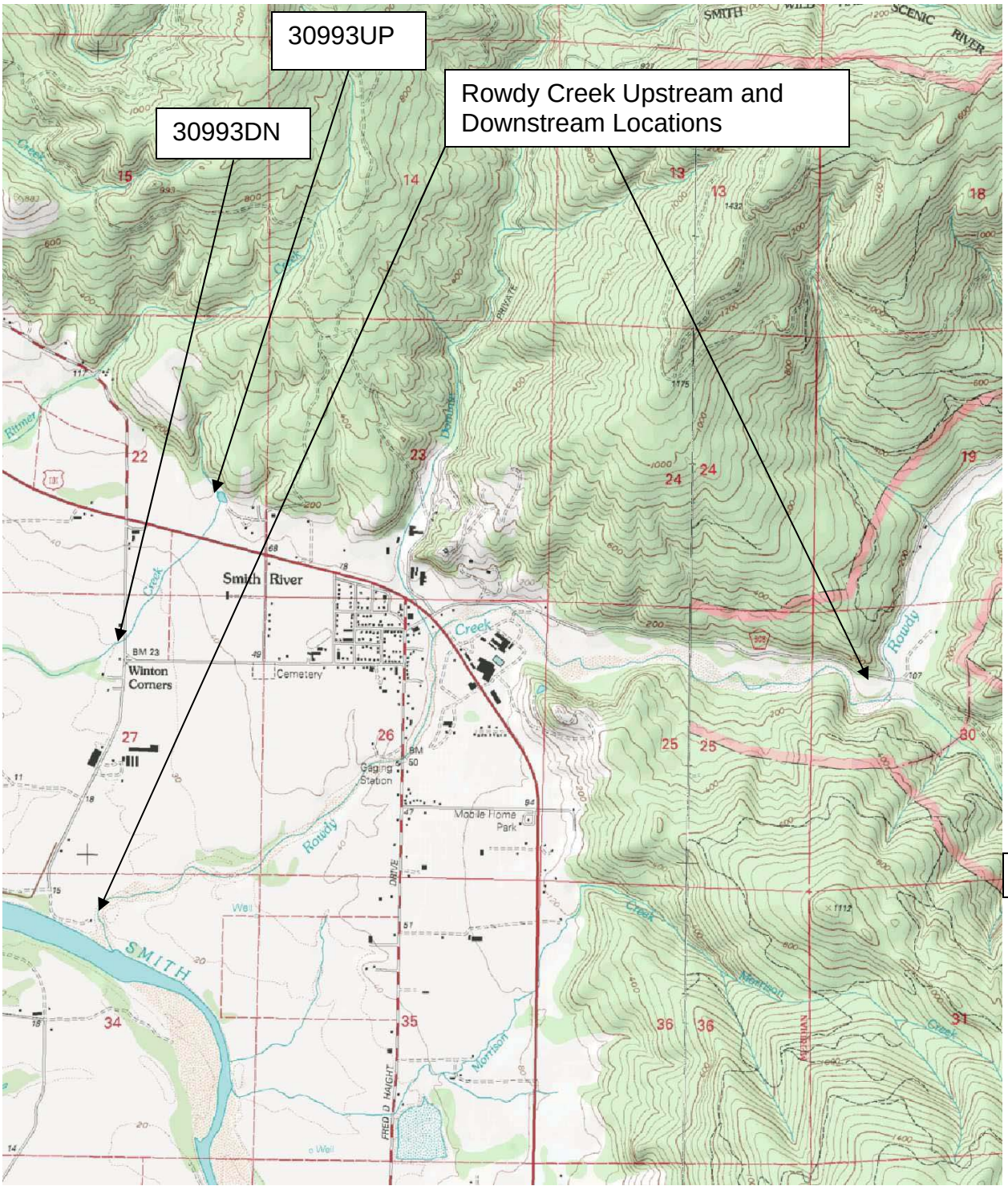
30993UP
30993DN
Rowdy Creek Upstream and Downstream Locations
Smith River
Winton Corners
Cemetery
Gaging Station
Mobile Home Park
SMITH
Rowdy
Creek
North

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME

AQUATIC TOXICOLOGY LABORATORY REPORT

9300 Elk Grove-Florin Road
Elk Grove, CA 95624

Lab No: P-2612
E.P. No:_____

Index: **PCA:**

Date Received: 08/20/2010
Samples: ROWDYUP
ROWDYDN
30993UP
30993DN

ATL: T1097-T1104

Report Date: 08/31/2010

To: **Stormer Feiler**
North Coast Regional Water Quality Control Board
5550 Skyline Blvd. Suite A
Santa Rosa, CA 93706

C.C.: **Stella McMillin**
California Department of Fish and Game
1701 Nimbus Road, Ste F
Gold River, CA 95403

Remarks

Water samples were collected by Regional Water Quality Control Board staff on August 18, 2010 and delivered to the Aquatic Toxicology Laboratory on August 20, 2010. Water quality and toxicity were determined by Department of Fish and Game's Aquatic Toxicology Laboratory staff. Four static acute toxicity tests (96-h) with 48-h renewal of undiluted water sample were performed using *Ceriodaphnia dubia* neonates following ATL-SOP-009 and EPA-821-R-02-012. Four chronic toxicity and reproduction tests (7-day) with daily renewal of undiluted water sample were performed using *Ceriodaphnia dubia* neonates following ATL-SOP-011 and EPA-821-R-02-013.

RESULTS OF EXAMINATION

Table 1: *Ceriodaphnia dubia* 96-h Toxicity Test Data.

RWQCB Sample #	Date Received	ATL Test #	Test Begin	Test End	Control Survival (%)	Sample Survival (%)	Survival Sig (Y/N)
ROWDYUP	08/20/10	T1097	08/20/10	08/24/10	90	95	N
ROWDYDN	08/20/10	T1098	08/20/10	08/24/10	90	95	N
30993UP	08/20/10	T1099	08/20/10	08/24/10	90	90	N
30993DN	08/20/10	T10100	08/20/10	08/24/10	90	100	N

Table 2: *Ceriodaphnia dubia* 7-day Chronic Toxicity and Reproduction Test Data.

RWQCB Sample #	Date Received	ATL Test #	Test Begin	Test End	Control Survival (%)	Sample Survival (%)	Survival Sig (Y/N)	Control Reproduction (ave)	Sample Reproduction (ave)	Reproduction Sig (Y/N)
ROWDYUP	08/20/10	T10101	08/20/10	08/27/10	90	90	N	13.3	13.6	N
ROWDYDN	08/20/10	T10102	08/20/10	08/27/10	90	100	N	13.3	9.2	N
30993UP	08/20/10	T10103	08/20/10	08/27/10	90	90	N	13.3	13.1	N
30993DN	08/20/10	T10104	08/20/10	08/27/10	90	90	N	13.3	0.4	Y

Table 3: 96-h Toxicity Test Water Quality Characteristics

RWQCB Sample #	Date Tested	ATL Test #	Cond (µmho/cm)		Temp (°C)		pH		DO (mg/L)		Alkalinity (mg/L)	Hardness (mg/L)
			IN	OUT	IN	OUT	IN	OUT	IN	OUT		
ATL Control	08/20/10	Control	261	270	24.3	24.3	7.36	7.31	5.81	5.41	66	83
ROWDYUP	08/20/10	T1097	94	107	24.3	24.7	7.38	7.42	5.85	5.61	N/D	N/D
ROWDYDN	08/20/10	T1098	89	102	24.3	24.7	7.33	7.43	5.88	5.54	N/D	N/D
30993UP	08/20/10	T1099	133	145	24.2	24.4	7.20	7.31	6.02	5.35	18	26
30993DN	08/20/10	T10100	68	79	24.2	24.3	7.36	7.40	5.93	5.38	16	8

ND: Not Done due to lack of sample volume.

Table 4: 7-day Toxicity and Reproduction Test Water Quality Characteristics

RWQCB Sample #	Date Tested	ATL Test #	Cond (µmho/cm)		Temp (°C)		pH		DO (mg/L)		Alkalinity (mg/L)	Hardness (mg/L)
			IN	OUT	IN	OUT	IN	OUT	IN	OUT		
ATL Control	08/20/10	Control	261	266	24.4	24.4	7.35	7.32	5.98	5.57	66	83
ROWDYUP	08/20/10	T10101	96	101	24.4	24.4	7.40	7.42	6.03	5.74	N/D	N/D
ROWDYDN	08/20/10	T10102	89	98	24.4	24.4	7.37	7.41	6.04	5.81	N/D	N/D
30993UP	08/20/10	T10103	133	140	24.3	24.2	7.24	7.32	6.14	5.73	18	26
30993DN	08/20/10	T10104	68	77	24.3	24.1	7.40	7.42	6.11	5.88	16	8

ND: Not Done due to lack of sample volume.

Conclusion:

None of the samples tested produced a significant difference in mortality when compared to laboratory controls in either the 96-hour acute or the 7-day chronic tests for *Ceriodaphnia dubia.*

In the 7-day chronic test for reproduction, sample 30993DN produced a significant difference in reproduction when compared to the laboratory control for *Ceriodaphnia dubia* indicating reproductive toxicity in this sample.

PESTICIDE INVESTIGATIONS UNIT
OFFICE OF SPILL PREVENTION AND RESPONSE

BY _____
Dan Waligora, Principal Investigator

REVIEWED BY _____
Stella McMillin, Environmental Scientist, Pesticide Investigations Unit

APPROVED BY _____
Dave Crane, Acting OSPR Laboratory Program Manager

References:

USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition. EPA-821-R-02-012. Office of Water, Washington, D.C.

USEPA. 2002. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organism. Fourth Edition. EPA-821-R-02-013. Office of Water, Washington, D.C.

DEPARTMENT OF FISH AND GAME
FISH AND WILDLIFE
WATER POLLUTION CONTROL LABORATORY

2005 NIMBUS ROAD
RANCHO CORDOVA, CA 95670
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LABORATORY REPORT

Name: Marco Sigala
Agency: CA Department of Fish and Game
Address: 7544 Sandholdt Road
City: Moss Landing, CA 95039

msigala@mlml.calstate.edu
Phone 707-576-2662

CC:

Project: RWB1_NUTRIENT_2010
Lab L-514-10
Customer: Region 1 SWAMP
Index-PCA
Spill MPSL-DFG
Suspect: MPSL-DFG_Field_v1.0
P.O.#

Sample Number: L-514-10-01 ID#: AA50523 Sample Collection Date: 8/18/2010 Time: 8:45
Sample Location: Lab Submittal Date: 8/20/2010
Customer reference: ROWDYUP

	TEST RESULT	UNITS	QUALIFIER	ANALYSIS	ANALYZED	REPORTING	DETECTION	METHOD REFERENCE
Dissolved Copper	0.58	µg/L	DNQ	9/30/2010	MP	1.00	0.30	SM 3113 B
Total Copper	0.60	µg/L	DNQ	9/30/2010	MP	1.00	0.30	EPA 200.8

Sample Comments:

Sample Number: L-514-10-02 ID#: AA50524 Sample Collection Date: 8/18/2010 Time: 10:20
Sample Location: Lab Submittal Date: 8/20/2010
Customer reference: ROWDYDN

	TEST RESULT	UNITS	QUALIFIER	ANALYSIS	ANALYZED	REPORTING	DETECTION	METHOD REFERENCE
Dissolved Copper	0.94	µg/L	DNQ	9/30/2010	MP	1.00	0.30	SM 3113 B
Total Copper	0.53	µg/L	DNQ	9/30/2010	MP	1.00	0.30	EPA 200.8

Sample Comments:

Sample Number: L-514-10-03 ID#: AA50525 Sample Collection Date: 8/18/2010 Time: 12:00
Sample Location: Lab Submittal Date: 8/20/2010
Customer reference: 30993UP

	TEST RESULT	UNITS	QUALIFIER	ANALYSIS	ANALYZED	REPORTING	DETECTION	METHOD REFERENCE
Dissolved Copper	0.36	µg/L	DNQ	9/30/2010	MP	1.00	0.30	SM 3113 B
Total Copper	0.85	µg/L	DNQ	9/30/2010	MP	1.00	0.30	EPA 200.8

Sample Comments:

D = Dilution
DNQ = Detected not Quantified
H = Holding Time Exceeded
ND = Not Detected L-514-10
Lab Number:

Sample Number: L-514-10-04 ID#: AA50526 Sample Collection Date: 8/18/2010 Time: 9:45
Sample Location: Lab Submittal Date: 8/20/2010
Customer reference: 30993DN

	TEST RESULT	UNITS	QUALIFIER	ANALYSIS	ANALYZED	REPORTING	DETECTION	METHOD REFERENCE
Dissolved Copper	3.99	µg/L		9/30/2010	MP	1.00	0.30	SM 3113 B
Total Copper	13.7	µg/L		9/30/2010	MP	1.00	0.30	EPA 200.8

Sample Comments:

Reviewed by **Date** **Laboratory Director** **Date**

Total Lab Analysis Price: $520.00

D = Dilution
DNQ = Detected not Quantified
H = Holding Time Exceeded
ND = Not Detected L-514-10
Lab Number:

BES

BLOCK ENVIRONMENTAL SERVICES

2451 Estand Way
Pleasant Hill, CA 94523-3911
(925) 682-7200 FAX 686-0399

Whole Sediment Toxicity Testing Results for Sediment Four One-Species Screening Bioassays

August 2010

Prepared For:
Yeggie Dearborn
cel analytical, inc
82 Mary Street, Suite # 2
San Francisco, CA 94103

and

Rich Fadness
5550 Skylane Blvd. # A
Santa Rosa, CA 95403

BES Sample # 27137-40

Prepared By:
Block Environmental Services, Inc.
2451 Estand Way
Pleasant Hill, CA 94523-3911
(925) 682-7200

September 8, 2010

David Block, Ph.D.
Laboratory Director

N Bradbury
Nanette Bradbury, B.S.
Laboratory Manager

1. INTRODUCTION

The Federal Water Pollution Control Act Amendments of 1972 (PL 92-500), the Clean Water Act (CWA) of 1977 (PL 95-217), and the Water Quality Act of 1987 (PL 100-4) explicitly state that it is the national policy that the discharge of toxic substances in toxic amounts be prohibited. Toxicity to aquatic life is one of the criteria used to gauge the hazardous potential of a discharged waste.

Block Environmental Services (BES) has conducted four 10-day sediment bioassays for cel analytical inc. The testing organism of interest is the amphipod *Hyalella azteca*. The test was performed using four field collected samples as well as a Laboratory control sediment. A concurrent reference toxicant test was run with this test. This report describes the procedures used and the results obtained for the toxicity test initiated on August 24, 2010.

BES is an Environmental Laboratory Accreditation Program certified laboratory (#1812).

2. MATERIALS AND METHODS

2.1 SAMPLE PREPARATION AND HANDLING

Test Sediment – Four sediment samples were collected in 1L glass, amber, wide mouth bottles and shipped to the BES Laboratory. The samples were kept at 4 °C until test initiation.

Laboratory Sediment Preparation – A formulated sediment was used for this study. This sediment consisted of 75% sand, 12.5% Kaolin, 0.5% dolomite, 11.99% α- cellulose and 0.01% humic acid – Kemble, N.E., Dwyer, F.J., Ingersoll, C.G., Dawson, T.D., and Norberg-King, T.J., 1999, Tolerance of freshwater test organisms to formulated sediments for use as control materials in whole-sediment toxicity tests: Environmental Toxicology and Chemistry, v. 18, no. 2, 10.1002/etc.5620180218, p. 222-230.

2.2 Reference Toxicant – Potassium Chloride (KCl) was used as the reference toxicant for the amphipod (*H. azteca*). A stock solution containing 600 mg/L was used for preparation of the treatment levels for the organisms. The treatment levels were 37.5, 75, 150, 300 and 600 mg/L KCl in carbon filtered water. The toxicity endpoints from the reference toxicant test are subsequently plotted on a running control chart from the last 20 tests. The mean values as well as the upper and lower control limits (± 2 standard deviations) are recalculated with each successive test result. The outliers, which are values falling outside the upper and lower control limits, and trends of increasing or decreasing sensitivity, can then be readily identified and any problems addressed. By definition, one in 20 tests would be expected to fall outside of the control limits by chance alone.

2.3 TOXICITY TEST PROCEDURES

2.3.1 Test Procedures – A detailed procedure for each test is outlined in laboratory standard operating procedures (SOPs), which are stored at the BES laboratory. The SOPs are based upon the following reference(s):

- Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates (EPA/600/R-99/064).
- Kemble, N.E., Dwyer, F.J., Ingersoll, C.G., Dawson, T.D., and Norberg-King, T.J., 1999, Tolerance of freshwater test organisms to formulated sediments for use as control materials in whole-sediment toxicity tests: Environmental Toxicology and Chemistry, v. 18, no. 2, 10.1002/etc.5620180218, p. 222-230.

Test conditions are summarized in Table 2-1.

2.3.2 Data Analysis – All toxicity testing results will be analyzed using the software program ToxCalc (Version 5.0). This program determines if there is a statistically significant reduction in response at the $p = 0.05$ level and utilizes the flowchart for statistical analysis outlined in EPA/600/R-99/064. The testing compared the sample responses with the Laboratory control sediment. The parameters of interest for the sediment tests are the survival and growth of surviving organisms. In addition, the Median Lethal Concentration (LC_{50}) was calculated for the reference toxicant test. The LC_{50} values will show the point estimate of the toxicant concentration that causes a 50% percent reduction in organism survival. These concentrations are bracketed by Upper and Lower 95% Confidence Limits and are reported here as the 95% Confidence Interval (C.I.)

Table 2-1 Summary Of Testing Parameters

Test Conditions	*H. azteca*
Test Type	Whole-sediment toxicity test with renewal of overlying water
Temperature	23 ± 1 °C
Light Intensity	About 100-1000 lux
Photoperiod	16L:8D
Test Chamber	300 ml high form lipless beaker
Sediment Volume	100 ml
Overlying water volume	175 ml
Renewal of overlying water	2 volume additions/day (1 volume addition every 12 hrs)
Organism Age	7-14 days (1-2 day range in age)
Organism Source	Aquatic Biosystems, Fort Collins, CO
Organisms/Chamber	10
Replicates/treatment	8
Food Source	YCT
Feeding	1 ml after am water renewal
Overlying water	Carbon Filtered Water
Aeration	None, unless DO drops below 2.5 mg/L
Reference Toxicant	KCl
Reference Toxicant Concentrations	Control, 37.5, 75, 150, 300 and 600 mg/L
Test Duration	10 days
Effects Measured	Survival & growth
Test Acceptability	≥ 80% survival and measurable growth of control organisms

3. RESULTS

3.1 Sample and Testing Summary

Client Sample Identification	BES Sample #	Sample Dates	Sample Times
Rowdy DN	27137	08/18/2010	1020
Rowdy UP	27138	08/18/2010	0845
30993 UP	27139	08/18/2010	1200
30993 DN	27140	08/18/2010	0945

3.2 Sample Test Duration Summary

Test Duration	*H. azteca*	
	Date	Time
Initiation	08/24/2010	1540
Termination	09/02/2010	NA

NA – Not Applicable

3.3 *H. azteca* END POINT VALUES –

Raw Data Summary

Sample Identification	10 Day Percent Survival	10 Day Dry Weight/Organism	
	Average (%)	Average (mg)	Standard Deviation
Laboratory Sediment	69	0.06	0.03
Rowdy DN	74	0.09	0.03
Rowdy UP	79	0.06	0.02
30993 UP	90	0.07	0.02
30993 DN	88	0.06	0.01

Initial average weight of organisms at test initiation: 0.02 mg

3.3.1 Testing Notes

There was not a statistically significant reduction in survival or growth for the sediment samples with respect to the Laboratory sediment.

The Laboratory sediment did not pass the survival acceptability criteria (≥ 80%), but did show a measurable increase in growth at test termination. The reduced survival in the

laboratory control sediment may have been caused by the escape of organisms during the twice-daily water changes, as the amphipods did not appear to burrow into the formulated sediment to the same extent as the field samples.

3.3.2 Reference Toxicant Test

Raw Data Summary

Sample Concentration (mg/L as KCl)	96 hr Percent Survival Average (%)
Cl	90
37.5	100
75	100
150	90
300	90
600	20

Statistical Analysis Summary

End Point	mg/L as KCl
LC50	453.22
Lower and Upper Control Chart Limits	127.90-509.80

3.3.3 Testing Notes

The Laboratory control passed the survival test acceptability criteria (≥ 90%).

This test generated a survival (LC_{50}) endpoint that was within the control chart limitations. This *H. azteca* response indicates that the test performed with this species is valid.

The raw data and summary statistics are presented in the Appendix to this report.

4. CONCLUSIONS

The objective of these tests was to evaluate the survival and growth of a freshwater amphipod following a 10-day exposure to field collected sediment samples. The results for thess whole sediment toxicity tests conducted in August 2010indicate that:

- *H. azteca* survival and growth were not adversely affected when compared to amphipods concurrently exposed to a Laboratory sediment. The Laboratory sediment did not pass the survival test acceptability criteria. Results obtained from the reference toxicant tests are typical of in-house sensitivity data to KCl, indicating that the stock organisms used were in good condition.