Du'Bois J. Ferguson
Remediation Manager

Schlumberger Oilfield Service
300 Schlumberger Drive
Sugar Land, TX 77478
Tel: 281-285-3692
DFerguson3@slb.com

July 10, 2011

VIA FedEx Overnight

Section Chief
Environmental Enforcement Section
U.S. Department of Justice
PO Box 7611
Washington, DC 20044-7611

Craig Zeller
Remedial Project Manager
Superfund Division
U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303

Re: DOJ Case No. 90-11-2-696/1

Subject: June 2011 Monthly Report
Sangamo Weston/Twelvemile Creek/Lake Hartwell Superfund Site
Natural Resources Trustees Consent Decree

Dear Section Chief:

In accordance with the Consent Decree and Section XIV of the Unilateral Administrative Order for the above referenced site, Schlumberger is required to submit Progress Reports on a quarterly basis. Given the current pace of activities, we will be submitting Progress Reports on a monthly basis until further notice in satisfaction of the reporting requirements of the Consent Decree and Unilateral Administrative Order.

In keeping with Paragraph 20 of the Consent Decree:

> I certify that the information contained in or accompanying this submission is true, accurate and complete. This certification is based on my personal preparation, review, or analysis of the submission, and/or supervision of persons who, acting on my instructions, made the verification that the submitted information is true, accurate and complete.

If you have any questions, please do not hesitate to contact me at (281) 285-3692.

Sincerely,

D. J. Ferguson

DuBois J. Ferguson
Remediation Manager

10979058

U.S. EPA REGION IV

SDMS

POOR LEGIBILITY

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V. 2-040506

cc: Honorable G. Ross Anderson, Jr.
G. Ross Anderson, Jr. Federal Building
and United States Courthouse
315 South McDuffie Street, 2nd Floor
Anderson, SC 29624

Honorable William W. Wilkins
Nexsen Pruet
55 E. Camperdown Way
Suite 400
Greenville SC 29601

Leon C. Harmon Esq.
Nexsen Pruet
55 E. Camperdown Way
Suite 400
Greenville SC 29601

John Cresswell
Assistant Director
Division of Site Assessment and Remediation
Bureau of Land &Waste Management
SC Department of Health and
Environmental Control
2600 Bull Street
Columbia, SC 29201

Regional Solicitor's Office
U.S. Department of the Interior
Attn: Harriet M. Deal
75 Spring Street, SW Room 304
Atlanta, GA 30303

Diane Beeman & Diane Duncan
Ecological Services Office
U.S. Fish and Wildlife Service
176 Croghan Spur Road, Suite 200
Charleston, SC 29407

Paul League
SC Department of Natural Resources
Office of Chief Counsel
1000 Assembly Street
Columbia, SC 29202

Anthony Rabern
Georgia Department of Natural Resources
3695 Highway 197
Clarkesville, GA 30523

Office of the Attorney General
Timothy J. Ritzka
Assistant Attorney General
40 Capitol Square SW
Atlanta, GA 30334

Jamie Sykes
Richard B. Russell Project Office
4144 Russell Dam Drive
Elberton, GA 30635

Frank S. Holleman III
Wyche Burgess Freeman & Parham, P.A.
44 East Camperdown Way
Greenville SC 29601-3591

Mr. Paul Doody
ARCADIS
6723 Towpath Road
Syracuse, NY 13214-0066

Mr. Ronald Cardwell
McNair Law Firm, P.A.
Post Office Box 447
Greenville, SC 29602

Ms. Celeste T. Jones
McNair Law Firm, P.A.
Post Office Box 11390
Columbia, SC 29211

June 2011 Monthly Report
Sangamo Weston/Twelvemile Creek/Lake Hartwell Superfund Site
Operable Unit 2

Activities Initiated/Completed

- Dredge Clare continued dredging in the Woodside II (WSII) Impoundment, and continued to perform dredging in the approximate vicinity of STA 50 to STA 58.
- Dredge Kami continued to dredge in the WSII Impoundment, and performed dredging in the upstream direction from approximately STA 62 to STA 57.
- Removed flashboards from WS II.
- Performed daily water quality monitoring.
- Initiated and completed sediment removal activities at Balls Beach, and associated hauling of stockpiled materials. The area was graded and a silt fence was installed.
- Initiated construction of road in center of creek from STA 30+00 to 32+00.
- Maintained lower water surface elevation in WSII Impoundment.
- Continued inspection of site for SWPPP compliance, and made adjustments as necessary.
- On June 9, 2011, SCDHEC Solid Waste Management Regional personnel were onsite for a general visit/inspection and performed a Class Three Landfill Inspection in accordance with Regulation 61-107.19, Part V. No issues were noted during the inspection. The completed Inspection Form is provided as Attachment 1.

Results of Sampling, Tests, and Other Data

- Sampling and analysis is being conducted relative to the creek turbidity, and water treatment system (WTS) effluent water. Results for the effluent water are attached (Attachment 2).
- During dredging, turbidity samples were collected twice daily upstream and downstream of the dredge activities.
- Project photographs are included as Attachment 3.

Plans, Reports, and other Deliverables

- Analytical data related to samples collected from the WTS to assess water treatment effluent water were submitted to SCDHEC in the May Monthly Report (submitted June 28, 2011) in Attachment 2.
- Dredging is in Phase I and II of III from STA 51+00 to STA 68+40, at the Woodside II impoundment. The Dredge Verification Report(s) (DVR) were

submitted for STA 50+00 to 55+00 and the revised STA 25+00 to STA 30+00 in June.

Work Planned for July 2011

- Continue dredge verification surveys with submittal of each 500 foot section to the Special Receivers and their consultant.
- Continue placement of dredged sediment in SMU.
- Continue monitoring WTS discharge.
- Continue dredging in the WSII impoundment.

Issues Encountered, Anticipated Delays, Solutions

- Discharge of treated water ceased on June 6th due to low pH levels. A pH adjustment system was installed, and discharge of treated water resumed on June 7th once a minimum pH of 6.0 could be obtained/maintained.
- Severe weather, including thunder storms, occurred on June 9, 10, 11, 12, 15, 23, and 24, which caused a delay in dredging and related activities.
- Encountered significant difficulty dredging debris close to bedrock, resulting in equipment clogging.

ARCADIS

Attachment 1

DHEC

PROMOTE PROTECT PROSPER

Class Three Landfill Inspection Form
Regulation 61-107.19, Part V

Facility Name: 12 MILE CREEK/RIVER SMU

Date/Time of Inspection: 9 JUN 11

County: PICKENS

Permit #: —

Reason for Inspection: ____ Routine; ____ Follow-up; ____ Complaint; ____ Other: Monthly

Current Weather Conditions: HAZY SKIES 85°

Previous 24-hours: Rain Y (N) – If yes, amount ____ inches; High winds Y (N)

1 – Meets or exceeds regulatory requirements; 2A – Improvement needed (minor issues exist; corrective measures recommended); 2B – Improvement needed (moderate issues exist; corrective action required and scheduled); 3 – Unacceptable (serious issues and/or recurring issues with minimal or no corrective action taken – alleged regulatory or permit condition violations have occurred – enforcement referral required); Y – Yes: Meets or exceeds regulatory requirements; N – No: Corrective measures recommended that should be fixed by the next inspection or an agreed upon completion date; NA – Not applicable; NI – Not inspected

Procedures for Excluding Receipt of Unapproved Waste (258.20)

1. N/A Overall effectiveness of Special Waste Analysis and Implementation Plan (SWAIP)
2. Y N NA NI Trained waste screener present
3. Y N NA NI Random daily load inspections conducted and documented
4. Y N NA NI Records of unacceptable waste maintained
5. Y N NA NI Personnel training program on recognition of regulated hazardous waste and PCB waste
6. Y N NA NI Record of Notification to Department within 72-hours of hazardous or PCB waste receipt
7. Y N NA NI Unauthorized wastes removed from working face by the end of the operating day

Cover Material Requirements (258.21)

8. N/A ≥ 6" soil (short-term cover)
9. ____ Alternate Daily Cover (ADC)
10. ____ ≥ 6" soil (long-term and/or intermediate cover)
11. Y N NA NI Adequate soil quantity available for cover

Control of (258.21, 22, 24, 25 and 37):

12. I Blowing litter
13. I Off-site odors
14. I Disease vectors
15. I Fires/Open burning
16. I Scavenging

Access Requirements (258.25)

17. I Condition of access controls
18. I Condition of all weather roads – entrance
19. I Condition of all weather – internal haul roads

Run-on/Run-off Controls (258.26)

20. I Condition of ditches/swales
21. I Condition of berms/terraces/downchutes
22. I Condition of sedimentation ponds

Leachate Seeps (258.26 and 27)

23. N/A Leachate seep management

Liquid Restrictions (258.28)

24. N/A Free of unauthorized bulk or non-containerized liquids

Record Keeping Requirements (258.29)

25. Y (N) NA NI Required records are maintained in the landfill's operating record

Scale Requirements (258.30)

26. Y N (NA) NI Scales installed and functioning properly

Required Equipment to Operate Landfill (258.31)

27. (Y) N NA NI Required equipment operational – if not please provide details in comments as to the type of equipment down for repairs, impact to operations, and status on temporary replacement equipment

ALL UP

Certified Landfill Manager/Supervisor (258.32)

28. Y N (NA) NI Manager and supervisor certified by SCDHEC
29. Y N (NA) NI Certified manager or supervisor on-site

Leachate Collection System (258.33 and 34)

30. Y N (NA) NI Leachate handling agreement in place
31. ____ Leachate collection system management

Leachate Recirculation System (258 Subpart I and Permit)

32. ____ Leachate recirculation system management
33. Y N NA NI Required leachate recirculation reports/data contained in the landfill's operating record
34. ____ Leachate seep management
35. ____ Leachate collection system management

Testing of Municipal Solid Waste (MSW) Incinerator Ash (258.35)

36. Y N (NA) NI MSW incinerator ash management

Sign Requirements (258.36)

37. Y N (NA) NI Required signs posted

Condition of Monitoring Wells (258.51)

38. I Monitoring well maintenance program

Working Face/Elevation (258.87)

39. (Y) N NA NI Method of elevation control with benchmark

Plans and Permit (Permit)

40. Y N NA NI Operating in accordance with approved plans and general permit
41. Y N NA NI Permitted engineering drawings available
42. Y N NA NI Permitted operational plan available
43. Y N NA NI Permitted stabilization/landscaping plan available
44. Y N NA NI Permitted contingency plan available
45. Y N NA NI Permitted approved groundwater-monitoring plan available
46. Y N NA NI Permitted closure plan available
47. Y N NA NI Permitted post-closure plan available

Name of those present during the inspection: ROY WELLER

Comments: FACILITY APPEARED TO BE OPERATING PROPERLY UPON INSPECTION.

Inspection Item	Corrective action required	Date to be completed

Additional comment page: Y (N)

Photos taken: (Y) N

The signature below certifies that the SCDHEC Inspector has personally checked each item and has answered according to the true condition existing at the time of Inspection.

Roy H Weller
Facility Representative

Bill Rogers
SCDHEC Inspector

ARCADIS

Attachment 2

ARCADIS

Infrastructure · Water · Environment · Buildings

ARCADIS
6723 Towpath Road
P.O. Box 66
Syracuse
New York 13214-0066
Tel 315.446.9120
Fax 315.449.0017
www.arcadis-us.com

ENVIRONMENTAL

Mr. Dale Stoudemire, Manager
South Carolina Department of Health and Environmental Control
Bureau of Water/Water Pollution Control Division
Data Management Section
2600 Bull Street
Columbia, South Carolina 29201

Subject:
Schlumberger Technology Corporation, Twelvemile Creek Restoration Project
Pickens County, South Carolina
May 2011 Sampling Results Report

Date:
June 28, 2011

Contact:
Lance S. Ketcham

Phone:
315.671.9163

Email:
lance.ketcham@arcadis-us.com

Our ref:
MT001019

Dear Mr. Stoudemire:

On behalf of Schlumberger Technology Corporation (STC), ARCADIS is providing a summary of sampling results for the Twelvemile Creek Restoration Project in Pickens County for the month of May 2011 in accordance with the October 15, 2009 letter from Butch Swygert of South Carolina Department of Health and Environmental Control (SCDHEC) to Chris Moody of ARCADIS and the August 9, 2010 SCDHEC construction operation approval memorandum, which replaces the March 11, 2010 SCDHEC construction operation approval memorandum. The August 9, 2010 approval memorandum upgrades the onsite water treatment plant to a Group III – Physical/Chemical facility with a maximum discharge of 8.64 million gallons per day (MGD).

Table 1 contains the water treatment plant flow for the month of May. This data is recorded onsite and is reviewed by a South Carolina certified water treatment plant operator. The maximum daily discharge to Twelvemile Creek for May 2011 was 3.88 MGD on May 15. The average discharge to Twelvemile Creek from the water treatment plant for the month of May was 2.41 MGD.

Table 2 contains the results of the analyses described in Table 1 of the October 15, 2009 letter that were performed on the water treatment plant effluent during the month of April 2011. The Laboratory Services Reports from Rogers & Callcott Laboratory Services related to these tests are provided in Attachment A. The samples were analyzed for pH, temperature, total suspended solids and PCBs. The results for total suspended solids and PCBs were within the ranges outlined in the October 15, 2009 letter. The last pH reading taken during the month of May was not

within the range outlined in the October 15, 2009 letter. Corrective measures were implemented by the Contractor in June to address the pH in the water treatment plant as discussed in the email to SCDHEC on June 7, 2011. Subsequent pH results have been within the range outlined in the October 15, 2009 letter.

Table 3 summarizes the results of the whole effluent toxicity (WET) testing; the Laboratory Services Reports from Rogers & Callcott Laboratory Services for this testing are provided in Attachment B. The acute WET testing result for the first sampling event was within the ranges outlined in the October 15, 2009 letter. The chronic WET testing results from Rogers & Callcott Laboratory Services were not within the ranges outlined in the October 15, 2009 letter for the first sampling event or the subsequent re-sampling that was performed. In addition to re-sampling, the Contractor also provided the samples collected in May to an alternate laboratory (Hydrosphere Research) for analysis. For both sampling events, the results from Hydrosphere Research showed the samples within the ranges mentioned previously; results are provided in Attachment C. In addition, subsequent sampling in early June yielded results within the allowable ranges.

A detailed explanation of the variability in sample results, including a laboratory audit with tests methodology review, is being prepared in response to a June 17, 2011 letter from Mr. Greg Cassidy of SCDHEC.

If you have any questions on the above, please feel free to contact me.

Sincerely,

ARCADIS

Lance S. Ketcham
Principal Engineer

Copies:
Melinda Vickers, SCDHEC
Eric Kim, SCDHEC
Du'Bois J. Ferguson, STC
Gary Odom, STC
J. Paul Doody, ARCADIS

ARCADIS

Tables

Table 1. Daily Flow from Water Treatment Plant for May 2011. Twelvemile Creek Restoration Project, Pickens County

Date	Flow, MGD
Monthly Avg [1]	MR
Daily Max [1]	MR
5/1/2011	3.18
5/2/2011	2.88
5/3/2011	1.96
5/4/2011	3.53
5/5/2011	2.56
5/6/2011	3.01
5/7/2011	2.74
5/8/2011	2.48
5/9/2011	0.71
5/10/2011	3.81
5/11/2011	1.68
5/12/2011	2.58
5/13/2011	3.07
5/14/2011	2.79
5/15/2011	**3.88**
5/16/2011	2.48
5/17/2011	2.74
5/18/2011	2.80
5/19/2011	2.70
5/20/2011	2.81
5/21/2011	2.27
5/22/2011	2.19
5/23/2011	0.59
5/24/2011	1.61
5/25/2011	2.50
5/26/2011	2.81
5/27/2011	3.61
5/28/2011	3.31
5/29/2011	3.29
5/30/2011	0
5/31/2011	1.19
Total Discharge to Twelvemile Creek	74.60
Days per Month	31
Average Discharge	2.41

Notes:

1. The flow rates shown are recorded by a South Carolina certified wastewater treatment plant operator in the water treatment plant flow log maintained onsite. A flow rate of 0 MGD is shown in this table when no flow is recorded in the flow log for that day.
2. The bolded value is the maximum daily discharge recorded.

Superscript Notes:

[1] Discharge reporting guidelines are outlined in the 10/15/2009 letter from Butch Swygert (South Carolina Department of Health and Environmental Control) to Chris Moody (ARCADIS).

Acronyms and Abbreviations:

Avg - average
Max - maximum
MGD - million gallons per day
MR - monitor and report

Table 2. Effluent Sampling Result for May 2011. Twelvemile Creek Restoration Project, Pickens County

Sample Number	Location	Sample Type	Week	Sample Date and Time	pH	Temp. (°C)	TSS (mg/L)	PCB (µg/L)						
								PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260
Monthly Avg.[1]	–	–	–	–	6.0 to 8.5	–	25	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Daily Max.[1]	–	–	–	–	6.0 to 8.5	–	45	0.5	0.5	0.5	0.5	0.5	0.5	0.5
AD00097	WTP Effluent Discharge	G	1	5/3/2011 12:40	6.0	24.1	NA	NA	NA	NA	NA	NA	NA	NA
AD00098	WTP Effluent Discharge	C		5/3/2011 12:35	NA	NA	10.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
AD00645	WTP Effluent Discharge	G	2	5/10/2011 12:10	6.0	24.1	NA	NA	NA	NA	NA	NA	NA	NA
AD00646	WTP Effluent Discharge	C		5/10/2011 12:08	NA	NA	5.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
AD01078	WTP Effluent Discharge	G	3	5/17/2011 12:20	6.0	18.1	NA	NA	NA	NA	NA	NA	NA	NA
AD01079	WTP Effluent Discharge	C		5/17/2011 12:15	NA	NA	19.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
AD01452	WTP Effluent Discharge	G	4	5/25/2011 11:25	5.5	24.8	NA	NA	NA	NA	NA	NA	NA	NA
AD01453	WTP Effluent Discharge	C		5/25/2011 11:20	NA	NA	10.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
				Average	5.9	22.8	11.2	-	-	-	-	-	-	-

Notes:

1. Sampling results compiled from Laboratory Services Reports provided by Rogers & Callcot Laboratory Services and submitted in tabular form as required per the10/15/2009 letter from Butch Swygert (South Carolina Department of Health and Environmental Control [SCDHEC]) to Chris Moody (ARCADIS) and the 3/11/2010 SCDHEC construction and operational approval memorandum.
2. The monthly average includes non-detect readings as indicated by "<" (if applicable) and assumes a value equal to the detection limit. Monthly averages are not calculated for parameters without a detected concentration (indicated by "-").
3. Shaded values are not within the ranges provided in the 10/15/2009 letter.

Superscript Note:

[1] Discharge reporting guidelines and limits are outlined in the 10/15/2009 letter from Butch Swygert (SDHEC) to Chris Moody (ARCADIS).

Acronyms and Abbreviations:

°C - degrees centigrade
G - grab sample
C - 24-hour composite sample
µg/L - micrograms per liter
MGD - million gallons per day
mg/L - milligrams per liter
NA - not analyzed
PCB - polychlorinated biphenyl
Temp. - temperature

Table 3. Whole Effluent Toxicity Result for May 2011. Twelvemile Creek Restoration Project, Pickens County

WET Analysis	Monthly Average [1]	Daily Maximum[1]	Event 1 Results	Event 2 Results	Monthly Average
Ceriodaphnia dubia Chronic WET @ CTC=17.4%	25%	40%	80.9%	85.4%	83.2%
Ceriodaphnia dubia Chronic WET-Reproduction @ CTC=17.4%	MR, %	MR, %	80.9%	85.4%	83.2%
Ceriodaphnia dubia Chronic WET-Survival @ CTC=17.4%	MR, %	MR, %	10.0%	0.0%	5.0%
Ceriodaphnia dubia Acute WET @ ATC=35.5%	–	0 [2]	0	NA	–

Notes:

1. WET testing was performed by ETT.
2. Results of the WET testing are presented as the percent reduction relative to the control sample.
3. Event 1 samples were collected on 5/3, 5/4, and 5/6/2011. One composite sample was collected each day (sample numbers AC99984, AD00178, and AD00466, respectively) to complete the Chronic WET testing. Sample AC99984 was used in the Acute WET testing.
4. Event 2 samples were collected on 5/25, 5/26, and 5/28/2011. One composite sample was collected each day (sample numbers AD01430, AD01554, and AD01638, respectively) to complete the Chronic WET testing.
5. Shaded values indicate that the results are not within the ranges outlined in the 10/15/2009 letter.

Superscript Notes:

[1] Discharge reporting guidelines and limits are outlined in the 10/15/2009 letter from Butch Swygert (South Carolina Department of Health and Environmental Control) to Chris Moody (ARCADIS).

[2] A results of "0" indicates a passing result.

Acronyms and Abbreviations:

MR - monitor and report

NA - not analyzed

WET - whole effluent toxicity

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Attachments

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Attachment A

Laboratory Services Report:
October 15, 2009 Table 1
Analyses

ROGERS & CALLCOTT
LABORATORY SERVICES

P.O. Box 5655, Greenville, SC 29606
Phone: (864) 232-1556 - FAX: (864) 232-6140

AN EMPLOYEE-OWNED COMPANY

Laboratory Services Report

Client: Schlumberger Technology Corporation
Sangamo - Twelve Mile Creek Project
Attention Gary Odom by email

Date Received: 05/03/2011
Time Received: 13:50
Date Reported: 05/05/2011

South Carolina Laboratory Identification 23105
North Carolina Laboratory Certificate Number 27
NELAP Laboratory Identification E87822

Sample Number	*Sample Description*
AD00097	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge grab, collected on 05/03/2011 at 12:40
AD00098	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/03/2011 at 12:35

The attached report is for the samples that were received and are referenced above. Rogers and Callcott maintains a formal QA/QC program. Unless otherwise noted, all analyses performed under NELAP certification have complied with all the requirements of the NELAC standard. The analyses met the QA/QC confidence interval for each test method unless otherwise qualified. Estimated uncertainty available upon request.

We appreciate the opportunity to be of service to you. Please contact us at (864) 232-1556 should you have any questions about this report.

Results released by: Amy J Ashley
authorized signature

Results reviewed by: SSG

Carbon copy: Email to L Ketcham S Handley A Kohler S Cary N Harmer

This report may not be reproduced, except in full, without written permission from Rogers & Callcott, Inc.

Sample Number	Sample Description, Date and Time Collected
AD00097	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge grab, collected on 05/03/2011 at 12:40

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
pH (Field)	6.0	pH units		0.1	05/03/2011 12:40	LRW	SM 4500HB
Temperature (Field)	24.1	degrees C		0.1	05/03/2011 12:40	LRW	SM 2550B

Sample Number	Sample Description, Date and Time Collected
AD00098	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/03/2011 at 12:35

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
3 to 5 day turn around	Completed				05/05/2011 00:00		
Total Suspended Solids	10	mg/l		2.0	05/03/2011 14:05	MLR	SM 2540D
Polychlorinated Biphenyls (PCBs)							
PCB-1016	< RDL	ug/l		0.5	05/05/2011 01:31	RKH	EPA 608
PCB-1221	< RDL	ug/l		0.5	05/05/2011 01:31	RKH	EPA 608
PCB-1232	< RDL	ug/l		0.5	05/05/2011 01:31	RKH	EPA 608
PCB-1242	< RDL	ug/l		0.5	05/05/2011 01:31	RKH	EPA 608
PCB-1248	< RDL	ug/l		0.5	05/05/2011 01:31	RKH	EPA 608
PCB-1254	< RDL	ug/l		0.5	05/05/2011 01:31	RKH	EPA 608
PCB-1260	< RDL	ug/l		0.5	05/05/2011 01:31	RKH	EPA 608
2,4,5,6-Tetrachloro-m-xylene, (Surrogate	102	%		0	05/05/2011 01:31	RKH	EPA 608
Decachlorobiphenyl, (Surrorate)	98	%		0	05/05/2011 01:31	RKH	EPA 608
Liquid-liquid Extraction Pest/PCB 608	Completed				05/03/2011 14:00	CGW	EPA 608

ROGERS & CALLCOTT
LABORATORY SERVICES
P.O. Box 5655, Greenville, SC 29606
Phone (864) 232-1556 Fax (864) 232-6140
Shipping Address: 426 Fairforest Way
Greenville, SC 29607

CHAIN OF CUSTODY RECORD

Client Name: SCHLUMBERGER

Address:

Report To:

Telephone No. FAX No.

PO No. Project No.

Rogers & Callcott Lab No.	Yr. 11 Date	Time	Sample Description	Total Number of Containers	PARAMETERS									COMMENTS:
Filtered (Yes/No)						N	N							
Cooled (Yes/No)						Y	Y							
Container Type (P/G)						P	C							
Container Volume						1L	2½							
Sample Type (Grab/Composite)						C	C							
Sample Source (WW, GW, DW, Other)						WW	WW							
Sample Source Chlorinated (Yes/No)						N	N							
Lab Receipt Cl2 Check						NA	NA							
Lab Receipt pH Check						NA	7							
Preserved (Code)						A	A							
AD	00098	5/3	1235	WATER TREATMENT PLANT DIS. DISCH.	2	TSS	PCB							SAMPLER SET OUT @ 1235 ON 5/2/11 TIME PROPORTIONAL BY R+C AD00097 pH 6.05 GRAB TAKEN + TEMP 24.1°C READ @ 1240 ON 5/3/11 BY R+C

A–None B–HNO_3 C–H_2SO_4 D–NaOH E–HCL F–$Na_2S_2O_3$ G–Boric Acid H–Ascorbic Acid I– ____

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① [signature]	5.3.11 | 1350	② [signature] Shipper Name & #	5.3.11 | 1350
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤	Date/Time	Received by (Sig.) ⑥ Shipper Name & #	Date/Time
Seal # at'chd by ○ Recvd. Intact by ○		Seal # at'chd by ○ Recvd. Intact by ○	

KNOWN HAZARDS ASSOCIATED WITH SAMPLES

Temperature of blank or representative sample
At time of collection 3.1 °C
At time of lab receipt 5.9 °C

ROGERS & CALLCOTT
LABORATORY SERVICES

P.O. Box 5655, Greenville, SC 29606
Phone: (864) 232-1556 - FAX: (864) 232-6140

AN EMPLOYEE-OWNED COMPANY

Laboratory Services Report

Client: Schlumberger Technology Corporation
Sangamo - Twelve Mile Creek Project
Attention Gary Odom by email

Date Received: 05/10/2011
Time Received: 14:05
Date Reported: 05/16/2011

South Carolina Laboratory Identification 23105
North Carolina Laboratory Certificate Number 27
NELAP Laboratory Identification E87822

Sample Number	*Sample Description*
AD00645	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge grab, collected on 05/10/2011 at 12:10
AD00646	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/10/2011 at 12:08

The attached report is for the samples that were received and are referenced above. Rogers and Callcott maintains a formal QA/QC program. Unless otherwise noted, all analyses performed under NELAP certification have complied with all the requirements of the NELAC standard. The analyses met the QA/QC confidence interval for each test method unless otherwise qualified. Estimated uncertainty available upon request.

We appreciate the opportunity to be of service to you. Please contact us at (864) 232-1556 should you have any questions about this report.

Results released by: Anne Norris
authorized signature

Results reviewed by: SB

Carbon copy: Email to L Ketcham S Handley A Kohler S Cary

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Sample Number	Sample Description, Date and Time Collected
AD00645	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge grab, collected on 05/10/2011 at 12:10

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
pH (Field)	6.0	pH units		0.1	05/10/2011 12:10	LRW	SM 4500HB
Temperature (Field)	24.1	degrees C		0.1	05/10/2011 12:10	LRW	SM 2550B

Sample Number	Sample Description, Date and Time Collected
AD00646	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/10/2011 at 12:08

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
3 to 5 day turn around	Completed				05/16/2011 00:00		
Total Suspended Solids	5.6	mg/l		2.0	05/10/2011 14:47	JLA	SM 2540D
Polychlorinated Biphenyls (PCBs)							
PCB-1016	< RDL	ug/l		0.5	05/13/2011 21:38	RKH	EPA 608
PCB-1221	< RDL	ug/l		0.5	05/13/2011 21:38	RKH	EPA 608
PCB-1232	< RDL	ug/l		0.5	05/13/2011 21:38	RKH	EPA 608
PCB-1242	< RDL	ug/l		0.5	05/13/2011 21:38	RKH	EPA 608
PCB-1248	< RDL	ug/l		0.5	05/13/2011 21:38	RKH	EPA 608
PCB-1254	< RDL	ug/l		0.5	05/13/2011 21:38	RKH	EPA 608
PCB-1260	< RDL	ug/l		0.5	05/13/2011 21:38	RKH	EPA 608
2,4,5,6-Tetrachloro-m-xylene, (Surrogate	100	%		0	05/13/2011 21:38	RKH	EPA 608
Decachlorobiphenyl, (Surrorate)	109	%		0	05/13/2011 21:38	RKH	EPA 608
Liquid-liquid Extraction Pest/PCB 608	Completed				05/10/2011 14:30	CGW	EPA 608

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LABORATORY SERVICES
P.O. Box 5655, Greenville, SC 29606
Phone (864) 232-1556 Fax (864) 232-6140
Shipping Address: 426 Fairforest Way
Greenville, SC 29607

CHAIN OF CUSTODY RECORD

Client Name: SCHLUMBERGER

Address:

Report To:

Telephone No. FAX No.

PO No. Project No.

								N	N					Filtered (Yes/No)
								Y	Y					Cooled (Yes/No)
								P	G					Container Type (P/G)
								½G	1G					Container Volume
								C	C					Sample Type (Grab/Composite)
								WN	WN					Sample Source (WW, GW, DW, Other)
								N	N					Sample Source Chlorinated (Yes/No)
								NA	neg					Lab Receipt Cl_2 Check KRV
								NA	7					Lab Receipt pH Check 5.10
								A	A					Preserved (Code)
Rogers & Callcott Lab No.	Yr. 11 Date	Time	Sample Description	Total Number of Containers	PARAMETERS	TSS	PCB							COMMENTS:
AC 00644	5/10	1208	WATER TREATMENT PLANT* EFF. DISCH.	3		2	1	-N						SAMPLER SET OUT @ 1208 ON 5/9/11 Time prop. By R+C
														AD00645
														pH 6.0 GRAB TAKEN +
														Temp 24.1 READ @ 1210
														ON 5/10/11 By R+C

Preserved (Code): A–None, B–HNO_3, C–H_2SO_4, D–NaOH, E–HCL, F–$Na_2S_2O_3$, G–Boric Acid, H–Ascorbic Acid, I– ____

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① [signature]	5/10/11 1405	② Norma Salley Shipper Name & #	5/10/11 1405
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤	Date/Time	Received by (Sig.) ⑥ Shipper Name & #	Date/Time
Seal # at'chd by ○ Recvd. Intact by ○		Seal # at'chd by ○ Recvd. Intact by ○	

KNOWN HAZARDS ASSOCIATED WITH SAMPLES
* SUFFICIENT SAMPLE FOR FIELD DUPLICATES

Temperature of blank or representative sample
At time of collection 3.2 °C
At time of lab receipt 5.2 °C

Form Revised July 2008

R/C COC FORM

ROGERS & CALLCOTT
LABORATORY SERVICES

P.O. Box 5655, Greenville, SC 29606
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AN EMPLOYEE-OWNED COMPANY

Laboratory Services Report

Client: Schlumberger Technology Corporation
Sangamo - Twelve Mile Creek Project
Attention Gary Odom by email

Date Received: 05/17/2011
Time Received: 13:50
Date Reported: 05/19/2011

South Carolina Laboratory Identification 23105
North Carolina Laboratory Certificate Number 27
NELAP Laboratory Identification E87822

Sample Number	*Sample Description*
AD01078	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge grab, collected on 05/17/2011 at 12:20
AD01079	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/17/2011 at 12:15

The attached report is for the samples that were received and are referenced above. Rogers and Callcott maintains a formal QA/QC program. Unless otherwise noted, all analyses performed under NELAP certification have complied with all the requirements of the NELAC standard. The analyses met the QA/QC confidence interval for each test method unless otherwise qualified. Estimated uncertainty available upon request.

We appreciate the opportunity to be of service to you. Please contact us at (864) 232-1556 should you have any questions about this report.

Results released by: Amy J Ashley
authorized signature

Results reviewed by: SS

Carbon copy: Email to L Ketcham S Handley A Kohler S Cary

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Sample Number	Sample Description, Date and Time Collected
AD01078	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge grab, collected on 05/17/2011 at 12:20

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
pH (Field)	6.0	pH units		0.1	05/17/2011 12:20	LRW	SM 4500HB
Temperature (Field)	18.1	degrees C		0.1	05/17/2011 12:20	LRW	SM 2550B

Sample Number	Sample Description, Date and Time Collected
AD01079	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/17/2011 at 12:15

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
3 to 5 day turn around	Completed				05/19/2011 00:00		
Total Suspended Solids	19	mg/l		2.0	05/17/2011 16:34	JLA	SM 2540D
Polychlorinated Biphenyls (PCBs)							
PCB-1016	< RDL	ug/l		0.5	05/18/2011 22:20	RKH	EPA 608
PCB-1221	< RDL	ug/l		0.5	05/18/2011 22:20	RKH	EPA 608
PCB-1232	< RDL	ug/l		0.5	05/18/2011 22:20	RKH	EPA 608
PCB-1242	< RDL	ug/l		0.5	05/18/2011 22:20	RKH	EPA 608
PCB-1248	< RDL	ug/l		0.5	05/18/2011 22:20	RKH	EPA 608
PCB-1254	< RDL	ug/l		0.5	05/18/2011 22:20	RKH	EPA 608
PCB-1260	< RDL	ug/l		0.5	05/18/2011 22:20	RKH	EPA 608
2,4,5,6-Tetrachloro-m-xylene, (Surrogate	90	%		0	05/18/2011 22:20	RKH	EPA 608
Decachlorobiphenyl, (Surrorate)	88	%		0	05/18/2011 22:20	RKH	EPA 608
Liquid-liquid Extraction Pest/PCB 608	Completed				05/17/2011 14:05	CGW	EPA 608

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Phone (864) 232-1556 Fax (864) 232-6140
Shipping Address: 426 Fairforest Way
Greenville, SC 29607

CHAIN OF CUSTODY RECORD

Client Name: Schlumberger
Address:
Report To:
Telephone No.: FAX No.:
PO No.: Project No. TMC

Rogers & Callcott Lab No.	Yr. 11 Date	Time	Sample Description	Total Number of Containers	PARAMETERS	TSS	PCB						COMMENTS:
													Filtered (Yes/No)
								N	N				Cooled (Yes/No)
								Y	Y				Container Type (P/G)
								P	G				Container Volume
								1/2 G	2 1/2 L				Sample Type (Grab/Composite)
								C	C				Sample Source (WW, GW, DW, Other)
								WW	WW				Sample Source Chlorinated (Yes/No)
								N	N				Lab Receipt Cl_2 Check mcl 5-17-11
								NA	Neg				Lab Receipt pH Check
								NA	7				
								A	A				Preserved (Code) A–None B–HNO_3 C–H_2SO_4 D–NaOH E–HCL F–$Na_2S_2O_3$ G–Boric Acid H–Ascorbic Acid I– ____
AD 01079	5/17	1215	WATER TREATMENT PLANT EFF DISCH	2		1	1	N					SAMPLER SET OUT ON 5/16/11 @ 1215; TIME prop. By R&C
													AD01078
													pH 6.0 GRAB TAKEN
													TEMP 18.1°C + READ @ 1220
													5/17/11 By R&C

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.) Shipper Name & #	Date/Time
① [signature]	5.17.11 1350	② [signature]	5.17.11 1350
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤	Date/Time	Received by (Sig.) ⑥ Shipper Name & #	Date/Time
Seal # at'chd by ○	Recvd. Intact by ○	Seal # at'chd by ○	Recvd. Intact by ○

KNOWN HAZARDS ASSOCIATED WITH SAMPLES

Temperature of blank or representative sample
At time of collection 3.0 °C
At time of lab receipt 4.7 °C

Form Revised July 2008

R/C COC FORM

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LABORATORY SERVICES
P.O. Box 5655, Greenville, SC 29606
Phone: (864) 232-1556 - FAX: (864) 232-6140

AN EMPLOYEE-OWNED COMPANY

Laboratory Services Report

Client: Schlumberger Technology Corporation
Sangamo - Twelve Mile Creek Project
Attention Gary Odom by email

Date Received: 05/25/2011
Time Received: 13:55
Date Reported: 05/31/2011

South Carolina Laboratory Identification 23105
North Carolina Laboratory Certificate Number 27
NELAP Laboratory Identification E87822

Sample Number	Sample Description
AD01452	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge grab, collected on 05/25/2011 at 11:25
AD01453	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/25/2011 at 11:20

The attached report is for the samples that were received and are referenced above. Rogers and Callcott maintains a formal QA/QC program. Unless otherwise noted, all analyses performed under NELAP certification have complied with all the requirements of the NELAC standard. The analyses met the QA/QC confidence interval for each test method unless otherwise qualified. Estimated uncertainty available upon request.

We appreciate the opportunity to be of service to you. Please contact us at (864) 232-1556 should you have any questions about this report.

Results released by: Anne Norris
authorized signature

Results reviewed by: [signature]

Carbon copy: Email to L Ketcham S Handley A Kohler S Cary

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Sample Number	Sample Description, Date and Time Collected
AD01452	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge grab, collected on 05/25/2011 at 11:25

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
pH (Field)	5.5	pH units		0.1	05/25/2011 11:25	LRW	SM 4500HB
Temperature (Field)	24.6	degrees C		0.1	05/25/2011 11:25	LRW	SM 2550B

Sample Number	Sample Description, Date and Time Collected
AD01453	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/25/2011 at 11:20

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
3 to 5 day turn around	Completed				05/31/2011 00:00		
Total Suspended Solids	10	mg/l		2.0	05/25/2011 14:05	JLA	SM 2540D
Polychlorinated Biphenyls (PCBs)							
PCB-1016	< RDL	ug/l		0.5	05/31/2011 02:24	RKH	EPA 608
PCB-1221	< RDL	ug/l		0.5	05/31/2011 02:24	RKH	EPA 608
PCB-1232	< RDL	ug/l		0.5	05/31/2011 02:24	RKH	EPA 608
PCB-1242	< RDL	ug/l		0.5	05/31/2011 02:24	RKH	EPA 608
PCB-1248	< RDL	ug/l		0.5	05/31/2011 02:24	RKH	EPA 608
PCB-1254	< RDL	ug/l		0.5	05/31/2011 02:24	RKH	EPA 608
PCB-1260	< RDL	ug/l		0.5	05/31/2011 02:24	RKH	EPA 608
2,4,5,6-Tetrachloro-m-xylene, (Surrogate	98	%		0.00	05/31/2011 02:24	RKH	EPA 608
Decachlorobiphenyl, (Surrorate)	96	%		0.00	05/31/2011 02:24	RKH	EPA 608
Liquid-liquid Extraction Pest/PCB 608	Completed				05/25/2011 14:30	CGW	EPA 608

ROGERS & CALLCOTT LABORATORY SERVICES

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Phone (864) 232-1556 Fax (864) 232-6140
Shipping Address: 426 Fairforest Way
Greenville, SC 29607

CHAIN OF CUSTODY RECORD

Client Name: Schlum Berger

Address:

Report To:

Telephone No.: FAX No.:

PO No.: Project No.: TMC

Rogers & Callcott Lab No.	Yr. 11 Date	Time	Sample Description	Total Number of Containers	PARAMETERS: TSS	PCB							
Filtered (Yes/No)					N	N							
Cooled (Yes/No)					Y	Y							
Container Type (P/G)					P	G							
Container Volume					1/2 C	2 1/2 L							
Sample Type (Grab/Composite)					C	C							
Sample Source (WW, GW, DW, Other)					WW	WW							
Sample Source Chlorinated (Yes/No)					N	N							
Lab Receipt Cl2 Check					NA	Neg							
Lab Receipt pH Check					NA	7							
Preserved (Code)					A	A							
AD	01453	5/25	1120	WATER TREATMENT PLANT EFF. DISCH.	2	1	1						

Preserved (Code): A–None, B–HNO_3, C–H_2SO_4, D–NaOH, E–HCL, F–$Na_2S_2O_3$, G–Boric Acid, H–Ascorbic Acid, I– ____

COMMENTS:

SAMPLED SET OUT @ 1120 ON 5/24/11, TIME prep. By R+C

AD01452

pH 5.5 GRAB TAKEN + TEMP 24.4 READ @ 1125 ON 5/25/11 By R+C

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① [signature]	5-25-11 1355	② [signature] Shipper Name & #	5-25-11 1355
Relinquished by (Sig.) ③		Received by (Sig.) ④ Shipper Name & #	
Relinquished by (Sig.) ⑤		Received by (Sig.) ⑥ Shipper Name & #	
Seal # at'chd by ◯	Recvd. Intact by ◯	Seal # at'chd by ◯	Recvd. Intact by ◯

KNOWN HAZARDS ASSOCIATED WITH SAMPLES

Temperature of blank or representative sample
At time of collection 3.1 °C
At time of lab receipt 5.7 °C

ARCADIS

Attachment B

Laboratory Services Report:
Whole Effluent Toxicity Testing

ROGERS & CALLCOTT
LABORATORY SERVICES

P.O. Box 5655, Greenville, SC 29606
Phone: (864) 232-1556 - FAX: (864) 232-6140

AN EMPLOYEE-OWNED COMPANY

Laboratory Services Report

Client: Schlumberger Technology Corporation
Sangamo - Twelve Mile Creek Project
Attention Gary Odom by email

Date Reported: 05/17/2011

South Carolina Laboratory Identification 23105
North Carolina Laboratory Certificate Number 27
NELAP Laboratory Identification E87822

Sample Number	*Sample Description*
AC99984	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/03/2011 at 12:35
AD00178	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/04/2011 at 12:45
AD00466	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/06/2011 at 12:05

The attached report is for the samples that were received and are referenced above. Rogers and Callcott maintains a formal QA/QC program. Unless otherwise noted, all analyses performed under NELAP certification have complied with all the requirements of the NELAC standard. The analyses met the QA/QC confidence interval for each test method unless otherwise qualified. Estimated uncertainty available upon request.

We appreciate the opportunity to be of service to you. Please contact us at (864) 232-1556 should you have any questions about this report.

Results released by: Anne Norris
authorized signature

Results reviewed by: SH

Carbon copy: Email to L Ketcham S Handley A Kohler S Cary

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ROGERS & CALLCOTT
LABORATORY SERVICES

Case Narrative

AC99984 Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/03/2011 at 12:35

Composite sample AC99984 was subcontracted to ETT for Acute and Chronic Toxicity tests.

AD00178 Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/04/2011 at 12:45

This sample was an additional composite subcontracted to complete the Chronic Toxicity testing.

AD00466 Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/06/2011 at 12:05

This sample was an additional composite subcontracted to complete the Chronic Toxicity testing.

Sample Number	Sample Description, Date and Time Collected
AC99984	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/03/2011 at 12:35

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
Subcontracted Sample Analysis	Completed				05/17/2011 00:00		

Analysis comment for Subcontracted Sample Analysis: See enclosed subcontract report which includes a total of 10 ages for Acute and Chronic Toxicity from ETT Environmental.

Sample Number	Sample Description, Date and Time Collected
AD00178	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/04/2011 at 12:45

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
Subcontracted Sample Analysis	Completed				05/17/2011 00:00		

Analysis comment for Subcontracted Sample Analysis: See enclosed subcontract report which includes a total of 10 ages for Acute and Chronic Toxicity from ETT Environmental.

Sample Number	Sample Description, Date and Time Collected
AD00466	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/06/2011 at 12:05

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
Subcontracted Sample Analysis	Completed				05/17/2011 00:00		

Analysis comment for Subcontracted Sample Analysis: See enclosed subcontract report which includes a total of 10 ages for Acute and Chronic Toxicity from ETT Environmental.

D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

DMR Attachment for Pass/Fail Whole Effluent Toxicity Test Results

TWELVE MILE CREEK RESTORATION PROJE Permit number SC Discharge number

FINAL LIMITS 04/01/2010- Parameter TGA3B MLOC=1 ATC=35.50% effluent

	Year	Month	Day		Year	Month	Day
Monitoring period From	11	5	01	To	11	5	31

Mortality Data - Acute and Chronic Tests / Reproduction Data-Chronic Tests Only

Date 03-May-11

Lab ID 23104

Group	# Adults	# Dead	Pass/Fail	Average	Variance	Pass/Fail
Control	20	0				
Test	20	0	Pass			

Mortality Data - Acute and Chronic Tests / Reproduction Data-Chronic Tests Only

Date

Lab ID

Group	# Adults	# Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Mortality Data - Acute and Chronic Tests / Reproduction Data-Chronic Tests Only

Date

Lab ID

Group	# Adults	# Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Mortality Data - Acute and Chronic Tests / Reproduction Data-Chronic Tests Only

Date

Lab ID

Group	# Adults	# Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Mortality Data - Acute and Chronic Tests / Reproduction Data-Chronic Tests Only

Date

Lab ID

Group	# Adults	# Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Mortality Data - Acute and Chronic Tests / Reproduction Data-Chronic Tests Only

Date

Lab ID

Group	# Adults	# Dead	Pass/Fail	Average	Variance	Pass/Fail
Control						
Test						

Signature of Principal Executive Officer or Authorized Agent _____

Name/Title of Principal Executive Officer (*typed or printed*) _____

DHEC 3420 (8/05)

source	rep	Control Survival and Reproduction by Test Day 1	2	3	4	5	6	7	8	Total	
M9 4-21	A		0							0	
V1 4-22	A		0							0	
BB9 4-22	A		0							0	
Random	A		0							0	
	A		0							0	
	B		0							0	
	B		0							0	
	B		0							0	
	B		0							0	
	B		0							0	
	C		0							0	
	C		0							0	
	C		0							0	
	C		0							0	
	C		0							0	
	D		0							0	
	D		0							0	
	D		0							0	
	D		0							0	Mean
	D		0							0	0.0

		35.5 % Effluent Survival and Reproduction by Test Day 1	2	3	4	5	6	7	8	Total	
M9 4-21	A		0							0	
V1 4-22	A		0							0	
BB9 4-2	A		0							0	
Random	A		0							0	
0	A		0							0	
0	B		0							0	
0	B		0							0	
0	B		0							0	
0	B		0							0	
0	B		0							0	
0	C		0							0	
0	C		0							0	
0	C		0							0	
0	C		0							0	
0	C		0							0	
0	D		0							0	
0	D		0							0	
0	D		0							0	
0	D		0							0	Mean
0	D		0							0	0.0
									05-May-11		
									05:32 PM	AE	
Old temp. °C			24.5								

D=Dead N/A-Lost or not used

[redacted]	T37745
[redacted]	SCHLUMBERGER
[redacted]	EFFLUENT
[redacted]	SC
[redacted]	0
[redacted]	5
[redacted]	03-May-11
[redacted]	1645
[redacted]	J0
[redacted]	Ceriodaphnia dubia
[redacted]	5-2-11
[redacted]	BATCH 2
[redacted]	SCAPF
[redacted]	MHSF
[redacted]	%
[redacted]	35.5
[redacted]	
[redacted]	30 ml
[redacted]	15 ml
[redacted]	1
[redacted]	16lt/8dk
[redacted]	24.8
[redacted]	0.05 ml
[redacted]	0.05 ml
[redacted]	EPA 821-R-02-013:1002

Comments
NEO.FED TIME- 1430

****

01:29 PM

ETT Environmental, Inc.
P.O. Box 16414, Greenville, SC 29606
(864) 877-6942 • Fax (864) 877-6938
4 Craftsman Court, Greer, SC 29650

Ceriodaphnia dubia Survival and Reproduction Test

EPA-821-R-02-013 Method 1002

Test Species: *Ceriodaphnia dubia*

Client: SCHLUMBERGER
Facility: EFFLUENT
NPDES #: SC

Test Date: 03-May-11

Laboratory ID#: T37744

Test Reviewed and Approved By:

Robert W. Kelley, Ph.D.
Laboratory Manager

[redacted] **Certification #E87819**

SCDHEC Certification #23104

Test results presented in this report conform to all requirements of NELAC, conducted under NELAC Certification Number E87819 Florida Dept. of Health. Included results pertain only to provided samples.

NCDENR Certification # 022

D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

DMR Attachment for Chronic Multi-Concentration Whole Effluent Toxicity Test Results Using Linear Interpolation

TWELVE MILE CREEK RESTORATION F Permit number SC Discharge number

FINAL LIMITS 04/01/2010- Parameter Code TCP3B MLOC=1 CTC= 17.40% effluent

		Year	Month	Day		Year	Month	Day
Monitoring period	From	11	5	1	To	11	5	31

		Mortality Data			Reproduction Data	
		Group	# Adults	# Dead	Group Average	Group Variance
Date	03-May-11	0	10	0	22.0	22.00
Lab ID	23104	8	10	0	14.9	56.99
		17.4	10	1	4.2	30.84
		35	10	3	2.0	8.22
IC25=	< 8.0%	50	10	3	4.2	10.62
48 hr Chronic LC50 =	> 100.0%	100	10	10	0.0	0.00

% Survival Effect at CTC= 10.0%

% Reproduction Effect at CTC= 80.9%

		Mortality Data			Reproduction Data	
		Group	# Adults	# Dead	Group Average	Group Variance
Date						
Lab ID	23104					
IC25=						
48 hr Chronic LC50 =						

% Survival Effect at CTC=

% Reproduction Effect at CTC=

Signature of Principal Executive Officer or Authorized Agent _____

Name/Title of Principal Executive Officer (*typed or printed*) _____

DHEC 3710 (8/05)

PERMITTEE NAME/ADDRESS (*Include Facility Name/Location If Different*)

NAME: TWELVE MILE CREEK RESTORATION PROJECT

ADDRESS: PICKENS COUNTY, SC

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (*NPDES*)

DISCHARGE MONITORING REPORT (*DMR*)

Form Approved.
OMB No. 2040-0004

SC		MINOR
PERMIT NUMBER	DISCHARGE NUMBER	FINAL LIMITS

DMR VALID: 04/01/2010-

FACILITY: TWELVE MILE CREEK RESTORATION PROJECT

LOCATION: PICKENS COUNTY, SC

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	11	5	01	TO	11	5	31

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING AVERAGE	QUANTITY OR LOADING MAXIMUM	QUANTITY OR LOADING UNITS	QUANTITY OR CONCENTRATION MINIMUM	QUANTITY OR CONCENTRATION AVERAGE	QUANTITY OR CONCENTRATION MAXIMUM	QUANTITY OR CONCENTRATION UNITS	NO. EX	FREQUENCY OF ANALYSIS	Sample Type
TCP3B LAB ID: 23104	SAMPLE MEASUREMENT	*********	*********	*****	*********	80.9	80.9	PER-CENT	2	1/30	24
%Effect Statre 7Day Chr Ceriodaphnia MLOC=1	PERMIT REQUIREMENT	*********	*********	*****	*********	25 QRTR AVG	40 MAXIMUM			1/30	24
TJP3B LAB ID: 23104	SAMPLE MEASUREMENT	*********	*********	*****	*********	10.0	10.0	PER-CENT	0	1/30	24
%Mortality 7Day Chr CERIODAPHNIA MLOC=1	PERMIT REQUIREMENT	*********	*********	*****	*********	REPORT QRTR AVG	REPORT MAXIMUM			1/30	24
TVP3B LAB ID: 23104	SAMPLE MEASUREMENT	*********	*********	*****	*********	80.9	80.9	PER-CENT	0	1/30	24
% Repro Reduc Statre 7d Chr Ceriodaphnia MLOC=1	PERMIT REQUIREMENT			*****	*********	REPORT QRTR AVG	REPORT MAXIMUM			1/30	24
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: 0

CODE NUMBER

DATE: YEAR MO DAY

COMMENTS AND EXPLANATIONS OF ANY VIOLATIONS (*Reference all attachments here*)

Chronic toxicity CTC=17.4% effluent

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION/GROWTH TEST
Statistical Analyses

Client: **TWELVE MILE CREEK RESTORATION PROJECT**

Sample Identification: **EFFLUENT**

Test Date: **03-May-2011**

Tests for Normality and Heterogeneity of Variance

Parameter	*Test Used*	*Result*
Normality	N/A	N/A
Variance	N/A	N/A

Sample Use

	Sample Date	Sample Used		
Sample A	03-May-11	03-May-11	04-May-11	
Sample B	05-May-11	05-May-11	06-May-11	
Sample C	07-May-11	07-May-11	08-May-11	09-May-11

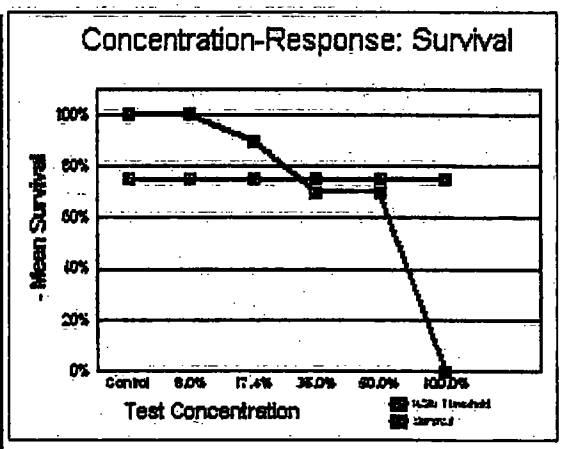
Tests for Differences in Survival and Reproduction

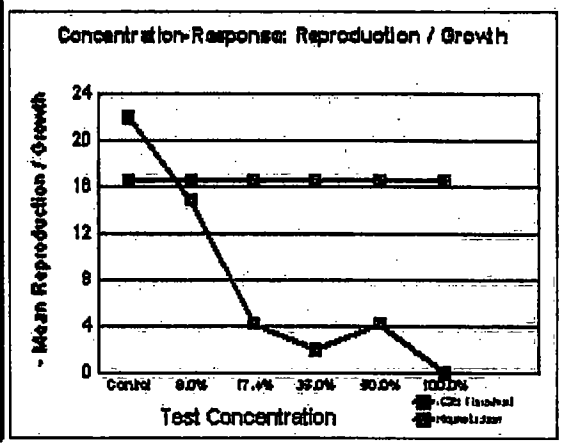
Test Type Used: Linear Interpolation

		% Effluent					
Effect	**Control**	**8.0%**	**17.4%**	**35.0%**	**50.0%**	**100.0%**	
Survival	100.0%	100.0%	90.0%	70.0%	70.0%	0.0%	
% reduction		0.0%	10.0%	30.0%	30.0%	100.0%	
Reproduction	22.0	14.9	4.2	2.0	4.2	0.0	
% reduction (smoothed)		32.3%	80.9%	85.9%	85.9%	100.0%	
Variance	22.00	56.99	30.84	8.22	10.62	0.00	

Acceptability Criteria	Value	Upper Limit	Lower Limit
CV:Coeff. of Variation	21.3%	42.0%	8.9%
PMSD: % MSD	20.1%	37.0%	11.0%
MSD:Min. Sign. Diff.	4.4	Acceptability criteria limits not exceeded	

IC25 Point Estimates			TEST RESULTS	
Survival	IC25=	30.6%	%Reduction per Linear Interpolation	
Reproduction	IC25=	< 8.0%	@CTC of	17.4%
Hypothesis Testing			Survival effect	10.0%
NOEC Reproduc		<8.0%	Reproduction effect	80.9%
ChV Reproducti		<8.0%		FAIL





Comments

source	rep	Test Day 1	2	3	4	5	6	7	8	Total	
V7 4-22	A			0	4	9	13			26	control
A3 4-21	B			0	5	11	0			16	
U3 4-22	C			0	4	7	11			22	
CC9 4-22	D			0	0	9	14			23	
P10 4-21	E			0	3	9	12			24	
DD2 4-22	F			0	0	12	12			24	
D8 4-21	G			0	3	0	13			16	
W4 4-22	H			0	4	10	14			28	
EE5 4-22	I			0	4	0	11			15	
N4 4-21	J			4	0	7	15			26	22.0
8	A			0	4	7	0			11	
	B			0	0	7	9			16	
	C			0	3	9	13			25	
	D			0	3	11	0			14	
	E			0	4	0	13			17	
	F			4	0	0	6			10	
	G			0	0	0	0			0	
	H			0	3	8	0			11	
	I			0	5	9	11			25	Mean
	J			5	0	6	9			20	14.9
17.4	A			0	0	0	0			0	
	B			0	0	0	0			0	
	C			0	0	0	0			0	
	D			0	0	0	10			10	
	E			0	3	0	0			3	
	F			0	2	0	3			5	
	G			0	0	0	D			0	
	H			0	0	0	0			0	
	I			0	0	0	8			8	Mean
	J			0	2	6	8			16	4.2
35	A			0	0	0	9			9	
	B			0	0	0	0			0	
	C			0	0	0	0			0	
	D			4	0	0	D			4	
	E			0	0	0	D			0	
	F			0	2	0	0			2	
	G			0	0	0	0			0	
	H			0	0	0	2			2	
	I			0	0	0	3			3	Mean
	J			0	0	0	D			0	2.0
50	A			0	2	0	6			8	
	B			0	0	0	8			8	
	C			0	D					0	
	D			0	0	0	D			0	
	E			0	1	0	4			5	
	F			0	0	0	7			7	
	G		D							0	
	H			0	0	0	6			6	
	I			0	0	0	3			3	Mean
	J			0	0	0	5			5	4.2
100	A		D							0	
	B		D							0	
	C		D							0	
	D		D							0	
	E		D							0	
	F		D							0	
	G		D							0	
	H		D							0	
	I		D							0	Mean
	J		D							0	0.0
renew		JS	JS	JS	AE	BB			End Date		
fed		JS	JS	JS	AE	BB			09-May-11		
time fed & renew		02:07 PM	11:30 AM	02:25 PM	08:01 AM	07:10 AM			12:25 PM	AE	
New temp. °C		25.7	25.4	25.4	24.5	24.7					
Old temp. °C		25.2	25.3	25.6	24.7	24.9	24.8				

D=Dead N/A-Lost or not used

Lab#	T37744
Client	SCHLUMBERGER
Sample ID	EFFLUENT
NPDES#	SC
County	0
Month	5
Start & fed Date	03-May-11
Start & fed Time	1515
Started & fed By	JC
Test Organism	Ceriodaphnia dubia
Neo. born date	22-Dec-99
Neo. born time	BATCH 2
Test Type	SCCD
Dilution Water	MHSF
Units for Conc.	%
%3rd BROOD	
Test vessels	30 ml
Test volume	15 ml
Incubator #	1
Light	16lt/8dk
Initial Temp °C	25
Selenastrum	0.05 ml
YAT	0.05 ml
Test method	EPA 821-R-02-013:1002

Comments

ROGERS & CALLCOTT LABORATORY SERVICES

P.O. Box 5665, Greenville, SC 29606
Phone (864) 232-1556 Fax (864) 232-6140
Shipping Address: 426 Fairforest Way
Greenville, SC 29607

CHAIN OF CUSTODY RECORD

PAGE 1 1

Client Name: ROGERS & CALLCOTT

Address:

Report To:

Telephone No.: FAX No.:

PO No.: Project No.: TMC

Rogers & Callcott Lab No.	Yr. 11 Date	Time	Sample Description	Total Number of Containers	PARAMETERS: ACUTE TOXICITY							
Filtered (Yes/No)					N							
Cooled (Yes/No)					Y							
Container Type (P/G)					P							
Container Volume					2G							
Sample Type (Grab/Composite)					C							
Sample Source (WW, GW, DW, Other)					WW							
Sample Source Chlorinated (Yes/No)					N							
Lab Receipt Cl2 Check												
Lab Receipt pH Check												
Preserved (Code)					A							
AC 99984	5/3	1235	WATER TREATMENT PLANT ETT DISCHARGE *	1	1							

Preserved (Code): A–None, B–HNO_3, C–H_2SO_4, D–NaOH, E–HCL, F–$Na_2S_2O_3$, G–Boric Acid, H–Ascorbic Acid, I– ____

COMMENTS:

3774A/3774B

SAMPLER SET OUT @ 1235 ON 5/2/11 TIME PROPORTIONAL BY R&C

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.) / Shipper Name & #	Date/Time
① [signature]	5/3/11 1412	② [signature]	5/3/11 1412
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ / Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤	Date/Time	Received by (Sig.) ⑥ / Shipper Name & #	Date/Time
Seal # at'chd by ◯ Recvd. Intact by ◯		Seal # at'chd by ◯ Recvd. Intact by ◯	

KNOWN HAZARDS ASSOCIATED WITH SAMPLES

* DELIVER TO ETT LAB

Temperature of blank or representative sample

At time of collection 3.1 °C

At time of lab receipt 5.8 °C

Form Revised July 2008

R/C COC FORM

ROGERS & CALLCOTT
LABORATORY SERVICES
P.O. Box 5655, Greenville, SC 29606
Phone (864) 232-1556 Fax (864) 232-6140
Shipping Address: 426 Fairforest Way
Greenville, SC 29607

CHAIN OF CUSTODY RECORD

PAGE 1 1

Client Name: ROGERS + CALLCOTT

Address:

Report To:

Telephone No.: FAX No.:

PO No.: Project No.: TMC

Rogers & Callcott Lab No.	Yr 11 Date	Time	Sample Description	Total Number of Containers	PARAMETERS: CHRONIC TOXICITY							
Filtered (Yes/No)					N							
Cooled (Yes/No)					Y							
Container Type (P/G)					P							
Container Volume					2L							
Sample Type (Grab/Composite)					C							
Sample Source (WW, GW, DW, Other)					WW							
Sample Source Chlorinated (Yes/No)					N							
Lab Receipt Cl2 Check												
Lab Receipt pH Check												
Preserved (Code)					A							
AD	00178	5/4	1245	WALNUT TREATMENT PLANT EFF. DISCH. *	1	1						

Preserved (Code): A–None, B–HNO_3, C–H_2SO_4, D–NaOH, E–HCL, F–$Na_2S_2O_3$, G–Boric Acid, H–Ascorbic Acid, I– ____

COMMENTS:

37744B

SAMPLER SET OUT @ 1245 ON 5/3/11. TIME PROP. BY R+C

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.) / Shipper Name & #	Date/Time	KNOWN HAZARDS ASSOCIATED WITH SAMPLES
① [signature]	5/4/11 1418	② [signature]	5/4/11 1418	* DELIVERED TO ETT LAB
Relinquished by (Sig.) ③		Received by (Sig.) ④ Shipper Name & #		
Relinquished by (Sig.) ⑤		Received by (Sig.) ⑥ Shipper Name & #		Temperature of blank or representative sample: At time of collection 3.1 °C; At time of lab receipt 2.8 °C
Seal # at'chd by ◯ Recvd. intact by ◯		Seal # at'chd by ◯ Recvd. intact by ◯		

Form Revised July 2008

R/C COC FORM

ROGERS & CALLCOTT LABORATORY SERVICES

P.O. Box 5655, Greenville, SC 29606
Phone (864) 232-1556 Fax (864) 232-6140
Shipping Address: 426 Fairforest Way
Greenville, SC 29607

CHAIN OF CUSTODY RECORD

PAGE 1 / 1

Client Name: ROGERS + CALLCOTT

Address:

Report To:

Telephone No.: FAX No.:

PO No.: Project No.: TMC

Rogers & Callcott Lab No.	Yr. 11 Date	Time	Sample Description	Total Number of Containers	PARAMETERS: CHRONIC TOXICITY								
					Filtered (Yes/No)	N							
					Cooled (Yes/No)	Y							
					Container Type (P/G)	P							
					Container Volume	½G							
					Sample Type (Grab/Composite)	C							
					Sample Source (WW, GW, DW, Other)	WW							
					Sample Source Chlorinated (Yes/No)	N							
					Lab Receipt Cl2 Check								
					Lab Receipt pH Check								
					Preserved (Code)	A							
AD 004160	5/6	1205	WWTP Treatment Plant Eff. Disch. *	1		1							

Preserved (Code): A–None, B–HNO_3, C–H_2SO_4, D–NaOH, E–HCL, F–$Na_2S_2O_3$, G–Boric Acid, H–Ascorbic Acid, I– ____

COMMENTS:

37749C

Sample set out @ 1205 on 5/5/11, Time prop. By R+C

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① [signature]	5/6/11 1345	② [signature] Shipper Name & #	5/6/11 1345
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤	Date/Time	Received by (Sig.) ⑥ Shipper Name & #	Date/Time

Seal # at'chd by ◯ Recvd. Intact by ◯ Seal # at'chd by ◯ Recvd. Intact by ◯

KNOWN HAZARDS ASSOCIATED WITH SAMPLES

* DELIVERED TO ETT LAB

Temperature of blank or representative sample

At time of collection 3.0 °C

At time of lab receipt 2.3 °C

Form Revised July 2008

R/C COC FORM

ROGERS & CALLCOTT
LABORATORY SERVICES

P.O. Box 5655, Greenville, SC 29606
Phone: (864) 232-1556 - FAX: (864) 232-6140

AN EMPLOYEE-OWNED COMPANY

Laboratory Services Report

Client: Schlumberger Technology Corporation
Sangamo - Twelve Mile Creek Project
Attention Gary Odom by email

Date Reported: 06/07/2011

South Carolina Laboratory Identification 23105
North Carolina Laboratory Certificate Number 27
NELAP Laboratory Identification E87822

Sample Number	*Sample Description*
AD01430	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/25/2011 at 11:20
AD01554	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/26/2011 at 11:25
AD01638	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/28/2011 at 08:28

The attached report is for the samples that were received and are referenced above. Rogers and Callcott maintains a formal QA/QC program. Unless otherwise noted, all analyses performed under NELAP certification have complied with all the requirements of the NELAC standard. The analyses met the QA/QC confidence interval for each test method unless otherwise qualified. Estimated uncertainty available upon request.

We appreciate the opportunity to be of service to you. Please contact us at (864) 232-1556 should you have any questions about this report.

Results released by: Rebecca J. Musick
authorized signature

Results reviewed by:

Carbon copy: Email to L Ketcham S Handley A Kohler S Cary

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ROGERS & CALLCOTT
LABORATORY SERVICES

Case Narrative

AD01430 Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/25/2011 at 11:20

Composite sample AD01430 was subcontracted to ETT for Acute and Chronic Toxicity tests.

AD01554 Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/26/2011 at 11:25

This sample was an additional composite subcontracted to complete the Chronic Toxicity testing.

AD01638 Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/28/2011 at 08:28

This sample was an additional composite subcontracted to complete the Chronic Toxicity testing.

Sample Number	Sample Description, Date and Time Collected
AD01430	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/25/2011 at 11:20

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
Subcontracted Sample Analysis	Completed				06/07/2011 00:00		

Analysis comment for Subcontracted Sample Analysis: See enclosed subcontract report which includes a total of 7 pages for Acute and Chronic Toxicity from ETT Environmental Inc.

Sample Number	Sample Description, Date and Time Collected
AD01554	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/26/2011 at 11:25

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
Subcontracted Sample Analysis	Completed				06/07/2011 00:00		

Analysis comment for Subcontracted Sample Analysis: See enclosed subcontract report which includes a total of 7 pages for Acute and Chronic Toxicity from ETT Environmental Inc.

Sample Number	Sample Description, Date and Time Collected
AD01638	Schlumberger Technology TMC Water Treatment Plant Effluent Discharge composite, collected on 05/28/2011 at 08:28

Parameter	Result	Unit	Flag	RDL	Date/Time	Analyst	Method
Subcontracted Sample Analysis	Completed				06/07/2011 00:00		

Analysis comment for Subcontracted Sample Analysis: See enclosed subcontract report which includes a total of 7 pages for Acute and Chronic Toxicity from ETT Environmental Inc.

ETT
Environmental, Inc.
P.O. Box 18414, Greenville, SC 29606
(864) 877-6942 • Fax (864) 877-6938
4 Craftsman Court, Greer, SC 29650

Ceriodaphnia dubia Survival and Reproduction Test

EPA-821-R-02-013 Method 1002

Test Species: *Ceriodaphnia dubia*

Client: SCHLUMBERGER
Facility: EFFLUENT
NPDES #: SC

Test Date: 25-May-11

Laboratory ID#: T37846

Test Reviewed and Approved By:

Robert W. Kelley, Ph.D.
Laboratory Manager

[redacted] **Certification #E87819**

SCDHEC Certification #23104

Test results presented in this report conform to all requirements of NELAC, conducted under NELAC Certification Number E87819 Florida Dept. of Health. Included results pertain only to provided samples.

NCDENR Certification # 022

D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

DMR Attachment for Chronic Multi-Concentration Whole Effluent Toxicity Test Results Using Linear Interpolation

TWELVE MILE CREEK RESTORATION P Permit number SC Discharge number

FINAL LIMITS 04/01/2010- Parameter Code TCP3B MLOC=1 CTC= 17.40% effluent

		Year	Month	Day		Year	Month	Day
Monitoring period	From	11	5	1	To	11	5	31

Date 25-May-11

Lab ID 23104

IC25= < 8.0%

48 hr Chronic LC50 = 66.70%

Mortality Data			Reproduction Data	
Group	# Adults	# Dead	Group Average	Group Variance
0	10	0	31.6	9.82
8	10	0	20.0	69.11
17.4	10	0	4.6	6.27
35	10	0	4.1	7.11
50	10	3	0.9	0.99
100	10	10	0.0	0.00

% Survival Effect at CTC= 0.0%

% Reproduction Effect at CTC= 85.4%

Date

Lab ID 23104

IC25=

48 hr Chronic LC50 =

Mortality Data			Reproduction Data	
Group	# Adults	# Dead	Group Average	Group Variance

% Survival Effect at CTC=

% Reproduction Effect at CTC=

Signature of Principal Executive Officer or Authorized Agent _____

Name/Title of Principal Executive Officer (*typed or printed*) _____

DHEC 3710 (8/05)

CHRONIC DEFINITIVE SURVIVAL AND REPRODUCTION/GROWTH TEST
Statistical Analyses

Client: TWELVE MILE CREEK RESTORATION PROJECT

Sample Identification: EFFLUENT

Test Date: 25-May-2011

Tests for Normality and Heterogeneity of Variance

Parameter	*Test Used*	*Result*
Normality	N/A	N/A
Variance	N/A	N/A

Sample Use

	Sample Date	Sample Used		
Sample A	25-May-11	25-May-11	26-May-11	
Sample B	26-May-11	27-May-11	28-May-11	
Sample C	28-May-11	29-May-11	30-May-11	31-May-11

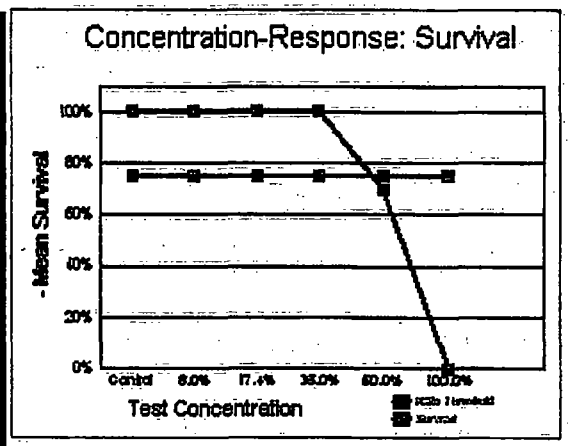
Tests for Differences in Survival and Reproduction

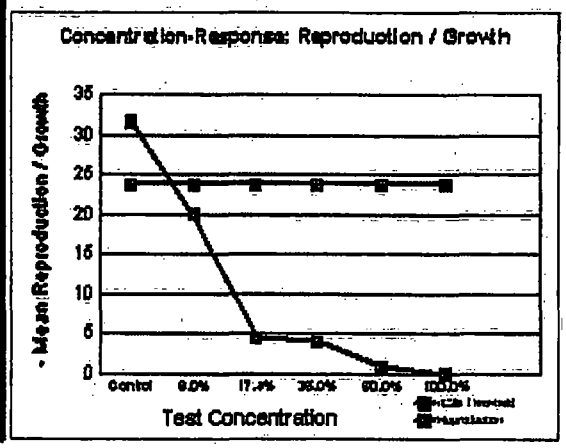
Test Type Used: Linear Interpolation

		% Effluent					
Effect	Control	8.0%	17.4%	35.0%	50.0%	100.0%	
Survival	100.0%	100.0%	100.0%	100.0%	70.0%	0.0%	
% reduction		0.0%	0.0%	0.0%	30.0%	100.0%	
Reproduction	31.6	20.0	4.6	4.1	0.9	0.0	
% reduction (smoothed)		36.7%	85.4%	87.0%	97.2%	100.0%	
Variance	9.82	69.11	6.27	7.11	0.99	0.00	

Acceptability Criteria	Value	Upper Limit	Lower Limit
CV:Coeff. of Variation	9.9%	42.0%	8.9%
PMSD: % MSD	11.9%	37.0%	11.0%
MSD:Min. Sign. Diff.	3.8	Acceptability criteria limits not exceeded	

IC25 Point Estimates		TEST RESULTS	
Survival	IC25= 47.5%	%Reduction per Linear Interpolation	
Reproduction	IC25= < 8.0%	@CTC of	17.4%
Hypothesis Testing		Survival effect	0.0%
NOEC Reproduc	<8.0%	Reproduction effect	85.4%
ChV Reproducti	<8.0%		FAIL





Comments

source	rep	Test Day 1	2	3	4	5	6	7	8	Total	
D5,5/19	A				6	8	0	20		34	control
A1,5/19	B				6	6	0	16		28	
Q3,5/19	C				3	12	0	17		32	
Q2,5/19	D				5	13	0	16		34	
DD2,5/13	E				3	0	12	17		32	
AA4,5/13	F				4	0	10	17		31	
AA2,5/13	G				5	9	0	18		32	
W3,5/12	H				5	0	11	20		36	
W4,5/12	I				4	12	0	16		32	
U1,5/12	J				0	11	14	0		25	31.6
8	A				6	0	0	14		20	
	B				3	9	0	13		25	
	C				6	0	5	15		25	
	D				4	0	0	13		17	
	E				4	0	0	13		17	
	F				3	11	0	13		27	
	G				3	10	0	15		28	
	H				2	0	0	2		4	
	I				4	11	0	13		28	Mean
	J				0	0	9	0		9	20.0
17.4	A				5	0	0	0		5	
	B				3	0	0	0		3	
	C				4	6	0	0		10	
	D				3	0	0	0		3	
	E				3	0	0	0		3	
	F				2	0	0	6		8	
	G				5	0	0	0		5	
	H				3	0	0	0		3	
	I				3	0	0	0		3	Mean
	J				0	0	3	0		3	4.6
35	A				3	0	0	0		3	
	B				0	0	0	0		0	
	C				4	0	0	0		4	
	D				3	0	0	3		6	
	E				0	0	0	0		0	
	F				4	0	3	0		7	
	G				3	0	0	2		5	
	H		N/A							0	
	I				4	0	0	3		7	Mean
	J				0	0	0	5		5	4.1
52	A				0	0	0	0		0	
	B				0	0	2	0		2	
	C				0	0	0	1		1	
	D				0	0	0	0		0	
	E				0	0	0	2		2	
	F	D								0	
	G				2	0	0	0		2	
	H	D								0	
	I				2	0	0	0		2	Mean
	J	D								0	0.9
100	A		D							0	
	B		D							0	
	C	D								0	
	D		D							0	
	E		D							0	
	F	D								0	
	G		D							0	
	H	D								0	
	I		D							0	Mean
	J	D								0	0.0
renew		BB	AE	AE	AE	BB	AE		End Date		
fed		BB	AE	AE	AE	BB	AE		01-Jun-11		
time fed & renew		12:48 PM	11:31 AM	09:54 AM	10:02 AM	09:30 AM	11:11 AM		10:23 AM	AE	
New temp. °C		25.2	25.1	24.6	24.6	24.8	24.3				
Old temp. °C		24.8	24.6	24.9	25.2	24.6	24.8	24.7			

D=Dead N/A-Lost or not used

Lab#	T37846
Client	SCHLUMBERGER
Sample ID	EFFLUENT
NPDES#	SC
County	0
Month	6
Start & fed Date	05/25/11
Start & fed Time	1530
Started & fed By	BB
Test Organism	Ceriodaphnia dubia
Neo. born date	05/24/11
Neo. born time	BATCH 2
Test Type	SCCD
Dilution Water	MHSF
Units for Conc.	%
%3rd BROOD	
Test vessels	30 ml
Test volume	15 ml
Incubator #	1
Light	16l/8dk
Initial Temp °C	24.7
Selenastrum	0.05 ml
YAT	0.05 ml
Test method	EPA 821-R-02-013:1002

Comments

8% J PALE ON DAY 2
N/A=NO ORGANISM IN CUP

ROGERS & CALLCOTT LABORATORY SERVICES

P.O. Box 5655, Greenville, SC 29606
Phone (864) 232-1556 Fax (864) 232-6140
Shipping Address: 426 Fairforest Way
Greenville, SC 29607

CHAIN OF CUSTODY RECORD

PAGE 1 / 1

Client Name: ROGERS & CALLCOTT

Address:

Report To:

Telephone No.: FAX No.:

PO No.: Project No.: TMC

Rogers & Callcott Lab No.	Yr. 11 Date	Time	Sample Description	Total Number of Containers	PARAMETERS: Acute + Chronic Toxicity							
Filtered (Yes/No)					N							
Cooled (Yes/No)					Y							
Container Type (P/G)					P							
Container Volume					1/2G							
Sample Type (Grab/Composite)					C							
Sample Source (WW, GW, DW, Other)					WW							
Sample Source Chlorinated (Yes/No)					N							
Lab Receipt Cl_2 Check												
Lab Receipt pH Check												
Preserved (Code)					A							
AD	D1430	5/25	1120	WATER TREATMENT PLANT EFF. DISCH.	2	2						

Preserved (Code): A–None, B–HNO_3, C–H_2SO_4, D–NaOH, E–HCL, F–$Na_2S_2O_3$, G–Boric Acid, H–Ascorbic Acid, I– ____

COMMENTS:

37846A

SAMPLER SET OUT @ 1120, 5/24/11, TIME PROP. BY R+C

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① [signature]	5/25/11 1421 1355	② [signature] Shipper Name & #	5/25/11 1421 1355
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤	Date/Time	Received by (Sig.) ⑥ Shipper Name & #	Date/Time
Seal # at'chd by ◯	Recvd. intact by ◯	Seal # at'chd by ◯	Recvd. intact by ◯

KNOWN HAZARDS ASSOCIATED WITH SAMPLES

* DELIVERED TO ETTLAB

Temperature of blank or representative sample

At time of collection 3.1 °C

At time of lab receipt 5.8 °C

Form Revised July 2008

R/C COC FORM

ROGERS & CALLCOTT LABORATORY SERVICES

P.O. Box 5655, Greenville, SC 29606
Phone (864) 232-1556 Fax (864) 232-6140
Shipping Address: 426 Fairforest Way
Greenville, SC 29607

CHAIN OF CUSTODY RECORD

PAGE 1 1

Client Name: ROGERS + CALLCOTT

Address:

Report To:

Telephone No.: FAX No.:

PO No.: Project No.: TMC

Rogers & Callcott Lab No.	Yr. 11 Date	Time	Sample Description	Total Number of Containers	PARAMETERS	CHRONIC TOXICITY							COMMENTS:
													37846B
AD 01554	5/26	1125	WATER TREATMENT PLANT * EFF. DISCH.	2		2							SAMPLER SET OUT @ 1125 ON 5/25/11, TIME PROP. BY R+C.

Filtered (Yes/No)	N
Cooled (Yes/No)	Y
Container Type (P/G)	P
Container Volume	½G
Sample Type (Grab/Composite)	C
Sample Source (WW, GW, DW, Other)	WW
Sample Source Chlorinated (Yes/No)	N
Lab Receipt Cl_2 Check	
Lab Receipt pH Check	
Preserved (Code)	A

A–None, B–HNO_3, C–H_2SO_4, D–NaOH, E–HCL, F–$Na_2S_2O_3$, G–Boric Acid, H–Ascorbic Acid, I– ____

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① [signature]	5/26/11 1400	② [signature] Shipper Name & #	5/26/11 1400
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤	Date/Time	Received by (Sig.) ⑥ Shipper Name & #	Date/Time

Seal # at'chd by ◯ Recvd. Intact by ◯ Seal # at'chd by ◯ Recvd. Intact by ◯

KNOWN HAZARDS ASSOCIATED WITH SAMPLES

* DELIVERED TO ETT LAB

Temperature of blank or representative sample

At time of collection 3.3 °C

At time of lab receipt 5.9 °C

Form Revised July 2008

R/C COC FORM

ROGERS & CALLCOTT
LABORATORY SERVICES
P.O. Box 5655, Greenville, SC 29606
Phone (864) 232-1556 Fax (864) 232-6140
Shipping Address: 426 Fairforest Way
Greenville, SC 29607

CHAIN OF CUSTODY RECORD

PAGE 1 1

Client Name: ROGERS + CALLCOTT
Address:
Report To:
Telephone No.: FAX No.:
PO No.: Project No. TMC

Filtered (Yes/No)	N
Cooled (Yes/No)	Y
Container Type (P/G)	P
Container Volume	½G
Sample Type (Grab/Composite)	C
Sample Source (WW, GW, DW, Other)	WW
Sample Source Chlorinated (Yes/No)	N
Lab Receipt Cl_2 Check	
Lab Receipt pH Check	
Preserved (Code)	A

A–None, B–HNO_3, C–H_2SO_4, D–NaOH, E–HCL, F–$Na_2S_2O_3$, G–Boric Acid, H–Ascorbic Acid, I– ____

Rogers & Callcott Lab No.	Yr. 11 Date	Time	Sample Description	Total Number of Containers	PARAMETERS	CHRONIC TOXICITY	COMMENTS: 37846C
AD 01638	5/28	0828	WATER TREATMENT PLANT EFF. DISCH.	2		2	SAMPLER SET OUT @ 0828 ON 5/27/11, TIME PROP. BY R+C

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① [signature]	5/28/11	② A. Ewald Z [signature] Shipper Name & #	5/28/11 0930
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤	Date/Time	Received by (Sig.) ⑥ Shipper Name & #	Date/Time

Seal # at'chd by ◯ Recvd. Intact by ◯ Seal # at'chd by ◯ Recvd. Intact by ◯

KNOWN HAZARDS ASSOCIATED WITH SAMPLES
* DELIVERED TO ETT LAB

Temperature of blank or representative sample
At time of collection 3.0 °C
At time of lab receipt 5.8 °C

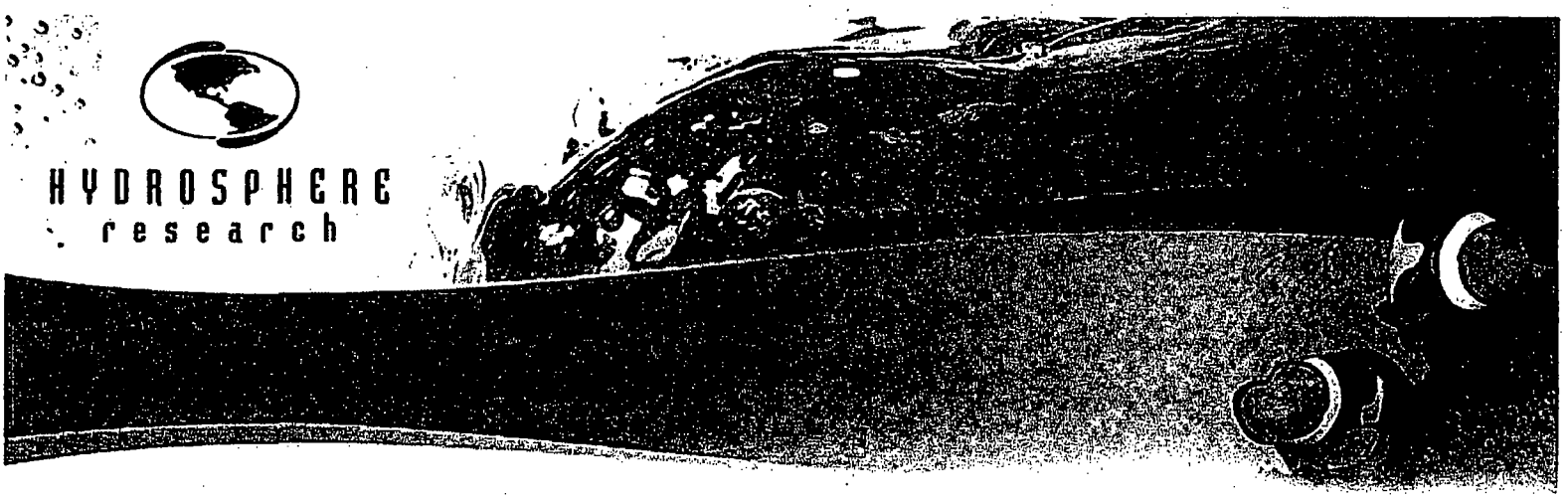
Form Revised July 2008

R/C COC FORM

ARCADIS

Attachment C

Hydrosphere Research Chronic Toxicity Test Results



Prepared for:
CH2M Hill
198 Old Henderson Road
Central, SC 29630

Prepared by:
Hydrosphere Research

Test Location:
11842 Research Circle
Alachua, FL 32615-6817

Contact information:
Craig Watts, Lab Director
Tel: (386) 462-7889
Fax: (386) 462-7264

Test Number:
CH2-SC 11104

Toxicity Test Report

Test Type: 7-Day Chronic Static Renewal Definitive Toxicity Tests

Initiated: May 4, 2011

Hydrosphere Research is a NELAC/P Certified Lab (E82295)

Contents

Synopsis

Whole Effluent Toxicity Report

Summary of Observations and Deviations from Protocol

Appendix A. Chain of Custody Record

Appendix B. Raw Data Sheets

Appendix C. Reference Toxicant Data

Synopsis of Bioassays for CH2M Hill

Personnel at CH2M Hill, South Carolina, collected a series of composite samples on May 3, 4, & 6, 2011, from the site labeled WTP Discharge at the Twelvemile Creek Restoration Project. Hydrosphere Research received these samples in good condition. The Chain of Custody forms are included as Appendix A.

Using these samples, a series of 7-day chronic static renewal definitive bioassay tests were conducted with the water flea (*Ceriodaphnia dubia*). Test concentrations were 0 (control), 8, 17.4, 35, 50, & 100 percent effluent. Bioassays were initiated on May 4, 2011.

The results are included as Appendix B and summarized in the following table:

	Percent Effluent	*C. dubia*	
		Final Survival (%)	Three Brood Totals (Average # of neonates / female)
WTP Discharge	Control	100	34.2
	8	100	36.3
	17.4	100	33.9
	35	100	20.9
	50	80	7.8
	100	0	0
	IC_{25}	--	**27.5%**

These bioassays were initiated within 36 hours of the sample collection time and were acceptable tests based on control survival and test conditions.

HYDROSPHERE research

NPDES WHOLE EFFLUENT TOXICITY TESTING REPORT FORM

All blanks on this form are to be filled in.
Blanks that are not used should be filled in with "N/A" or a line drawn through the blank. Please print.

Attachments: Please attach the following items to this report form and indicate with an "x" in box.

1.	All Chain-of-Custody Forms	X
2.	All Reference Toxicant Data for each Organism used in Test and Current Control Charts for each Organism	X
3.	All Raw Data (Bench Sheets) Pertaining to the Tests (i.e., all physical, chemical, and biological measurements)	X
4.	All Result Calculations	X
5.	Discharge Monitoring Reports (DMR) when Applicable	NA

Facility/industry/client name:	Twelvemile Creek Restoration Project		
Permit number:	Unknown	County:	Pickens

Consultant company name:	Hydrosphere Research	Telephone:	(386) 462-7889
Dates test(s) conducted--Begin:	05/04/11	End:	05/11/11
Persons conducting test(s) (print names):	G. Flaig, M. Foti, K. Waterman		

Authorized signature:	P.R.F.	Date:	5/13/2011

Laboratory report #/project #:	CH2-SC 11104	Sampler (print name):	N. Reeves

DMR monitoring period end date on which this test is reported (filled out by the Permittee--mm/dd/yy):					
Routine test:	X	Additional test:	NA	Failed routine test date:	NA

Samples

No.	Date & Time Collected	Lab Sample #	Grab	24-Hour Composite	Arrival Temperature (°C)	Initial Residual Chlorine	Lab Dechlorination	
							Y/N	Chemical Used
1.	05/03/11-1235	11104A	NA	X	0.7	<0.04	N	NA
2.	05/04/11-1245	11104B	NA	X	1.4	<0.04	N	NA
3.	05/06/11-1205	11104C	NA	X	1.6	<0.04	N	NA
4.	NA	NA	NA	NA	NA	NA	NA	NA
5.	NA	NA	NA	NA	NA	NA	NA	NA
6.	NA	NA	NA	NA	NA	NA	NA	NA
7.	NA	NA	NA	NA	NA	NA	NA	NA
8.	NA	NA	NA	NA	NA	NA	NA	NA
9.	NA	NA	NA	NA	NA	NA	NA	NA
10.	NA	NA	NA	NA	NA	NA	NA	NA

	Wet Ice	Blue Ice	Other (describe)	Samples Aerated	
				Yes (describe)	No
Refrigerant used for sample transportation:	X	NA	NA	X, All samples for 5 minutes	NA

	Bus	Hand	Common Carrier	Samples Filtered	
				Yes (describe)	No
Samples delivered by:	NA	NA	X	NA	X

HYDROSPHERE research

SUMMARY OF TEST CONDITIONS

Type of Test[a]	Test Concentrations[b] (% Effluent)	Test Species Used[c]	Age of Test Organism	Amount & Type of Food	How Often Fed	Test Chamber Volume	Volume of Effluent Used	Type of Chamber	# of Organisms/ Chamber	# of Replicates	Temp. Range (°C)
F	0, 8, 17.4, 35, 50, 100	CD	< 24 hours	0.1 ml YCT + 0.1 ml S. cap	1x/day	30 ml	20 ml	Plastic cup	1	10	25.0 ± 1.0
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

G. "Other" type of test:	NA	Temperature readings:	Single	Multiple	Continuous
			NA	X	NA

Description of control water:	Moderately Hard Reconstituted	Photoperiod during test:	16 hours light / 8 hours dark

Reference Toxicant Data[d]					
Name of Toxicant	Dates of Test		Species[c]	In-House or Commercially Obtained	LC_{25}/NOEC/ IC_{25}
	Begin	End			
KCl	05/03/11	05/10/11	CD	In-House	IC_{25} = 243.92mg/L
NA	NA	NA	NA	NA	NA

[a]Please fill the "Type of Test" box with the appropriate letter:

A. 48-Hr/Non-Renewal/Single Concentration (Screen)
B. 48-Hr/Non-Renewal/Multi-Concentration (Definitive)
C. 96-Hr/Renewed Every 48 Hrs/Single Concentration (Screen)
D. 96-Hr/Renewed Every 48 Hrs/Multi-Concentration (Definitive)
E. 7-Day Chronic/Single Concentration (Screen)/Renewed Daily
F. 7-Day Chronic/Multi-Concentration (Definitive)/Renewed Daily
G. Other (described in the "G" box)

[b]List all concentrations of effluent used (i.e., 0%, 6.25%, 12.5%, 25%, 50%, 100%).

[c]Write appropriate letters for the following species in this column:

CD - *Ceriodaphnia dubia*
FM - *Pimephales promelas* (fathead minnow)
SS - *Menidia beryllina* (inland silverside)
MS - *Americamysis bahia* (formerly *Mysidopsis bahia*, mysid shrimp)
CL - *Cyprinella leedsi* (bannerfin shiner)
Other - Please describe: _____

[d]Attach all reference toxicant raw data & control charts for each organism/reference toxicant used for the test.

HYDROSPHERE research

TEST RESULTS
ACUTE

Test Species	Test Concentrations[b] (% Effluent)	Grab Sample[c]	Composite Sample[c]	% Mortality[d] (48 Hours)	% Mortality[d] (96 Hours)	LC_{50}[e]
Control[a]	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
Control[a]	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA

[a]List % Control Mortality in appropriate column (48 or 96 hr) for organisms (use abbreviations shown on footnote "c" of page 2) that you list under the word "Control."

[b]List all concentrations of effluent used (i.e., 0%, 6.25%, 12.5%, 25%, 50%, 100%).

[c]Record number that corresponds with the number of the sample in the "Date & Time Collected" column in sample section on page 1.

[d]List % Mortality for each organism and control if you are conducting a single concentration (Screen) test.

[e]If multi-concentration (Definitive) tests are conducted on grab or composite samples, record the calculated LC_{50} in this column for each sample. Enter "N/A" in all % Mortality columns and LC_{50} box at bottom of this table.

Species	LC_{50}[f]
NA	NA
NA	NA

[f]If a single concentration (screen) test is conducted and >50% mortality occurs in any one of the four grab or composite samples, record <100% in this column. If ≤50% mortality occurs in all four grabs or composites, record >100% in this column. Draw a line through the LC_{50} column in the above table.

HYDROSPHERE research

TEST RESULTS
CHRONIC

Test Species[a]	Test Concentrations[b] (% Effluent)	IC_{25}		
		Growth	Reproduction	Fecundity
CD	0, 8, 17.4, 35, 50, 100	NA	27.5%	NA
NA	NA	NA	NA	NA
NA	NA	NA	NA	NA

[a]Use abbreviations shown on footnote "c" of page 2.

[b]List all concentrations of effluent used (i.e., 0%, 6.25%, 12.5%, 25%, 50%, 100%).

CD Survival in Control (>80%)	100%
Average Number of Young per Female in CD Control (min 15 young/surviving female)	34.2

FM Survival in Control (>80%)	NA
Average FM Dry Weight in Control (min ADW 0.25 mg/FM in surviving controls)	NA

MS Survival in Control (>80%)	NA
Average MS Dry Weight in Control (min ADW 0.20 mg/MS in surviving controls)	NA

SS Survival in Control (>80%)	NA
Average SS Dry Weight in Control (min immediate ADW 0.50 mg/SS in surviving controls)	NA

Summary of Observations and Deviations from Protocol

A series of 7-day chronic static renewal definitive bioassays were initiated on May 4, 2011, for CH2M Hill's Twelvemile Creek Restoration Project, Pickens County, South Carolina.

During these tests dissolved oxygen, temperature and pH remained within the limits established in the test method. The results of the standard reference toxicant tests, provided in Appendix C, indicate that the organisms were of normal sensitivity for this laboratory.

There were no unusual observations or deviations from standard test protocol. These test results only relate to the samples described in this report and meet all requirements of NELAC.

Notes:

1. Bioassay tests reported herein were conducted in accordance with one or more of the following:

   a. U.S. Environmental Protection Agency. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition. EPA-821-R-02-012. October 2002.

   b. U.S. Environmental Protection Agency. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms. Fourth Edition. EPA-821-R-02-013. October 2002.

   c. U.S. Environmental Protection Agency. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. Third Edition. EPA-821-R-02-014. October 2002.

2. The *C. dubia* acute bioassay and the *P. promelas (C. leedsi)* acute bioassays are conducted by methods summarized in Tables 11 and 13, respectively, of the document cited in 1.a. above.

3. Chemical and physical parameters reported herein were determined by methods described in "Methods for Chemical Analysis of Water and Waste, EPA 600/4-79-020, March, 1984.

4. The adverse effect measured in acute tests is mortality. Assessment of mortality is described in documents listed above. Chronic test endpoints are mortality and reproduction or growth, and assessment of these test endpoints are also described in the appropriate documents listed above.

5. Bioassay tests were performed at Hydrosphere Research, 11842 Research Circle, Alachua, FL 32615, telephone number (386) 462-7889. This laboratory is NELAC/P certified by the State of Florida Department of Health and Rehabilitation Services (Certification No. E82295).

6. The *C. dubia* test organisms were cultured in-house.

Appendix A

Chain of Custody

HYDROSPHERE research

CHAIN OF CUSTODY

Please complete ALL fields other than grey areas (grey areas are to be completed by lab personnel)

Client Name	Client Shipping Address
CH2M Hill	198 Old Henderson Road Central, SC 29630

Sample Kit Tracking Information	Method of Shipment	Prepared and Shipped By	Sample Kit Received By (Print Clearly and Sign)
Cooler 6 of 6 Container Type ☒ ½ Gallon Jug ☐ 5 Gallon Cubitainer™ ☐ Other ____ # of Containers 4	☐ Fed Ex Ground ☐ Fed Ex Overnight ☐ Client Pickup ☐ UPS ☐ Greyhound ☐ Other ____	WQ Date 4·13·11	Nikole Reeves Date 5/3/11 Time 12:45pm Condition of Seal Upon Receipt (Check One) ☒ Intact ☐ Other (describe) ____

Ship Sample Priority Overnight To	Refrigerant Used for Shipping	Composite Sample Information
Hydrosphere Research 11842 Research Circle Alachua, FL 32615 (386) 462-7889 *Be sure to mark for Saturday delivery if appropriate.*	☒ Wet Ice ☐ Other ____ *Samples must arrive at the lab at 6.0°C or less but never frozen. Pack cooler completely with ice before shipping.*	Samples/ Hour 2 Volume/Sample 170ML Total Hours 24 Total Volume ____ Initiated Date 5/2/11 Time 12:35pm Ended Date 5/3/11 Time 12:35pm Chilled During Collection ☒ Yes ☐ No
Sampling Location CH2M **Permit #** — **County Samples Collected In** SC	**Sample(s) Shipped Via** ☒ Fed Ex ☐ Greyhound ☐ Client ☐ UPS ☐ Other ____	

Outfall Number	Date	Time (24 Hour Format)	Sample Type: Comp.	Sample Type: Grab	# of Containers	Sampled By (Print Clearly and Sign)	For Lab Use: Arrival Temp (°C)	For Lab Use: Sample Id No.
	5/3/11	12:35pm	✓		1	WTP Discharge Eff.	0.7	111104A

Relinquished By (Print Clearly and Sign)	Date	Time	Shipped Via
Nikole Reeves	5/3/11	1:10pm	FedEx

Received By (Print Clearly and Sign)	Date	Time	Relinquished By (Print Clearly and Sign)	Date	Time
			KF 5.4.11		

Received By Lab (Print Clearly and Sign)	Date	Time	Shippers Tracking Numbers
Meaghan Foth	5.4.11	1100	7970 5475 6725

Distribution White (Original) – Lab, Yellow – Lab, Pink – Client

See Provisions on back

HYDROSPHERE research

CHAIN OF CUSTODY

Please complete ALL fields other than grey areas (grey areas are to be completed by lab personnel)

Client Name	Client Shipping Address
CH2M Hill	198 Old Henderson Road Central, SC 29630

Sample Kit Tracking Information	Method of Shipment	Prepared and Shipped By	Sample Kit Received By (Print Clearly and Sign)
Cooler 5 of 6 Container Type ☒ ½ Gallon Jug ☐ 5 Gallon Cubitainer™ ☐ Other # of Containers 4	☐ Fed Ex Ground ☐ Fed Ex Overnight ☐ Client Pickup ☐ UPS ☐ Greyhound ☐ Other	UUA Date 4·13·11	NIKOLE REEVES NKR Date 5/4 Time 12:30 Condition of Seal Upon Receipt (Check One) ☒ Intact ☐ Other (describe)

Ship Sample Priority Overnight To	Refrigerant Used for Shipping	Composite Sample Information
Hydrosphere Research 11842 Research Circle Alachua, FL 32615 (386) 462-7889 *Be sure to mark for Saturday delivery if appropriate.*	☒ Wet Ice ☐ Other *Samples must arrive at the lab at 6.0°C or less but never frozen. Pack cooler completely with ice before shipping.*	Samples/ Hour 2 Volume/Sample 170 Total Hours 24 Total Volume Initiated Date 5/3 Time 12:45 Ended Date 5/4 Time 12:45 Chilled During Collection ☒ Yes ☐ No
Sampling Location CH2M Permit # — County Samples Collected In SC	Sample(s) Shipped Via ☒ Fed Ex ☐ Greyhound ☐ Client ☐ UPS ☐ Other	

Outfall Number	Date	Time (24 Hour Format)	Sample Type: Comp.	Sample Type: Grab	# of Containers	Sampled By (Print Clearly and Sign)	For Lab Use: Arrival Temp (°C)	For Lab Use: Sample Id No.
	5/4	12:45	✓		3	WTP Discharge Eff NKR	14	11104 B

Relinquished By (Print Clearly and Sign)	Date	Time	Shipped Via
NIKOLE REEVES NKR	5/4	13:20	Fed Ex

Received By (Print Clearly and Sign)	Date	Time	Relinquished By (Print Clearly and Sign)	Date	Time
—			MF 5.5.11		

Received By Lab (Print Clearly and Sign)	Date	Time	Shippers Tracking Numbers
Meagan Fohr	5.5	1110	7947 2078 3867

Distribution White (Original) – Lab, Yellow – Lab, Pink – Client

See Provisions on back

HYDROSPHERE research

CHAIN OF CUSTODY

Please complete ALL fields other than grey areas (grey areas are to be completed by lab personnel)

Client Name	Client Shipping Address
CH2M Hill	198 Old Henderson Road Central, SC 29630

Sample Kit Tracking Information
Cooler 3 of 6
Container Type ☒ ½ Gallon Jug ☐ 5 Gallon Cubitainer™ ☐ Other
# of Containers 4

Method of Shipment
☐ Fed Ex Ground ☐ Fed Ex Overnight ☐ Client Pickup ☐ UPS ☐ Greyhound ☐ Other

Prepared and Shipped By MCA
Date 4·13·11

Sample Kit Received By (Print Clearly and Sign) NIKOLE REEVES
Date 5/6/11 Time 11:45 AM
Condition of Seal Upon Receipt (Check One) ☒ Intact ☐ Other (describe)

Ship Sample Priority Overnight To
Hydrosphere Research
11842 Research Circle
Alachua, FL 32615
(386) 462-7889
Be sure to mark for Saturday delivery if appropriate.

Sampling Location CH2M
Permit # —
County Samples Collected In SC

Refrigerant Used for Shipping
☒ Wet Ice ☐ Other
Samples must arrive at the lab at 6.0°C or less but never frozen. Pack cooler completely with ice before shipping.

Sample(s) Shipped Via
☒ Fed Ex ☐ Greyhound ☐ Client ☐ UPS ☐ Other

Composite Sample Information
Samples/ Hour 2 Volume/Sample 170 ml
Total Hours 24 Total Volume
Initiated Date 5/5 Time 12:05
Ended Date 5/6 Time 12:05
Chilled During Collection ☒ Yes ☐ No

Outfall Number	Date	Time (24 Hour Format)	Sample Type: Comp.	Sample Type: Grab	# of Containers	Sampled By (Print Clearly and Sign)	For Lab Use: Arrival Temp (°C)	For Lab Use: Sample Id No.
	5/6	12:05	✓		3	WTP Discharge Eff.	1.6	111054

Relinquished By (Print Clearly and Sign)	Date	Time	Shipped Via
NIKOLE REEVES	5/6/11	12:30	FedEx

Received By (Print Clearly and Sign)	Date	Time	Relinquished By (Print Clearly and Sign)	Date	Time
CF 5/7			CF 5/7		

Received By Lab (Print Clearly and Sign)	Date	Time	Shippers Tracking Numbers
Greg Flanz	5-7-11	1045	824331 7947·2910 8266 CF 5/7

Distribution White (Original) – Lab, Yellow – Lab, Pink – Client

See Provisions on back

Appendix B

Raw Data Sheets

Survival & Reproduction — **Chronic Freshwater Method (EPA-821-R-02-013, Method 1002.0)**

Client:	CH2M Hill - South Carolina
Code:	CH2-SC
Job #:	11104
Species:	*Ceriodaphnia dubia*
Code:	CD
ID #:	5716
Age:	< 24-h
Test Vessel:	30-mL Plastic Cup
Test Volume:	20-mLs per replicate
Initiation Date:	5.4.11
Termination Date:	5.11.11
Sample Description:	WTP Discharge

(Valid Control is 80% survival @ 24 & ≥15 neonates average surviving female)

Effluent, %	Sample Description	REP	1 R	2 F	3 Sa	4 SU	5 M	6 T	7 W	1st-3rd brood total
0	Control	A	✓	✓	∅	∅5	●	∅11	∅19	35
		B	✓	✓	∅	∅5	∅8	●	∅20	33
		C	✓	✓	∅	∅6	∅7	●	∅20	33
		D	✓	✓	∅	∅5	∅10	●	∅18	33
		E	✓	✓	∅	∅5	∅9	●	∅20	34
		F	✓	✓	∅	∅6	∅12	●	∅24	42
		G	✓	✓	∅	∅5	∅9	●	∅18	32
		H	✓	✓	∅	∅5	∅9	●	∅18	32
		I	✓	✓	∅	∅5	●	∅9	∅12	26
		J	✓	✓	∅	∅6	●	∅13	∅23	42
Total Live Count:			10	10	10	10	10	10	10	342 ✓

1st dilution	Sample Description	REP	1	2	3	4	5	6	7	1st-3rd brood total
8	Effluent	A	✓	✓	∅	∅5	●	∅11	∅17	33
		B	✓	✓	∅	∅5	∅12	●	∅21	38
		C	✓	✓	∅	∅6	∅12	● 1	∅21	40
		D	✓	✓	∅	∅5	∅11	●	∅17	33
		E	✓	✓	∅	∅5	∅8	● 1	∅22	36
		F	✓	✓	∅	∅4	∅11	●	∅20	35
		G	✓	✓	∅	∅5	∅12	●	∅19	36
		H	✓	✓	∅	∅5	∅12	● 1	∅24	42
		I	✓	✓	∅	∅5	∅9	●	∅22	36
		J	✓	✓	∅	∅5	●	∅13	∅16	34
Total Live Count:			10	10	10	10	10	10	10	368 ✓

2nd dilution	Sample Description	REP	1	2	3	4	5	6	7	1st-3rd brood total
17.4	Effluent	A	✓	✓	∅	∅5	●	∅11	∅16	32
		B	✓	✓	∅	∅6	∅11	●	∅18	35
		C	✓	✓	∅	∅5	●	∅11	∅16	32
		D	✓	✓	∅	∅5	∅10	●	∅18	33
		E	✓	✓	∅	∅5	∅4 ● 4		∅19	32
		F	✓	✓	∅	∅5	●	∅10	∅18	32
		G	✓	✓	∅	∅5	∅10	●	∅18	33
		H	✓	✓	∅	∅5	∅11	●	∅19	35
		I	✓	✓	∅	∅4	∅10	●	∅20	34
		J	✓	✓	∅	∅5	●	∅15	∅20	40
Total Live Count:			10	10	10	10	10	10	10	339 ✓

3rd dilution	Sample Description	REP	1	2	3	4	5	6	7	1st-3rd brood total
35	Effluent	A	✓	✓	∅	∅2	∅3	∅9	∅17	29
		B	✓	✓	∅	∅3	●	∅8	∅14	25
		C	✓	✓	∅	∅	∅3	∅9	∅12	24
		D	✓	✓	∅	∅3	●	∅6	∅16	25
		E	✓	✓	∅	∅	∅4	●	∅11	15
		F	✓	✓	∅	∅3	●	∅8	∅13	24
		G	✓	✓	∅	∅	⊛	∅5	∅11	16
		H	✓	✓	∅	∅3	●	∅5	∅12	20
		I	✓	✓	∅	∅	∅5	∅12	●	17
		J	✓	✓	∅	∅	⊛	∅4	∅10	14
Total Live Count:			10	10	10	10	10	10	10	209 ✓

4th dilution	Sample Description	REP	1	2	3	4	5	6	7	1st-3rd brood total
50	Effluent	A	✓	✓	◐	◐	◐	⊛	∅3	3
		B	✓	✓	∅	∅	⊛	∅3	∅7	10
		C	✓	✓	∅	∅	●	∅2	∅8	10
		D	✓ ◐	~~○~~	~~○~~	~~○~~	~~○~~	~~○~~	~~∅ GF 5/6~~	/
		E	✓	✓	◐	◐	◒	●	∅6	6
		F	✓	✓	∅	∅	⊛	∅2	∅6 GF	8
		G	✓	∅	~~○~~	~~○~~	~~○~~	~~○~~	~~○ GF 5/6~~	/
		H	✓	✓	∅	∅2	●	∅6	∅12	20
		I	✓	✓	∅	∅	◒	∅5	●	5
		J	✓	✓	∅	∅	∅2	∅6	∅8	16
Total Live Count:			9	~~8~~ GF 5/6	8	8	8	8	8	78 ✓

5th dilution	Sample Description	REP	1	2	3	4	5	6	7	1st-3rd brood total
100	Effluent	A	~~✓~~	~~∅~~	○	○	○	○	○	
		B	✓	∅	○	○	○	○	○	
		C	✓	∅	○	○	○	○	○	
		D	✓	∅	○	○	○	○	○	
		E	~~✓~~	∅	○	○	~~○~~ GF 5/6	○	○	
		F	✓	∅	○	○	○	○	○	
		G	✓	∅	○	○	○	○	○	
		H	✓	∅	○	○	○	○	○	
		I	✓	∅	○	○	○	○	○	
		J	✓	∅	○	○	○	○	○	
Total Live Count:			~~9~~ 8 GF 5-6	~~0~~	—	—	GF 5/7	—	—	

Day:	0	1	2	3	4	5	6	7
Initials:	MF	GF	GF	GF	MF	[illegible]	MF	MF
Time:	1430	12:45	19:30	1:30	1150	14:00	1040	1000
YCT #:	118	118	118	118	118	118	118	
S. capricornutum #:	141	141	141	141	141	141	141	

Notes & Comments

① organism dead GF 5/5

③ 33 ✓ MF 5.11

② alive adult, no neonates MF 5.8 ✓

Normal CD's: ⊘ or ● Adult w/ neonates; ⊛ Adult w/ embryos; ◒ Adult newly deposited embryos; ◐ Adult w/ eggs in oviducts; # number of live neonates

Abnormal CD's: ⊗ Adult w/ small brood; ◐ Adult, reproductively inactive; ♂ Male; ∅ Dead Adult; * aborted brood

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	5/4/2011	Test ID:	11104	Sample ID:	CH2-SC
End Date:	5/11/2011	Lab ID:	HR-Hydrosphere Research	Sample Type:	EFF2-Industrial
Sample Date:	5/3/2011	Protocol:	EPAF 91-EPA Freshwater	Test Species:	CD-Ceriodaphnia dubia
Comments:	WTP Discharge				

Conc-%	1	2	3	4	5	6	7	8	9	10
B-Lab Control	35.000	33.000	33.000	33.000	34.000	42.000	32.000	32.000	26.000	42.000
8	33.000	38.000	40.000	33.000	36.000	35.000	36.000	42.000	36.000	34.000
17.4	32.000	35.000	32.000	33.000	32.000	33.000	33.000	35.000	34.000	40.000
35	29.000	25.000	24.000	25.000	15.000	24.000	16.000	20.000	17.000	14.000
50	3.000	10.000	10.000	0.000	6.000	8.000	0.000	20.000	5.000	16.000
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
B-Lab Control	34.200	1.0000	34.200	26.000	42.000	13.907	10			35.250	1.0000
8	36.300	1.0614	36.300	33.000	42.000	8.115	10	127.00	75.00	35.250	1.0000
17.4	33.900	0.9912	33.900	32.000	40.000	7.152	10	104.00	75.00	33.900	0.9617
*35	20.900	0.6111	20.900	14.000	29.000	24.754	10	56.00	75.00	20.900	0.5929
*50	7.800	0.2281	7.800	0.000	20.000	83.481	10	55.00	75.00	7.800	0.2213
*100	0.000	0.0000	0.000	0.000	0.000	0.000	10	55.00	75.00	0.000	0.0000

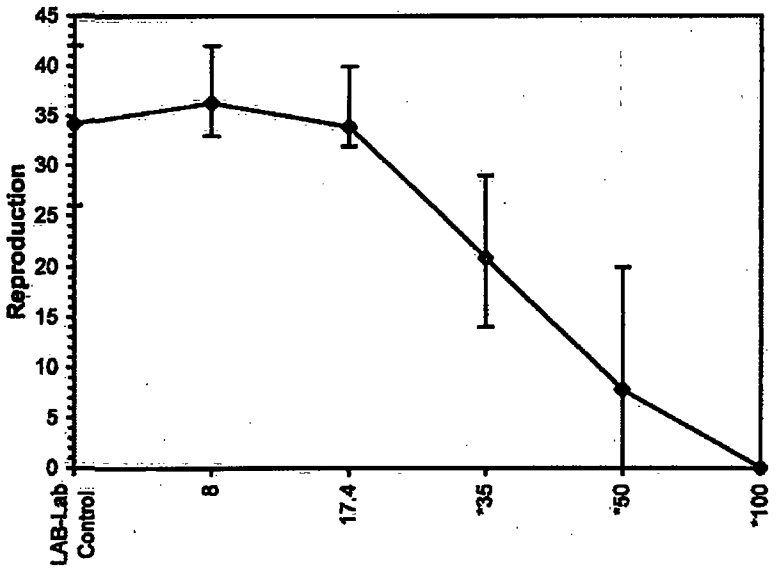
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.41378	1.035	0.55051	1.04775
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	17.4	35	24.6779	5.74713

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL		Skew
IC25	27.503	1.550	24.938	30.580	0.4737

Dose-Response Plot



ToxCalc v5.0.23

Reviewed by: 5/12/11

Water Quality I — **Chronic Freshwater Method (EPA-821-R-02-013, Method 1002.0)**

HYDROSPHERE research

Client:	CH2M Hill - South Carolina	Initiation Date:	5.4.11.
Code:	CH2-SC	Termination Date:	5.11.11
Job #:	11104	Sample Description:	WTP Discharge
Species:	*Ceriodaphnia dubia*		
ID #:	5716		

pH
(acceptable range for a valid test is 6 to 9)

Sample Description	% Effluent	0 new	1 old	1 new	2 old	2 new	3 old	3 new	4 old	4 new	5 old	5 new	6 old	6 new	7 old
Control	0	7.8	7.6	7.8	7.8	7.6	7.7	7.7	7.6	7.7	7.7	7.6	7.7	7.7	7.5
Effluent	8	7.7	7.6	7.7	7.8	7.6	7.7	7.7	7.6	7.7	7.7	7.6	7.6	7.6	7.5
Effluent	17.4	7.7	7.6	7.7	7.7	7.5	7.7	7.6	7.6	7.7	7.7	7.6	7.6	7.6	7.5
Effluent	35	7.6	7.5	GF 5/5 ~~7.6~~ 7.3	7.6	7.4	7.6	7.4	7.6	7.7	7.7	7.6	7.6	7.6	7.3
Effluent	50	7.5	7.4	GF 5/5 ~~7.5~~ 7.1	7.6	7.3	7.5	7.1	7.6	7.6	7.6	7.5	7.5	7.5	7.2
Effluent	100	6.6	6.8	GF 5/5 ~~7.1~~ 6.5	GF 5/6 ~~7.~~ 6.9	6.4		~~6.5~~			GF	5/7			
Meter ID:		8	9	9	9	8	9	9	9	9	5	5	8	5	8

Dissolved Oxygen (mg/L)
(acceptable minimum for a valid test is 4.0 mg/L)

Sample Description	% Effluent	0 new	1 old	1 new	2 old	2 new	3 old	3 new	4 old	4 new	5 old	5 new	6 old	6 new	7 old
Control	0	8.1	7.9	8.7	7.7	8.1	7.8	8.7	7.6	8.3	7.8	8.2	7.6	8.1	7.7
Effluent	8	8.1	7.9	8.7	7.8	8.1	7.8	8.6	7.6	8.3	7.9	8.3	7.5	8.1	7.8
Effluent	17.4	8.1	7.9	8.7	7.7	8.1	7.8	8.6	7.6	8.3	8.0	8.4	7.6	8.1	7.9
Effluent	35	8.1	8.0	8.5	7.8	8.1	7.9	8.5	7.6	8.3	7.9	8.4	7.6	8.2	7.8
Effluent	50	8.1	8.0	8.5	7.8	8.0	7.9	8.4	7.6	8.3	7.9	8.4	7.6	8.1	7.8
Effluent	100	8.0	9.1	8.4	7.8	7.8		~~8.2~~				GF	5/7		
Meter ID:		7	8	8	8	7	8	8	8	8	10	10	7	10	7

Day:	0	1	1	2	2	3	3	4	4	5	5	6	6	7
Control ID:	2565	2565		2565		2567		2567		2567		2567		
Diluent ID:	2565	2565		2565		2567		2567		2567		2567		
Effluent ID:	A	GF 5/5 ~~A~~ B		B		C		C		C		C		
Initials:	MF	GF	GF	GF	MF	GF	GF	MF	MF	[illegible]	[illegible]	MF	[illegible]	MF
Time:	1225	1300	1100	1450	1015	1440	1145	1150	1040	1415	1120	1640	1315	1010

Notes & Comments

Water Quality II — **Chronic Freshwater Method (EPA-821-R-02-013, Method 1002.0)**

HYDROSPHERE research

Client: CH2M Hill - South Carolina
Code: CH2-SC Job #: 11104
Species: *Ceriodaphnia dubia*
ID #: 5716

Initiation Date: 5.4.11 Termination Date: 5.11.11
Sample Description: WTP Discharge

Sample Description	% Effluent	Conductivity (µmho/cm) (a Conductivity of 2,150-µmho/cm = a Salinity of 1‰ @ 25°C) Measured in each new sample and control							
		0	1	2	3	4	5	6	7
Control	0	323	329	320	326	323	304	314	
Effluent	8	305	313	303	310	306	292	300	
Effluent	17.4	284	289	281	286	284	275	279	
Effluent	35	239	243	236	242	246	238	237	
Effluent	50	200	201	199	201	203	202	200	
Effluent	100	52	53	53	64				
Meter ID:		7	8	7	8	8	4	4	
Day:		0	1	2	3	4	5	6	7
Control ID:		2565	2565	2565	~~2565~~ 2567	2567	2567	2567	
Diluent ID:		2565	2565	2565	2567	2567	2567	2567	
Effluent ID:		A	B	B	C	C	C	C	
Initials:		MF	GF	MF	GF	MF	[illegible]	[illegible]	
Time:		1225	1100	1030	1145	1040	1130	1315	

Sample Description	% Effluent	Temperature (°C) (acceptable range for a valid test is 25±1°C) Measured at the end of each 24-h exposure period							
		0	1	2	3	4	5	6	7
Control	0	25.2	25.0	24.8	24.8	24.8	25.2	25.2	
Effluent	8	25.2	25.0	25.0	24.8	24.8	25.4	25.2	
Effluent	17.4	25.2	25.0	25.0	24.8	24.8	25.4	25.4	
Effluent	35	25.2	25.0	25.0	24.8	24.8	25.6	25.4	
Effluent	50	25.2	25.0	25.2	24.8	24.8	25.6	25.4	
Effluent	100	25.2	24.8			GF 5/7			
Meter ID:		56	56	56	56	56	56	56	

Notes & Comments:

HYDROSPHERE research

Client: CH2M Hill South Carolina

Code: CH2-SC Job: 11104

Sample Data

#	Sample Info: Date M/D/Y	Day	Letter Code	Description	Dissolved Oxygen (D.O.): D.O. (mg/L)	D.O. (%)	Aeration (min.)	Post Aeration D.O. (mg/L)	Initials	Total Residual Chlorine: TRC (mg/L)	Dechlor[1]	TRC Post-Dechl. (mg/L)	Initials	Ammonia: T-NH_3 (mg/L)	pH	Initials	Conductivity: Conductivity (µmho/cm)	Initials	Salinity: Salinity (ppt)	Adjusted (ppt)	Initials	Alkalinity/Hardness: Alkalinity ($mgCaCO_3/L$)	Hardness ($mgCaCO_3/L$)	Initials
1	5/4/11	W	A	WTP Discharge	9.0	109	5	8.0	MF	<0.04	X	X	MF	X	6.6	MF	52	MF	X	X	MF	<40	25	MF
2	5/5/11	R	B	"	8.8	103	—	—	GF	<0.04	—	—	GF	—	6.2	GF	56	GF	—	—	GF	<40	50	GF
3	5/6/11	F	B	"	9.2	113	5	7.8	MF	X	X	X	MF	X	6.4	MF	53	MF	X	X	MF	X	X	MF
4	5/7/11	Sa	C	"	9.9	121	5	8.2	GF	<0.04	—	—	GF	—	6.3	GF	63	GF	—	—	GF	40	50	GF
5	5/8/11	Su	C	"	10.1	124	5	8.1	MF	X	X	X	MF	X	7.2	MF	62	MF	X	X	MF	X	X	MF
6	5/9/11	M	C	"	10.2	126	5	7.9	kw	—	—	—	kw	x	6.3	kw	67	kw	—	—	kw	—	—	kw
7	5/10/11	T	C	"	10.3	122	5	8.0	MF	X	X	X	MF	X	6.4	MF	63	MF	X	X	MF	X	X	MF
8	/ /																							
9	/ /																							
10	/ /																							
11	/ /																							
12	/ /																							
13	/ /																							
14	/ /																							
15	/ /																							
16	/ /																							

Comments:

[1] 1-mL Effluent Dechlorinator (8-g/L NaThio) per 1-L Effluent Sample per 1-ppm TRC (EPA-821-R-02-012, Section 9.1.6, pg 41)

[2] Important: Organisms from Vendors need to have concurrent SRT's (EPA-821-R-02-012, Section 4.7.3, pg 8)

[3] Important: SRT's shall be conducted concurrently or no greater than 30-days before the date of "routine" test. (FDEP permits)

SRT 2.3

Species: Chronic or Acute?	Species	Source*	Needs to be Concurrent? (Check)	SRT Test: Date	</= 30d?
C or A		H or V		/	Y or N
C or A		H or V		/	Y or N
C or A		H or V		/	Y or N
C or A		H or V		/	Y or N
C or A		H or V		/	Y or N
C or A		H or V		/	Y or N

* H = Hydrosphere or Al (monthly, </= 30-days or concurrent)
V = Outside Vendor (concurrent Only)

Dilution Waters: Code	ID #	Alkalinity/Hardness: Alkalinity ($mgCaCO_3/L$)	Hardness ($mgCaCO_3/L$)	Initials
MHR	2565	63	90	awf
MHR	2567	62	92	awf

Appendix C

Reference Toxicant Data

HYDROSPHERE research

Control Chart-

Control Limits for Standard Reference Toxicant Tests

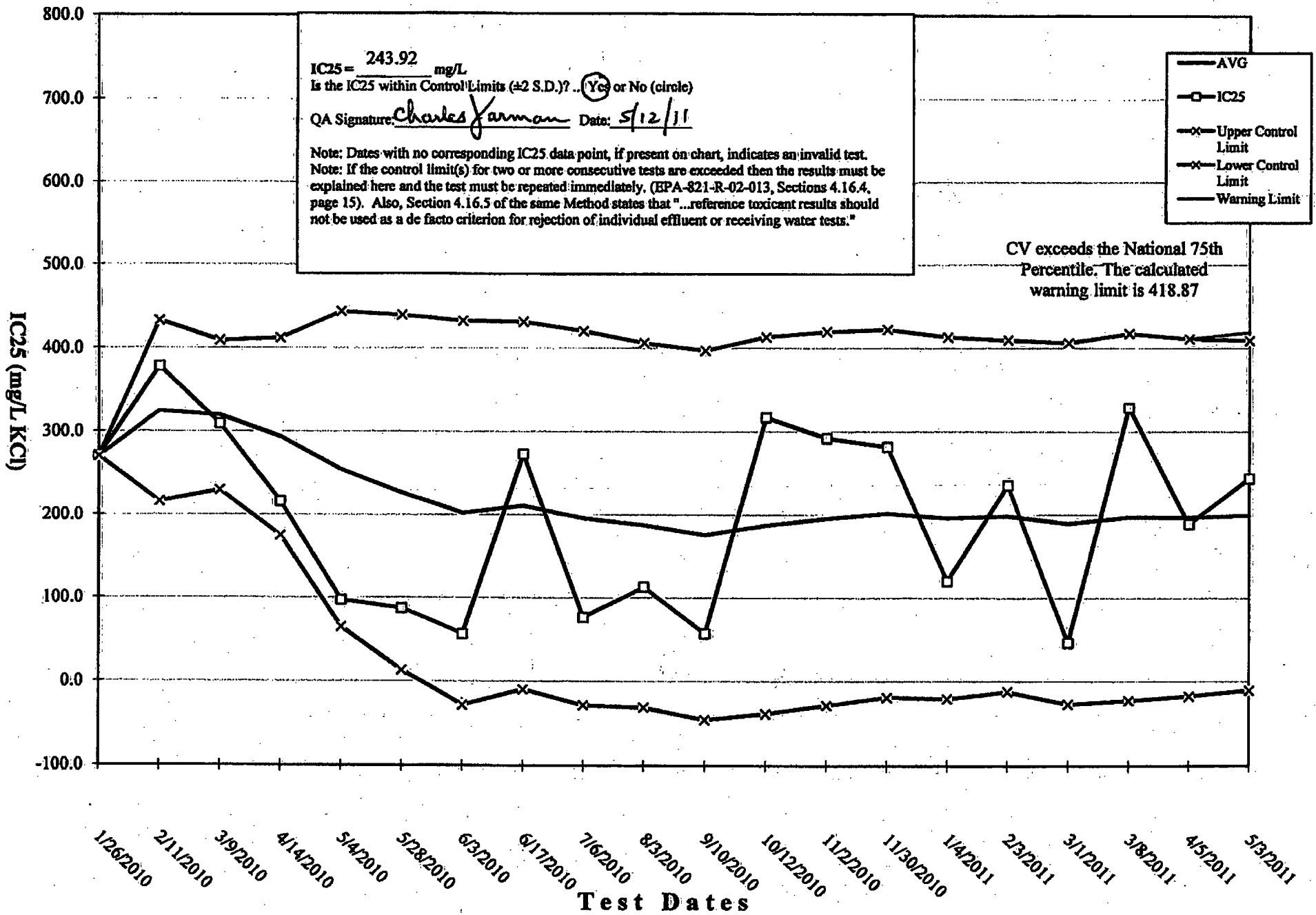
CHRONIC ··· *Ceriodaphnia dubia*

IC25 = 243.92 mg/L

Is the IC25 within Control Limits (±2 S.D.)? .. Yes or No (circle)

QA Signature: Charles Yarman Date: 5/12/11

Note: Dates with no corresponding IC25 data point, if present on chart, indicates an invalid test.
Note: If the control limit(s) for two or more consecutive tests are exceeded then the results must be explained here and the test must be repeated immediately. (EPA-821-R-02-013, Sections 4.16.4, page 15). Also, Section 4.16.5 of the same Method states that "...reference toxicant results should not be used as a de facto criterion for rejection of individual effluent or receiving water tests."

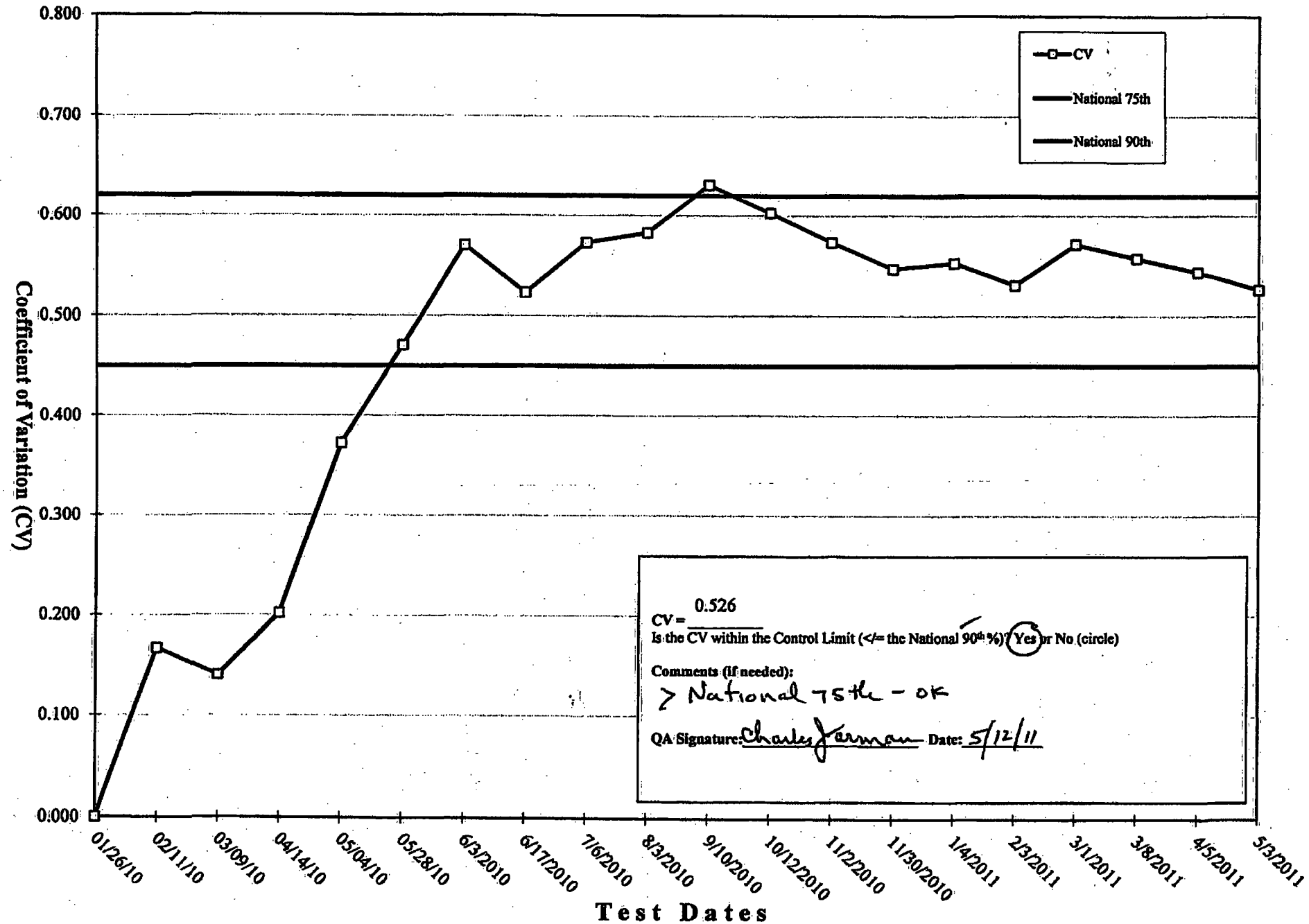


HYDROSPHERE research

Control Chart-II

Coefficient of Variation for Standard Reference Toxicant Tests

CHRONIC --- *Ceriodaphnia dubia*



CV = 0.526

Is the CV within the Control Limit (<= the National 90th %)? Yes or No (circle)

Comments (if needed):

> National 75th - ok

QA Signature: Charles Jarman Date: 5/12/11

SRT: Survival eproduction — **Chronic Freshwater Method (EPA-821-R-02- Method 1002.0)**

SRT for the Month of (circle one): Jan Feb Mar Apr (May) Jun Jul Aug Sep Oct Nov Dec

Species: *Ceriodaphnia dubia* | Code: CD | ID #: 5712 | Age: <24-h

Control Water: MHR | ID #: see "water quality"

Test Vessel: 30-mL Plastic Cup | Test Volume: 20-mLs per replicate

Initiation Date: 5.3.11 | Termination Date: 5.10.11

Toxicant: KCl | Stock Solution (Concentration): 100-gm KCl / Liter | Test Concentration (Units): gm KCl / Liter

Valid Control is ≥80% survival @ 7d & ≥15-neonate average surviving female

Control (mg/L)	REP	W 1	R 2	F 3	Sa 4	Su 5	M 6	T 7	1st-3rd brood total
	A	✓	✓	∅	∅5	∅12	●	∅22	39
	B	✓	✓	∅	∅5	∅11	●	∅21	37
	C	✓	✓	∅	∅6	∅12	∅21	●	39
	D	✓	✓	∅	∅6	∅13	●	∅21	40
	E	✓	✓	∅	∅5	∅14	●	∅21	40
	F	✓	✓	∅	∅5	∅12	●	∅22	39
	G	✓	✓	∅	∅6	∅13	●	∅21	40
	H	✓	✓	∅	∅5	∅12	●	∅21	38
	I	✓	✓	∅	∅6	∅14	●	∅22	42
	J	✓	✓	∅	∅5	∅14	●	∅21	NF ∅240
Total Live Count:		10	10	10	10	10	10	10	394 ✓

1st dilution (mg/L) 62.5	REP	1	2	3	4	5	6	7	1st-3rd brood total
	A	✓	✓	∅	∅5	∅10	●	∅22	37
	B	✓	✓	∅	∅5	∅12	●	∅19	36
	C	✓	✓	∅	∅5	∅11	●	∅20	36
	D	✓	✓	∅	∅4	∅12	●	∅20	36
	E	✓	✓	∅	∅6	∅13	●	∅20	39
	F	✓	✓	∅	∅2	∅9	●	∅13	24
	G	✓	✓	∅	∅5	∅12	●	∅19	36
	H	✓	✓	∅	∅6	∅13	●	∅21	40
	I	✓	✓	∅	∅5	∅13	●	∅21	39
	J	✓	✓	∅	∅5	∅12	●	∅21	38
Total Live Count:		10	10	10	10	10	10	10	361 ✓

2nd dilution (mg/L) 125	REP	1	2	3	4	5	6	7	1st-3rd brood total
	A	✓	✓	∅	∅6	∅11	●	∅21	38
	B	✓	✓	∅	∅5	∅12	●	∅20	37
	C	✓	✓	∅	∅6	∅11	●	∅22	39
	D	✓	✓	∅	∅3	∅10	●	∅20	33
	E	✓	✓	∅	∅5	∅11	●	∅20	36
	F	✓	✓	∅	∅6	∅10	●	∅22	38
	G	✓	✓	∅	∅5	∅11	●	∅22	38
	H	✓	✓	∅	∅3	∅11	●	∅19	33
	I	✓	✓	∅	∅5	∅11	●	∅21	37
	J	✓	✓	∅	∅6	∅12	●	∅20	38
Total Live Count:		10	10	10	10	10	10	10	367 ✓

3rd dilution (mg/L) 250	REP	1	2	3	4	5	6	7	1st-3rd brood total
	A	✓	✓	∅	∅6	∅11	●	∅20	37
	B	✓	✓	∅	∅6	∅11	●	∅20	37
	C	✓	✓	∅	∅	∅	∅	∅	/
	D	✓	✓	∅	∅	∅	∅	∅	/
	E	✓	✓	∅	∅6	∅13	●	∅20	39
	F	✓	✓	∅	∅5	∅11	●	∅21	37
	G	✓	✓	∅	∅5	∅12	●	∅21	38
	H	✓	✓	∅	∅5	∅12	●	∅22	39
	I	✓	✓	∅	∅5	∅10	●	∅11	26
	J	✓	✓	∅	∅6	∅12	●	∅21	39
Total Live Count:		10	10	10	8	8	8	8	292 ✓

4th dilution (mg/L) 500	REP	1	2	3	4	5	6	7	1st-3rd brood total
	A	✓	✓	∅	∅3	∅	∅8	∅15	26
	B	∅	∅	∅	∅	∅	∅	∅	—
	C	∅	∅	∅	∅	∅	∅	∅	—
	D	✓	✓	∅	∅2	∅	∅*	∅9	11
	E	✓	✓	∅	∅2	∅3	●	∅10	15
	F	∅	∅	∅	∅	∅	∅	∅	—
	G	✓	✓	∅	∅	∅*	∅8	●	8
	H	✓	✓	∅	∅1	∅9	●	∅15	25
	I	✓	✓	∅	∅1	∅4	●	∅8	13
	J	✓	✓	∅	∅	∅8	●	∅15	23
Total Live Count:		7	7	7	7	7	7	7	121 ✓

5th dilution (mg/L) 1000	REP	1	2	3	4	5	6	7	1st-3rd brood total
	A	∅		○	○	○	○	○	
	B	∅		○	○	○	○	○	
	C	∅		○	○	○	○	○	
	D	∅		○	○	○	○	○	
	E	∅		○	○	○	○	○	
	F	∅		○	○	○	○	○	
	G	∅		○	○	○	○	○	
	H	∅		○	○	○	○	○	
	I	∅		○	○	○	○	○	
	J	∅		○	○	○	○	○	
Total Live Count:		0							

	0	1	2	3	4	5	6	7
Initials:	KW	GR	MF	KW	GF	MF	MF	MF
Time:	15:46	245	340	12:04	330	210	345	1500
YCT #:	118	118	118	118	118	118	118	
S. capricornutum #:	141	141	141	141	141	141	141	

Notes & Comments

Normal CD's: ⊘ or ● Adult w/ neonates; ⊛ Adult w/ embryos; ◒ Adult newly deposited embryos; ◫ Adult w/ eggs in oviducts; # number of live neonates

Abnormal CD's: ⊗ Adult w/ small brood; ⦶ Adult, reproductively inactive; ♂ Male; ⊖ Dead Adult; * aborted brood

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	5/3/2011	Test ID:	MAYCD	Sample ID:	REF-Ref Toxicant
End Date:	5/10/2011	Lab ID:	HR-Hydrosphere Research	Sample Type:	KCL-Potassium chloride
Sample Date:		Protocol:	EPAF 91-EPA Freshwater	Test Species:	CD-Ceriodaphnia dubia
Comments:	Chronic				

Conc-mg/L	1	2	3	4	5	6	7	8	9	10
B-Lab Control	39.000	37.000	39.000	40.000	40.000	39.000	40.000	38.000	42.000	40.000
62.5	37.000	36.000	36.000	36.000	39.000	24.000	36.000	40.000	39.000	38.000
125	38.000	37.000	39.000	33.000	36.000	38.000	38.000	33.000	37.000	38.000
250	37.000	37.000	0.000	0.000	39.000	37.000	38.000	39.000	26.000	39.000
500	26.000	0.000	0.000	11.000	15.000	0.000	8.000	25.000	13.000	23.000
1000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
B-Lab Control	39.400	1.0000	39.400	37.000	42.000	3.426	10			39.400	1.0000
*62.5	36.100	0.9162	36.100	24.000	40.000	12.488	10	71.00	75.00	36.400	0.9239
*125	36.700	0.9315	36.700	33.000	39.000	5.752	10	65.50	75.00	36.400	0.9239
*250	29.200	0.7411	29.200	0.000	39.000	54.312	10	68.50	75.00	29.200	0.7411
*500	12.100	0.3071	12.100	0.000	26.000	84.681	10	55.00	75.00	12.100	0.3071
*1000	0.000	0.0000	0.000	0.000	0.000	0.000	10	55.00	75.00	0.000	0.0000

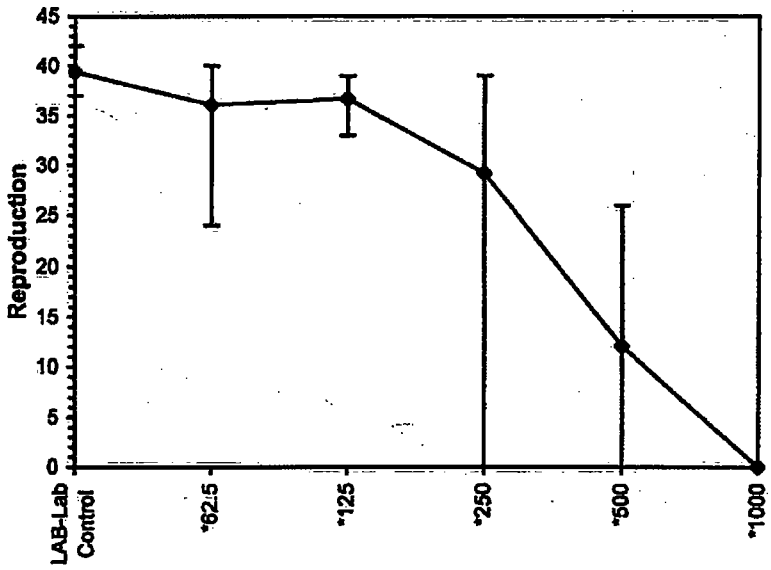
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.93674	1.035	-1.8001	5.98933
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	<62.5	62.5		

Linear Interpolation (200 Resamples)

Point	mg/L	SD	95% CL		Skew
IC25	243.92	46.92	177.04	327.45	0.1878

Dose-Response Plot



ToxCalc v5.0.23

Reviewed by: 5/12/11

SRT: Water Quality I

Chronic Freshwater Method (EPA-821-R-02-013, Method 1002.0)

HYDROSPHERE research

SRT for the Month of (circle one):

Jan Feb Mar Apr (May) Jun Jul Aug Sep Oct Nov Dec

Species: *Ceriodaphnia dubia*

ID #: 5712

Initiation Date: 5/3/11

Termination Date: 5.10.11

Toxicant: KCl

Stock Solution (Concentration): 100-gm KCl / L

Test Concentration (Units): gm KCl / L

mLs of Stock / 200-mLs	mg/L	pH (acceptable range for a valid test is 6 to 9)															
		new	old	new	old	new	old	new	old	new	old	new	old	new	old	new	old
		0	1		2		3		4		5		6		7		
Control	0	7.8	7.1	7.6	7.7	7.5	7.7	7.7	7.7	7.7	7.6	7.7	7.8	7.8	7.6		
125-µL	62.5	7.8 ~~8.0~~ GF 5/3	7.7	7.7	7.8	7.6	7.7	7.8	7.8	7.8	7.6	7.8	7.8	7.8	7.6		
250-µL	125	7.9 ~~8.0~~ GF 5/3	7.8	7.7	7.8	7.7	7.8	7.8	7.8	7.8	7.7	7.8	7.9	7.8	7.7		
0.5-mL	250	7.9 ~~8~~ GF 5/3	7.8	7.8	7.9	7.7	7.8	7.9	7.8	7.8	7.7	7.9	7.9	7.9	7.7		
1-mL	500	8.0	7.8	7.9	7.9	7.8	7.9	7.9	7.9	7.9	7.8	7.9	8.0	8.0	7.8		
2-mL	1000	8.0	7.9														
Meter ID:		9	9	5	8	5	5	9	9	9	8	8 ①	8	8	8		
Day:		0	1		2		3		4		5		6		7		
Stock Solution ID (SLN):		11017	11017		11017		11017		11017		11017		11017				
Dilution ID:		2565	2565		2565		2567		2567		2567		2567				
Initials:		GF	GF	KW	MF	KW	KW	GF	GF	GF	MF	MF	MF	MF	MF		
Time:		~~10~~ GF 5/3 1115	1305	1130	1340	1015	1200	0950	1340	1120	1200	1010	1335	1115	1500		

mLs of Stock / 200-mLs	Dissolved Oxygen (mg/L) (acceptable minimum for a valid test is ≥4.0-mg/L)														
	new	old	new	old	new	old	new	old	new	old	new	old	new	old	new	old
	0	1		2		3		4		5		6		7	
Control	8.5	7.8	8.6	7.6	8.1	7.8	8.5	7.9	8.6	7.6	8.3	7.6	8.1	7.6	
125-µL	8.5	7.8	8.7	7.6	8.2	7.9	8.6	7.9	8.6	7.6	8.3	7.6	8.1	7.7	
250-µL	8.5	7.9	8.7	7.6	8.2	8.0	8.6	7.9	8.6	7.6	8.3	7.6	8.1	7.7	
0.5-mL	8.5	7.9	8.7	7.7	8.3	8.0	8.7	7.9	8.6	7.5	8.3	7.6	8.1	7.6	
1-mL	8.5	8.0	8.7	7.8	8.3	8.1	8.7	8.0	8.6	7.4	8.4	7.7	8.1	7.6	
2-mL	8.6	8.0													
Meter ID:	8	8	10	7	10	10	8	8	8	8	~~7~~ ②	7	7	7	

Notes & Comments

① 9 - MF 5.8

② 8 - MF 5.8

SRT: Water Quality II

Chronic Freshwater Method (EPA-821-R-02-013, Method 1002.0)

HYDROSPHERE research

SRT for the Month of (circle one):
Jan Feb Mar Apr (May) Jun Jul Aug Sep Oct Nov Dec

Species: *Ceriodaphnia dubia*

ID #: 5712

Initiation Date: 5-3-2011 **Termination Date:** 5.10.11

Toxicant: KCl

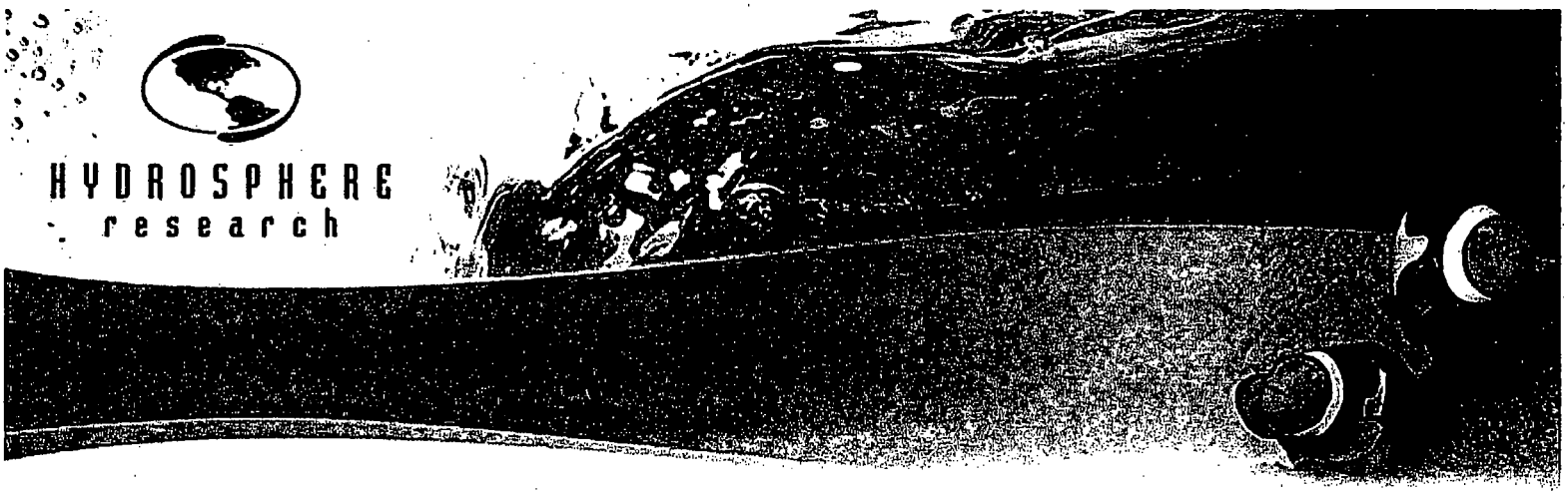
Stock Solution (Concentration): 100-gm KCl / L

Test Concentration (Units): gm KCl / L

mLs of Stock / 200-mLs	mg/L	Conductivity (µmho/cm) (a Conductivity of 2,150-µmho/cm = a Salinity of 1‰ @ 25°C) Measured in each new sample and control								Temperature (°C) (acceptable range for a valid test is 25±1°C) Measured at the end of each 24-h exposure period							
		0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Control	0	298	306	302	327	327	323	320			25.0 ~~30.0~~ KS/4	25.0	25.0	25.0	25.0	25.0	24.6
125-µL	62.5	413	425	417	452	447	447	443			25.0	25.0	25.0	25.0	25.0	25.0	24.6
250-µL	125	515	539	534	575	574	565	573			25.0	25.2	25.2	25.0	25.0	24.8	24.6
0.5-mL	250	736	774	754	804	818	839	820			25.2	25.2	25.2	25.0	25.0	25.0	24.6
1-mL	500	1164	1,219	1,176	1,284	1269	1302	1276			25.2	25.2	25.0	25.0	25.0	25.0	24.6
2-mL	1000	1995	—	—	—	—	—	—			25.2						
Meter ID:		8	4	4	8	8	8	7			56	56	56	56	56	56	56

Day:	0	1	2	3	4	5	6	7
Stock Solution ID (SLN):	11017	11017	11017	CF 5/5 ~~8~~ 11017	11017	11017	11017	
Dilution ID:	2565	2565	2565	2567	2567	2567	2567	
Initials:	GF	KS	KS	GF	GF	MF	MF	MF
Time:	13:40	11:30	10:20	09:50	11:20	10:10	11:15	15:00

Notes & Comments



Prepared for:
CH2M Hill
198 Old Henderson Road
Central, SC 29630

Prepared by:
Hydrosphere Research

Test Location:
11842 Research Circle
Alachua, FL 32615-6817

Contact information:
Craig Watts, Lab Director
Tel: (386) 462-7889
Fax: (386) 462-7264

Test Number:
CH2-SC 11144

Toxicity Test Report

Test Type: 7-Day Chronic Static Renewal Definitive Toxicity Tests

Initiated: May 26, 2011

Hydrosphere Research is a NELAC/P Certified Lab (E82295)

Contents

Synopsis

Whole Effluent Toxicity Report

Summary of Observations and Deviations from Protocol

Appendix A. Chain of Custody Record

Appendix B. Raw Data Sheets

Appendix C. Reference Toxicant Data

Synopsis of Bioassays for CH2M Hill

Personnel at CH2M Hill, South Carolina, collected a series of composite samples on May 25, 26, & 28, 2011, from the site labeled WTP Discharge at the Twelvemile Creek Restoration Project. Hydrosphere Research received these samples in good condition. The Chain of Custody forms are included as Appendix A.

Using these samples, a series of 7-day chronic static renewal definitive bioassay tests were conducted with the water flea (*Ceriodaphnia dubia*). Test concentrations were 0 (control), 8, 17.4, 35, 50, & 100 percent effluent. Bioassays were initiated on May 26, 2011.

The results are included as Appendix B and summarized in the following table:

	Percent Effluent	*C. dubia*	
		Final Survival (%)	Three Brood Totals (Average # of neonates / female)
WTP Discharge	Control	100	31.8
	8	100	32.0
	17.4	100	28.1
	35	100	10.3
	50	90	0.22
	100	0	0
	IC_{25}	--	21.53%

These bioassays were initiated within 36 hours of the sample collection time and were acceptable tests based on control survival and test conditions.

HYDROSPHERE research

NPDES WHOLE EFFLUENT TOXICITY TESTING REPORT FORM

All blanks on this form are to be filled in.
Blanks that are not used should be filled in with "N/A" or a line drawn through the blank. Please print.

Attachments: Please attach the following items to this report form and indicate with an "x" in box.

1.	All Chain-of-Custody Forms	X
2.	All Reference Toxicant Data for each Organism used in Test and Current Control Charts for each Organism	X
3.	All Raw Data (Bench Sheets) Pertaining to the Tests (i.e., all physical, chemical, and biological measurements)	X
4.	All Result Calculations	X
5.	Discharge Monitoring Reports (DMR) when Applicable	NA

Facility/industry/client name:	Twelvemile Creek Restoration Project		
Permit number:	Unknown	County:	Pickens

Consultant company name:	Hydrosphere Research	Telephone:	(386) 462-7889
Dates test(s) conducted--Begin:	05/26/11	End:	06/01/11
Persons conducting test(s) (print names):	G. Flaig, M. Foti, K. Waterman		

Authorized signature:		Date:	6/7/11

Laboratory report #/project #:	CH2-SC 11144	Sampler (print name):	N. Reeves

DMR monitoring period end date on which this test is reported (filled out by the Permittee--mm/dd/yy):					
Routine test:	X	Additional test:	NA	Failed routine test date:	NA

Samples

No.	Date & Time Collected	Lab Sample #	Grab	24-Hour Composite	Arrival Temperature (°C)	Initial Residual Chlorine	Lab Dechlorination	
							Y/N	Chemical Used
1.	05/25/11-1120	11144A	NA	X	0.7	<0.04	N	NA
2.	05/26/11-1130	11144B	NA	X	0.8	<0.04	N	NA
3.	05/28/11-0828	11144C	NA	X	2.5	<0.04	N	NA
4.	NA	NA	NA	NA	NA	NA	NA	NA
5.	NA	NA	NA	NA	NA	NA	NA	NA
6.	NA	NA	NA	NA	NA	NA	NA	NA
7.	NA	NA	NA	NA	NA	NA	NA	NA
8.	NA	NA	NA	NA	NA	NA	NA	NA
9.	NA	NA	NA	NA	NA	NA	NA	NA
10.	NA	NA	NA	NA	NA	NA	NA	NA

	Wet Ice	Blue Ice	Other (describe)	Samples Aerated	
				Yes (describe)	No
Refrigerant used for sample transportation:	X	NA	NA	X, Sample 1 for 5 minutes	NA

	Bus	Hand	Common Carrier	Samples Filtered	
				Yes (describe)	No
Samples delivered by:	NA	NA	X	NA	X

HYDROSPHERE research

SUMMARY OF TEST CONDITIONS

Type of Test[a]	Test Concentrations[b] (% Effluent)	Test Species Used[c]	Age of Test Organism	Amount & Type of Food	How Often Fed	Test Chamber Volume	Volume of Effluent Used	Type of Chamber	# of Organisms/ Chamber	# of Replicates	Temp. Range (°C)
F	0, 8, 17.4, 35, 50, 100	CD	<24 hours	0.1 ml YCT + 0.1 ml S. cap	1x/day	30 ml	20 ml	Plastic cup	1	10	25.0 ± 1.0
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

G. "Other" type of test:	NA	Temperature readings:	Single	Multiple	Continuous
			NA	X	NA

Description of control water:	Moderately Hard Reconstituted	Photoperiod during test:	16 hours light / 8 hours dark

Reference Toxicant Data[d]					
Name of Toxicant	Dates of Test		Species[c]	In-House or Commercially Obtained	LC_{50}/NOEC/IC25
	Begin	End			
KCl	05/03/11	05/10/11	CD	In-House	IC_{25} = 243.92mg/L
NA	NA	NA	NA	NA	NA

[a]Please fill the "Type of Test" box with the appropriate letter:

A. 48-Hr/Non-Renewal/Single Concentration (Screen)
B. 48-Hr/Non-Renewal/Multi-Concentration (Definitive)
C. 96-Hr/Renewed Every 48 Hrs/Single Concentration (Screen)
D. 96-Hr/Renewed Every 48 Hrs/Multi-Concentration (Definitive)
E. 7-Day Chronic/Single Concentration (Screen)/Renewed Daily
F. 7-Day Chronic/Multi-Concentration (Definitive)/Renewed Daily
G. Other (described in the "G" box)

[b]List all concentrations of effluent used (i.e., 0%, 6.25%, 12.5%, 25%, 50%, 100%).

[c]Write appropriate letters for the following species in this column:

CD - *Ceriodaphnia dubia*
FM - *Pimephales promelas* (fathead minnow)
SS - *Menidia beryllina* (inland silverside)
MS - *Americamysis bahia* (formerly *Mysidopsis bahia*, mysid shrimp)
CL - *Cyprinella leedsi* (bannerfin shiner)
Other - Please describe: _____

[d]Attach all reference toxicant raw data & control charts for each organism/reference toxicant used for the test.

HYDROSPHERE research

TEST RESULTS
ACUTE

Test Species	Test Concentrations[b] (% Effluent)	Grab Sample[c]	Composite Sample[c]	% Mortality[d] (48 Hours)	% Mortality[d] (96 Hours)	LC_{50}[e]
Control[a]	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
Control[a]	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA

[a]List % Control Mortality in appropriate column (48 or 96 hr) for organisms (use abbreviations shown on footnote "c" of page 2) that you list under the word "Control."

[b]List all concentrations of effluent used (i.e., 0%, 6.25%, 12.5%, 25%, 50%, 100%).

[c]Record number that corresponds with the number of the sample in the "Date & Time Collected" column in sample section on page 1.

[d]List % Mortality for each organism and control if you are conducting a single concentration (Screen) test.

[e]If multi-concentration (Definitive) tests are conducted on grab or composite samples, record the calculated LC_{50} in this column for each sample. Enter "N/A" in all % Mortality columns and LC_{50} box at bottom of this table.

Species	LC_{50}[f]
NA	NA
NA	NA

[f]If a single concentration (screen) test is conducted and >50% mortality occurs in any one of the four grab or composite samples, record <100% in this column. If ≤50% mortality occurs in all four grabs or composites, record >100% in this column. Draw a line through the LC_{50} column in the above table.

HYDROSPHERE research

TEST RESULTS
CHRONIC

Test Species[a]	Test Concentrations[b] (% Effluent)	IC_{25}		
		Growth	Reproduction	Fecundity
CD	0, 8, 17.4, 35, 50, 100	NA	21.53%	NA
NA	NA	NA	NA	NA
NA	NA	NA	NA	NA

[a]Use abbreviations shown on footnote "c" of page 2.

[b]List all concentrations of effluent used (i.e., 0%, 6.25%, 12.5%, 25%, 50%, 100%).

CD Survival in Control (>80%)	100%
Average Number of Young per Female in CD Control (min 15 young/surviving female)	31.8

FM Survival in Control (>80%)	NA
Average FM Dry Weight in Control (min ADW 0.25 mg/FM in surviving controls)	NA

MS Survival in Control (>80%)	NA
Average MS Dry Weight in Control (min ADW 0.20 mg/MS in surviving controls)	NA

SS Survival in Control (>80%)	NA
Average SS Dry Weight in Control (min immediate ADW 0.50 mg/SS in surviving controls)	NA

Summary of Observations and Deviations from Protocol

A series of 7-day chronic static renewal definitive bioassays were initiated on May 26, 2011, for CH2M Hill's Twelvemile Creek Restoration Project, Pickens County, South Carolina.

During these tests dissolved oxygen, temperature and pH remained within the limits established in the test method. The results of the standard reference toxicant tests, provided in Appendix C, indicate that the organisms were of normal sensitivity for this laboratory.

There were no unusual observations or deviations from standard test protocol. These test results only relate to the samples described in this report and meet all requirements of NELAC.

Notes:

1. Bioassay tests reported herein were conducted in accordance with one or more of the following:

   a. U.S. Environmental Protection Agency. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition. EPA-821-R-02-012. October 2002.

   b. U.S. Environmental Protection Agency. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms. Fourth Edition. EPA-821-R-02-013. October 2002.

   c. U.S. Environmental Protection Agency. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. Third Edition. EPA-821-R-02-014. October 2002.

2. The *C. dubia* acute bioassay and the *P. promelas (C. leedsi)* acute bioassays are conducted by methods summarized in Tables 11 and 13, respectively, of the document cited in 1.a. above.

3. Chemical and physical parameters reported herein were determined by methods described in "Methods for Chemical Analysis of Water and Waste, EPA 600/4-79-020, March, 1984.

4. The adverse effect measured in acute tests is mortality. Assessment of mortality is described in documents listed above. Chronic test endpoints are mortality and reproduction or growth, and assessment of these test endpoints are also described in the appropriate documents listed above.

5. Bioassay tests were performed at Hydrosphere Research, 11842 Research Circle, Alachua, FL 32615, telephone number (386) 462-7889. This laboratory is NELAC/P certified by the State of Florida Department of Health and Rehabilitation Services (Certification No. E82295).

6. The *C. dubia* test organisms were cultured in-house.

Appendix A

Chain of Custody

HYDROSPHERE research

CHAIN OF CUSTODY

Please complete ALL fields other than grey areas (grey areas are to be completed by lab personnel)

Client Name	Client Shipping Address
CH2M Hill	198 Old Henderson Road Central, SC 29630

Sample Kit Tracking Information	Method of Shipment	Prepared and Shipped By	Sample Kit Received By (Print Clearly and Sign)
Cooler 4 of 6 Container Type ☒ ½ Gallon Jug ☐ 5 Gallon Cubitainer™ ☐ Other _____ # of Containers 4	☐ Fed Ex Ground ☐ Fed Ex Overnight ☐ Client Pickup ☐ UPS ☐ Greyhound ☐ Other _____	WA Date 4·13·11	Nikole Reeves Date 5/25/11 Time 11:00AM Condition of Seal Upon Receipt (Check One) ☒ Intact ☐ Other (describe) _____

Ship Sample Priority Overnight To	Refrigerant Used for Shipping	Composite Sample Information
Hydrosphere Research 11842 Research Circle Alachua, FL 32615 (386) 462-7889 *Be sure to mark for Saturday delivery if appropriate.*	☒ Wet Ice ☐ Other _____ *Samples must arrive at the lab at 6.0°C or less but never frozen. Pack cooler completely with ice before shipping.*	Samples/ Hour 2 Volume/Sample 170mL Total Hours 24 Total Volume _____ Initiated Date 5/24 Time 11:20 Ended Date 5/25 Time 11:20 Chilled During Collection ☒ Yes ☐ No
Sampling Location CH2M **Permit #** — **County Samples Collected In** SC CH2M	**Sample(s) Shipped Via** ☒ Fed Ex ☐ Greyhound ☐ Client ☐ UPS ☐ Other _____	

Outfall Number	Date	Time (24 Hour Format)	Sample Type: Comp.	Sample Type: Grab	# of Containers	Sampled By (Print Clearly and Sign)	For Lab Use: Arrival Temp (°C)	For Lab Use: Sample Id No.
	5/25	11:20	X		1	WTP Discharge Effl.	07	11144

Relinquished By (Print Clearly and Sign)	Date	Time	Shipped Via
NIKOLE REEVES	5/25/11	12PM	FEDEX

Received By (Print Clearly and Sign)	Date	Time	Relinquished By (Print Clearly and Sign)	Date	Time
5/26			5/26		

Received By Lab (Print Clearly and Sign)	Date	Time	Shippers Tracking Numbers
Greg Flair	5·26·11	12:00	7971 3155 8529

Distribution White (Original) – Lab, Yellow – Lab, Pink – Client

See Provisions on back

HYDROSPHERE research

CHAIN OF CUSTODY

Please complete ALL fields other than grey areas (grey areas are to be completed by lab personnel)

Client Name	Client Shipping Address
CH2M Hill	198 Old Henderson Road Central, SC 29630

Sample Kit Tracking Information
Cooler 1 of 6
Container Type ☒ ½ Gallon Jug ☐ 5 Gallon Cubitainer™ ☐ Other
# of Containers 4

Method of Shipment
☐ Fed Ex Ground
☒ Fed Ex Overnight
☐ Client Pickup
☐ UPS
☐ Greyhound
☐ Other

Prepared and Shipped By UMQ
Date 4·13·11

Sample Kit Received By (Print Clearly and Sign) NIKOLE REEVES
Date 5/26/11 Time 11:30AM
Condition of Seal Upon Receipt (Check One) ☒ Intact ☐ Other (describe)

Ship Sample Priority Overnight To
Hydrosphere Research
11842 Research Circle
Alachua, FL 32615
(386) 462-7889
Be sure to mark for Saturday delivery if appropriate.

Refrigerant Used for Shipping
☒ Wet Ice ☐ Other
Samples must arrive at the lab at 6.0° C or less but never frozen. Pack cooler completely with ice before shipping.

Composite Sample Information
Samples/ Hour 24 Volume/Sample 170
Total Hours 24 Total Volume
Initiated Date 5/25 Time 11:30
Ended Date 5/26 Time 11:30
Chilled During Collection ☒ Yes ☐ No

Sampling Location CH2M
Permit # —
County Samples Collected In SC

Sample(s) Shipped Via
☒ Fed Ex ☐ Greyhound
☐ Client ☐ UPS
☐ Other

Outfall Number	Date	Time (24 Hour Format)	Sample Type: Comp.	Sample Type: Grab	# of Containers	Sampled By (Print Clearly and Sign)	For Lab Use: Arrival Temp (°C)	For Lab Use: Sample Id No.
	5/26	11:30	X		1	WTP Discharge Eff.	0.8	11144 E

Relinquished By (Print Clearly and Sign)	Date	Time	Shipped Via
NIKOLE REEVES	5/26/11	12PM	FED EX

Received By (Print Clearly and Sign)	Date	Time	Relinquished By (Print Clearly and Sign)	Date	Time
GF 5/27			GF 5/27		

Received By Lab (Print Clearly and Sign)	Date	Time	Shippers Tracking Numbers
Greg Fass	5·27·11	1150	7947 9195 3807

Distribution White (Original) – Lab, Yellow – Lab, Pink – Client

See Provisions on back

HYDROSPHERE research

CHAIN OF CUSTODY

Please complete ALL fields other than grey areas (grey areas are to be completed by lab personnel)

Client Name	Client Shipping Address
CH2M Hill	198 Old Henderson Road Central, SC 29630

Sample Kit Tracking Information
Cooler 3 of 3
Container Type ☒ ½ Gallon Jug ☐ 5 Gallon Cubitainer™ ☐ Other
# of Containers 4

Method of Shipment
☑ Fed Ex Ground
☐ Fed Ex Overnight
☐ Client Pickup
☐ UPS
☐ Greyhound
☐ Other

Prepared and Shipped By UHA
Date 4/21/11

Sample Kit Received By (Print Clearly and Sign) NIKOLE REEVES
Date 5/20 Time 8:00AM
Condition of Seal Upon Receipt (Check One)
☒ Intact
☐ Other (describe)

Ship Sample Priority Overnight To
Hydrosphere Research
11842 Research Circle
Alachua, FL 32615
(386) 462-7889
Be sure to mark for Saturday delivery if appropriate.

Refrigerant Used for Shipping
☐ Wet Ice
☐ Other
Samples must arrive at the lab at 6.0° C or less but never frozen. Pack cooler completely with ice before shipping.

Composite Sample Information
Samples/ Hour 2 Volume/Sample 70
Total Hours 24 Total Volume
Initiated Date 5/27 Time 8:28
Ended Date 5/28 Time 8:28
Chilled During Collection ☒ Yes ☐ No

Sampling Location CHZM
Permit # —
County Samples Collected In SC

Sample(s) Shipped Via
☒ Fed Ex ☐ Greyhound
☐ Client ☐ UPS
☐ Other

Outfall Number	Date	Time (24 Hour Format)	Sample Type: Comp.	Sample Type: Grab	# of Containers	Sampled By (Print Clearly and Sign)	For Lab Use: Arrival Temp (°C)	For Lab Use: Sample Id No.
	5/28	8:28	X		2	WTP Discharge Eff	2.5	11144C

Relinquished By (Print Clearly and Sign)	Date	Time	Shipped Via
NIKOLE REEVES	5/28/11	9:00AM	FEDEX

Received By (Print Clearly and Sign)	Date	Time	Relinquished By (Print Clearly and Sign)	Date	Time
		5/29		5/29	

Received By Lab (Print Clearly and Sign)	Date	Time	Shippers Tracking Numbers
K. Waterman	5/29/11	930	006 493386560

Distribution White (Original) – Lab, Yellow – Lab, Pink – Client

See Provisions on back

Appendix B

Raw Data Sheets

Survival & Reproduction — **Chronic Freshwater Method (EPA-821-R-02-013, Method 1002.0)**

Client: CH2M Hill - South Carolina
Code: CH2-SC Job #: 11144
Species: *Ceriodaphnia dubia* Code: CD
ID #: ① 607 Age: <24-h

Test Vessel: 30-mL Plastic Cup
Test Volume: 20-mLs per replicate

Initiation Date: 5.26.11 Termination Date: 6-1-11
Sample Description: WTP Discharge

(Valid Control is ≥80% survival @ 7d & ≥15 neonates average surviving female)	REP	F (1)	Sa (2)	Su (3)	M (4)	T (5)	W (6)	R (7)	1st-3rd brood total
Effluent, % 0 — Sample Description: Control	A	✓	✓	Ø4	Ø	Ø10	Ø16	O	30
	B	✓	✓	Ø4	Ø	Ø16	Ø4	O	28
	C	✓	✓	Ø4	Ø	Ø11	Ø17	O	32
	D	✓	✓	Ø4	Ø	Ø10	Ø19	O	33
	E	✓	✓	Ø4	Ø	Ø12	Ø19	O	35
	F	✓	✓	Ø3	Ø	Ø16	Ø19	O	32
	G	✓	✓	Ø4	Ø	Ø9	Ø20	O	33
	H	✓	✓	●	Ø4	Ø12	Ø16	O	32
	I	✓	✓	●	Ø3	Ø9	Ø19	O	31
	J	✓	✓	Ø4	Ø	Ø10	Ø18	O	32
Total Live Count		10	10	10	10	10	10		318 ✓

1st dilution — Effluent, % 8 — Sample Description: Effluent	REP	1	2	3	4	5	6	7	1st-3rd brood total
	A	✓	✓	Ø4	Ø	Ø10	Ø18	O	32
	B	✓	✓	Ø7	Ø	Ø11	Ø15	O	26
	C	✓	✓	Ø4	Ø	Ø16	Ø17	O	31
	D	✓	✓	Ø4	Ø	Ø10	Ø17	O	31
	E	✓	✓	Ø6	Ø	Ø13	Ø20	O	39
	F	✓	✓	●	Ø4	Ø9	Ø16	O	29
	G	✓	✓	Ø6	Ø	Ø10	Ø17	O	33
	H	✓	✓	●	Ø2	Ø9	Ø19	O	30
	I	✓	✓	●	Ø4	Ø11	Ø17	O	32
	J	✓	✓	Ø4	Ø	Ø10	Ø23	O	37
Total Live Count		10	10	10	10	10	10		320 ✓

2nd dilution — Effluent, % 17.4 — Sample Description: Effluent	REP	1	2	3	4	5	6	7	1st-3rd brood total
	A	✓	✓	●	Ø4	Ø10	Ø8	O	22
	B	✓	✓	Ø4	Ø	Ø10	Ø14	O	28
	C	✓	✓	Ø3	Ø	Ø9	Ø15	O	27
	D	✓	✓	Ø4	Ø	Ø16	Ø19	O	33
	E	✓	✓	Ø4	Ø	Ø11	Ø18	O	33
	F	✓	✓	●	Ø4	Ø3	Ø14	O	31
	G	✓	✓	Ø4	Ø	Ø10	Ø19	O	33
	H	✓	✓	●	Ø3	Ø7	Ø11	O	21
	I	✓	✓	●	Ø4	Ø10	Ø12	O	26
	J	✓	✓	Ø4	Ø	Ø8	Ø15	O	27
Total Live Count		10	10	10	10	10	10		281 ✓

3rd dilution — Effluent, % 35 — Sample Description: Effluent	REP	1	2	3	4	5	6	7	1st-3rd brood total
	A	✓	✓	●	Ø4	Ø8	●	O	12
	B	✓	✓	●	Ø3	Ø4	●	O	7
	C	✓	✓	●	Ø2	Ø7	●	O	9
	D	✓	✓	●	Ø4	Ø	Ø6	O	10
	E	✓	✓	●	Ø6	Ø	Ø7	O	13
	F	✓	✓	●	Ø2	Ø5	Ø	O	7
	G	✓	✓	●	Ø3	Ø8	Ø	O	11
	H	✓	✓	●	Ø3	Ø10	Ø	O	13
	I	✓	✓	●	Ø3	Ø8	●	O	11
	J	✓	✓	●	Ø5	Ø	Ø5	O	10
Total Live Count		10	10	10	~~10~~ 10	10	10		103 ✓

4th dilution — Effluent, % 50 — Sample Description: Effluent	REP	1	2	3	4	5	6	7	1st-3rd brood total
	A	✓	✓	◒	Ø	Ø	Ø	O	Ø
	B	✓	✓	◒	Ø2	~~Ø~~	~~Ø~~	~~O~~	Ø
	C	✓	✓	◒	Ø	O	Ø	O	Ø
	D	✓	✓	◒	Ø	Ø	Ø	O	Ø
	E	✓	✓	◒	Ø	Ø	Ø	O	Ø
	F	✓	✓	◐	◐	◐	Ø	O	Ø
	G	✓	✓	◒	Ø	Ø	Ø	O	Ø
	H	✓	✓	◒	Ø	Ø	Ø	O	Ø
	I	✓	✓	◒	Ø	Ø	Ø	O	Ø
	J	✓	✓	◒	Ø	Ø	Ø2	O	2
Total Live Count		10	10	10	~~10~~ 9	9	9		2

5th dilution — Effluent, % 100 — Sample Description: Effluent	REP	1	2	3	4	5	6	7	1st-3rd brood total
	A	✓	Ø	O	O	O	O	O	
	B	✓	Ø	O	O	O	O	O	
	C	✓		O	O	O	O	O	
	D	✓	Ø	O	O	O	O	O	
	E	✓	Ø	O	O	O	O	O	
	F	✓	Ø	O	O	O	Ø	O	
	G	✓	Ø	O	O	O	O	O	
	H	✓	Ø	O	O	Ø	O	O	
	I	Ø	Ø	O	O	O	O	O	
	J	✓	Ø	O	O	O	O	O	
Total Live Count		9	0						

Day	0	1	2	3	4	5	6	7
Initials:	GF	NF	GF	KW	KW	KW	GF	
Time:	4:30	1:50	13:30	14:40	13:36	13:40	13:00	:
YCT #:	118	118	118	118	118	118	—	
S. capricornutum #:	142	142	142	142	142	143	—	

Notes & Comments

① 5742 GF 5/27 — ③ organism reproductively inactive GF 6/1

② organism missing from vessel KW 5/30/11

Normal CD's: ⊘ or ● Adult w/ neonates; ⊛ Adult w/ embryos; ◒ Adult newly deposited embryos; ◐ Adult w/ eggs in oviducts; # number of live neonates

Abnormal CD's: ⊗ Adult w/ small brood; ◐ Adult, reproductively inactive; ♂ Male; ⊘ Dead Adult; * aborted brood

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	5/26/2011	Test ID:	11144CD	Sample ID:	CH2-SC
End Date:	6/1/2011	Lab ID:	HR-Hydrosphere Research	Sample Type:	EFF2-Industrial
Sample Date:	5/25/2011	Protocol:	EPAF 91-EPA Freshwater	Test Species:	CD-Ceriodaphnia dubia

Comments:

Conc-%	1	2	3	4	5	6	7	8	9	10
\B-Lab Control	30.000	28.000	32.000	33.000	35.000	32.000	33.000	32.000	31.000	32.000
8	32.000	26.000	31.000	31.000	39.000	29.000	33.000	30.000	32.000	37.000
17.4	22.000	28.000	27.000	33.000	33.000	31.000	33.000	21.000	26.000	27.000
35	12.000	7.000	9.000	10.000	13.000	7.000	11.000	13.000	11.000	10.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.000	
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
\B-Lab Control	31.800	1.0000	31.800	28.000	35.000	5.892	10			31.900	1.0000
8	32.000	1.0063	32.000	26.000	39.000	11.693	10	100.50	74.00	31.900	1.0000
17.4	28.100	0.8836	28.100	21.000	33.000	15.688	10	82.00	74.00	28.100	0.8809
*35	10.300	0.3239	10.300	7.000	13.000	20.998	10	55.00	74.00	10.300	0.3229
*50	0.222	0.0070	0.222	0.000	2.000	300.000	9	45.00	61.00	0.222	0.0070
*100	0.000	0.0000	0.000	0.000	0.000	0.000	10	55.00	74.00	0.000	0.0000

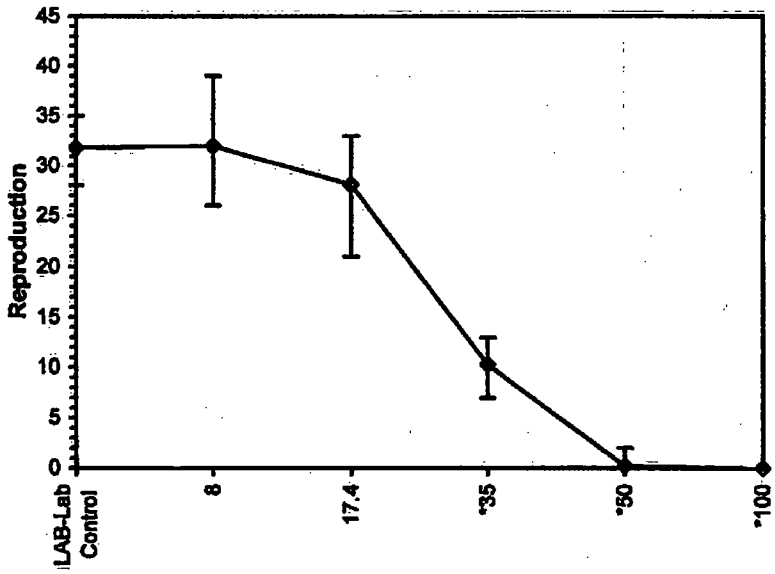
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.53767	1.035	-0.0558	1.72502
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Wilcoxon Rank Sum Test	17.4	35	24.6779	5.74713

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL		Skew
IC25	21.528	1.139	18.454	22.924	-0.8371

Dose-Response Plot



ToxCalc v5.0.23

Reviewed by: 6/3/11

Water Quality I — **Chronic Freshwater Method (EPA-821-R-02-013, Method 1002.0)**

HYDROSPHERE research

Client: CH2M Hill - South Carolina
Code: CH2-SC
Job #: 1144
Species: *Ceriodaphnia dubia*
ID #: 5742

Initiation Date: 5.26.11
Termination Date: 6.1.11
Sample Description: WTP Discharge

Sample Description	% Effluent	pH (acceptable range for a valid test is 6 to 9) 0 new	1 old	1 new	2 old	2 new	3 old	3 new	4 old	4 new	5 old	5 new	6 old	6 new	7 old
Control	0	7.7	7.5	7.6	7.6	7.6	7.8	7.6	7.7	7.6	7.7	7.6	7.7		
Effluent	8	7.6	7.4	7.6	7.6	7.6	7.8	7.6	7.7	7.6	7.6	7.6	7.7		
	17.4	7.6	7.4	7.5	7.6	7.6	7.6	7.5	7.7	7.5	7.6	7.6	7.7		
	35	7.5	7.3	7.5	7.5	7.5	7.8	7.4	7.6	7.4	7.6	7.5	7.6		
	50	7.3	7.2	7.2	7.4	7.4	7.6	7.3	7.5	7.3	7.5	7.4	7.5		
	100	6.6	6.9	6.3	6.5	6.3									
Meter ID:		8	8	8	9	9	5	5	5	5	5	5	9		
Day:		0	1		2		3		4		5		6		7
Control ID:		2580	2584		2584		2584		2584		2584		~~7~~ CF 6/1		
Diluent ID:		2580	2584		2584		2584		2584		2584		—		
Effluent ID:		A	A		B		C		C		C		—		
Initials:		MF	MF	MF	CF	CF	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	CF		
Times:		1320	1350	1335	1345	1150	1445	1150	1330	1130	1350	1115	1300		

Sample Description	% Effluent	Dissolved Oxygen (mg/L) (acceptable minimum for a valid test is 4.0 mg/L) 0 new	1 old	1 new	2 old	2 new	3 old	3 new	4 old	4 new	5 old	5 new	6 old	6 new	7 old
Control	0	8.1	7.6	8.1	7.7	8.4	7.4	8.0	7.9	8.0	7.7	8.1	7.6		
Effluent	8	MF 5.26 ~~7~~ 8.1	7.6	8.0	7.8	8.4	7.6	8.1	8.1	8.1	7.8	8.2	7.6		
	17.4	8.1	7.5	8.0	7.8	8.4	7.7	8.2	8.0	8.2	7.9	8.3	7.6		
	35	8.1	7.4	8.0	7.8	8.3	7.8	8.1	8.0	8.2	8.0	8.2	7.8		
	50	8.3	7.6	7.8	7.8	8.3	7.9	8.1	8.1	8.1	8.0	8.3	7.8		
	100	8.4	7.5	7.7	7.8	8.1									
Meter ID:		7	7	7	8	8	10	10	10	10	10	10	8		

Notes & Comments

Water Quality II

Chronic Freshwater Method (EPA-821-R-02-013, Method 1002.0)

HYDROSPHERE research

Client: CH2M Hill - South Carolina

Code: CH2-SC Job #: 11144

Species: *Ceriodaphnia dubia*

ID #: 5742

Initiation Date: 5.26.11 Termination Date: 6.1.11

Sample Description: WTP Discharge

Sample Description	% Effluent	Conductivity (µmho/cm) (a Conductivity of 2,150 µmho/cm = a Salinity of 1‰ @ 25°C) Measured in each new sample and control							
		0	1	2	3	4	5	6	7
Control	0	320	320	331	319	319	322		
Effluent	8	302	308	314	301	303	307		
	17.4	279	288	290	285	283	285		
	35	235	245	244	242	240	242		
	50	203	203	204	204	205	208		
	100	63	61	62	—	—	—	—	
Meter ID:		7	7	8	4	4	4		

Temperature (°C) (acceptable range for a valid test is 25±1°C) Measured at the end of each 24-h exposure period							
0	1	2	3	4	5	6	7
25.0	24.6	25.6	25.0	25.2	25.0		
25.2	24.6	25.6	25.2	25.2	25.0		
25.2	24.6	25.6	25.0	25.2	25.2		
25.2	24.6	25.6	25.0	25.2	25.0		
25.2	24.6	25.6	25.2	25.2	25.0		
25.2	24.6	w 5/29 ~~25.4~~	—	—	—	—	
56	56	54	54	56	56		

	0	1	2	3	4	5	6	7
Day:								
Control ID:	2580	2584	2584	2584	2584	2584		
Diluent ID:	2580	2584	2584	2584	2584	2584		
Effluent ID:	A	A	B	C	C	C		
Initials:	MF	MF	GF	K	K	K		
Time:	1320	1315	1150	1150	1130	1115		

Notes & Comments

CES SC 11144 Page 17 of 25

HYDROSPHERE research

Client: CH2M Hill South Carolina

Code: CH2-SC **Job:** 11144

Sample Data

#	Date M/D/Y	Day	Letter Code	Description	D.O. (mg/L)	D.O. (%)	Aeration (min.)	Post Aeration D.O. (mg/L)	Initials	TRC (mg/L)	Dechlor [1]	Post-Dechl. TRC (mg/L)	Initials	T-NH_3 (mg/L)	pH	Initials	Conductivity (µmhos/cm)	Initials	Salinity (ppt)	Adjusted (ppt)	Initials	Alkalinity ($mgCaCO_3/L$)	Hardness ($mgCaCO_3/L$)	Initials
1	5/26/11	M	A	WTP Discharge	10.0	112	5	8.4	MF	<0.04	—	—	GF	X	6.6	MF	63	MF	X	X	MF	40	25	GF
2	5/27/11	F	B	"	8.8	107	X	X	MF	<0.04	—	—	MH	X	6.3	MF	61	MF	X	X	MF	<40	25	MH
3	5/28/11	Sa	B	"	8.2	100	—	—	GF	—	—	—	GF	—	6.4	GF	61	GF	—	—	GF	—	—	GF
4	5/29/11	Su	C	"	7.7	93	X	X	K	<0.04	X	X	K	X	6.3	K	76	K	—	—	K	<40	25	K
5	5/30/11	M	C	"	7.8	95	X	X	K	—	—	—	K	X	6.3	K	77	K	—	—	K	—	—	K
6	5/31/11	T	C	"	8.0	95	X	X	K	—	—	—	K	X	6.5	K	75	K	—	—	K	—	—	K
7	/ /																							
8	/ /																							
9	/ /																							
10	/ /																							
11	/ /																							
12	/ /																							
13	/ /																							
14	/ /																							
15	/ /																							
16	/ /																							

Comments:

DR-MF 5.26

[1] 1-mL Effluent Dechlorinator (8-g/L NaThio) per 1-L Effluent Sample per 1-ppm TRC (EPA-821-R-02-012, Section 9.1.6, pg 41)

[2] Important: Organisms from Vendors need to have concurrent SRT's (EPA-821-R-02-012, Section 4.7.3, pg 8)

[3] Important: SRT's shall be conducted concurrently or no greater than 30-days before the date of "routine" test. (FDEP permits)

SRT 2,3

Species: Chronic or Acute?	Species	Source*	Reach to Concentrat. (Conc.)	SRT Test: Date	<= 30d?
C or A		H or V		/	Y or N
C or A		H or V		/	Y or N
C or A		H or V		/	Y or N
C or A		H or V		/	Y or N
C or A		H or V		/	Y or N
C or A		H or V		/	Y or N

* H = Hydrosphere or AI (monthly, <= 30-days or concurrent)
V = Outside Vendor (concurrent Only)

Dilution Waters: Code	ID #	Alkalinity ($mgCaCO_3/L$)	Hardness ($mgCaCO_3/L$)	Initials
MHR	2580	63	84	MF
MHR	2584	64	92	GF

Appendix C

Reference Toxicant Data

HYDROSPHERE research

Control Chart-

Control Limits for Standard Reference Toxicant Tests

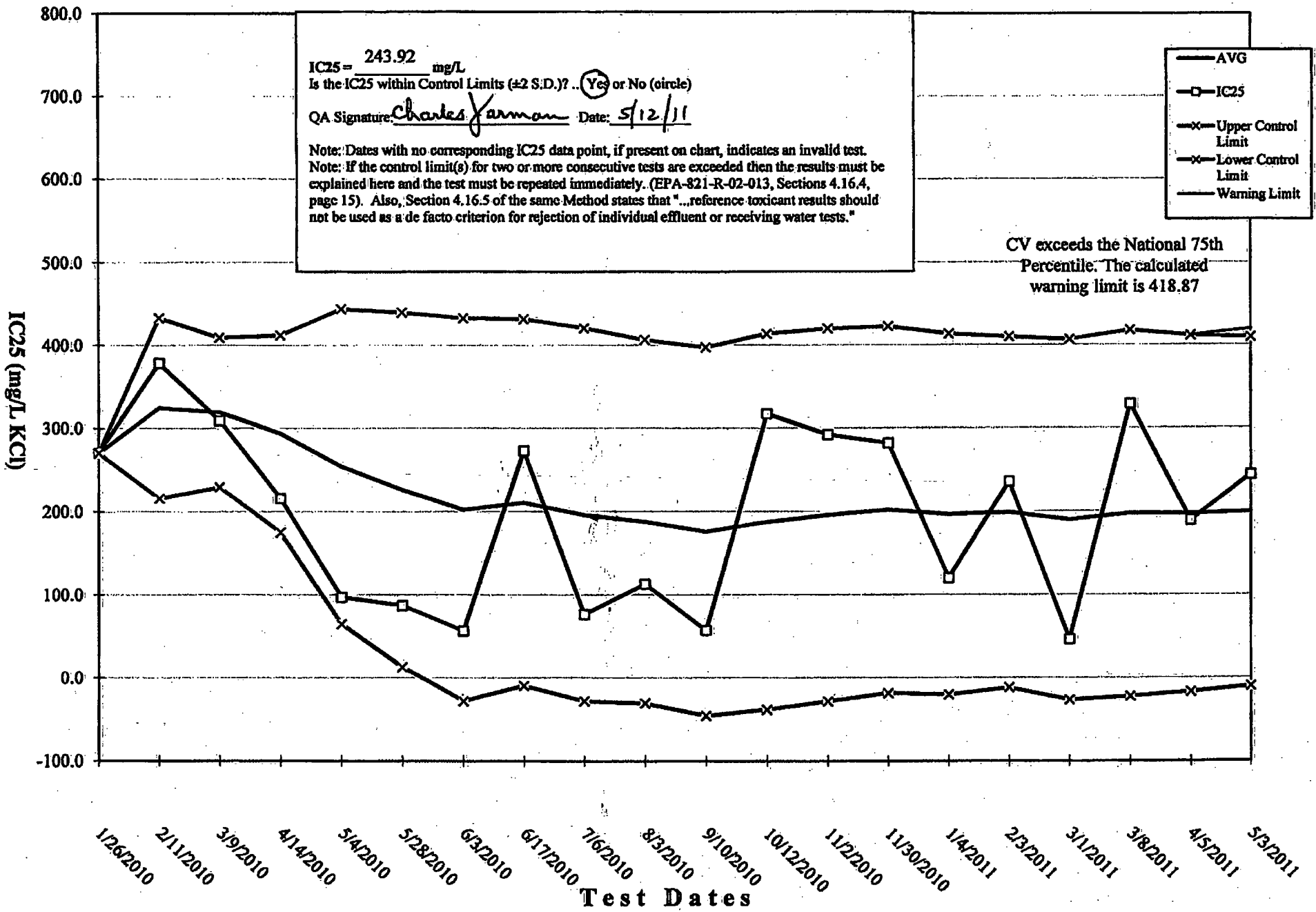
CHRONIC --- *Ceriodaphnia dubia*

IC25 = 243.92 mg/L

Is the IC25 within Control Limits (±2 S.D.)? .. Yes or No (circle)

QA Signature: Charles Yarmon Date: 5/12/11

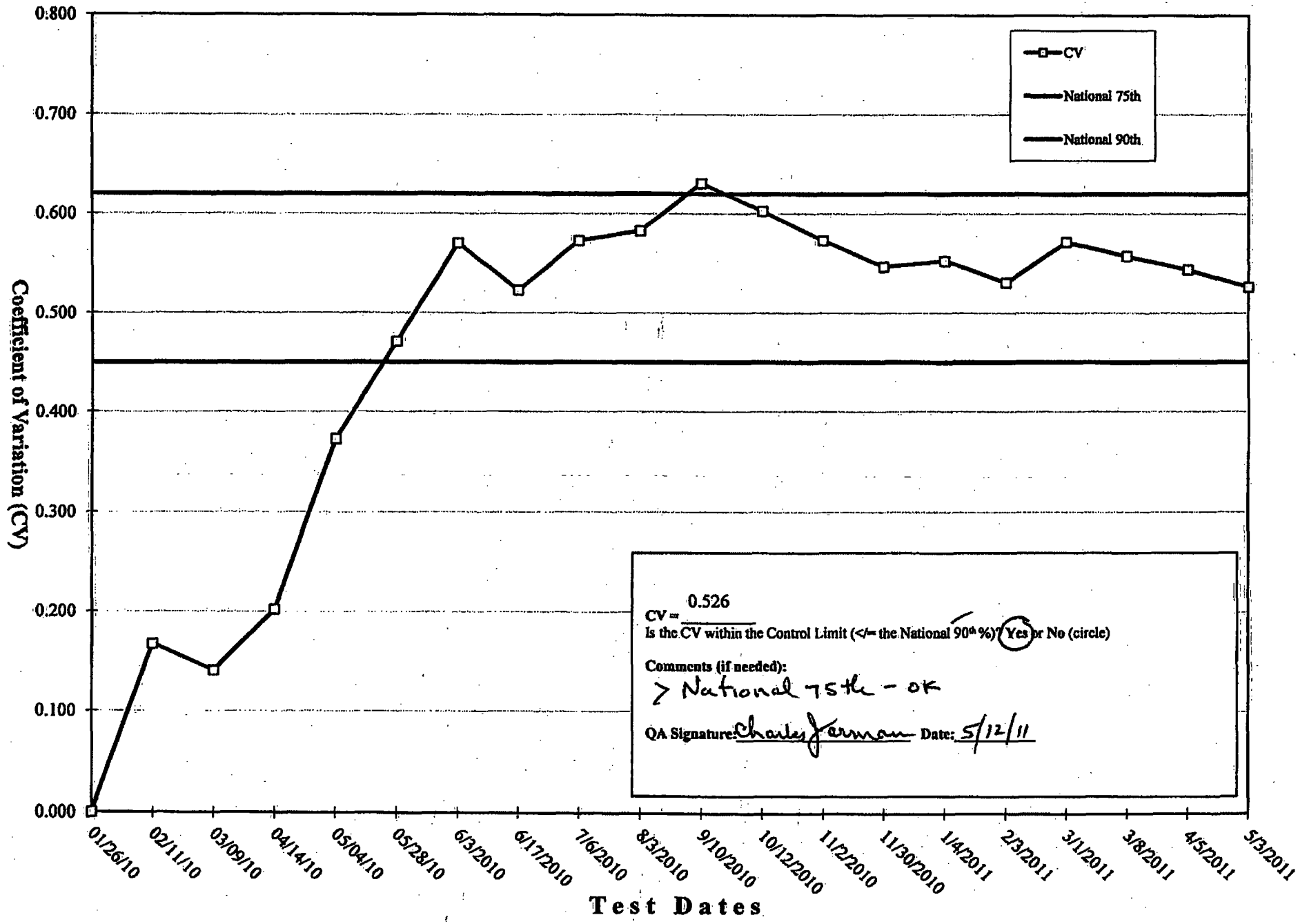
Note: Dates with no corresponding IC25 data point, if present on chart, indicates an invalid test.
Note: If the control limit(s) for two or more consecutive tests are exceeded then the results must be explained here and the test must be repeated immediately. (EPA-821-R-02-013, Sections 4.16.4, page 15). Also, Section 4.16.5 of the same Method states that "...reference toxicant results should not be used as a de facto criterion for rejection of individual effluent or receiving water tests."



HYDROSPHERE research

Control Chart-II

Coefficient of Variation for Standard Reference Toxicant Tests
CHRONIC --- *Ceriodaphnia dubia*



CV = 0.526

Is the CV within the Control Limit (</= the National 90th %)? Yes or No (circle)

Comments (if needed):

> National 75th - ok

QA Signature: Charles Jarman Date: 5/12/11

SRT: Survival eproduction

Chronic Freshwater Method (EPA-821-R-02- Method 1002.0)

SRT for the Month of (circle one): Jan Feb Mar Apr (May) Jun Jul Aug Sep Oct Nov Dec

Species: *Ceriodaphnia dubia* | Code: CD | ID #: 5712 | Age: < 24-h

Control Water: MHR | ID #: see "water quality"

Test Vessel: 30-mL Plastic Cup | Test Volume: 20-mLs per replicate

Initiation Date: 5.3.11 | Termination Date: 5.10.11

Toxicant: KCl | Stock Solution (Concentration): 100-gm KCl / Liter | Test Concentration (Units): gm KCl / Liter

Valid Control is ≥80% survival @ 7d & ≥15-neonates average /surviving female

mg/L	REP	W 1	R 2	F 3	Sa 4	Su 5	M 6	T 7	1st-3rd brood total
Control	A	✓	✓	∅	∅5	∅12	●	∅22	39
	B	✓	✓	∅	∅5	∅11	●	∅21	37
	C	✓	✓	∅	∅6	∅12	∅21	●	39
	D	✓	✓	∅	∅6	∅13	●	∅21	40
	E	✓	✓	∅	∅5	∅14	●	∅21	40
	F	✓	✓	∅	∅5	∅12	●	∅22	39
	G	✓	✓	∅	∅6	∅13	●	∅21	40
	H	✓	✓	∅	∅5	∅12	●	∅21	38
	I	✓	✓	∅	∅6	∅14	●	∅22	42
	J	✓	✓	∅	∅5	∅14	●	∅21	39 NC 240
Total Live Count:		10	10	10	10	10	10	10	394

1st dilution mg/L	REP	1	2	3	4	5	6	7	1st-3rd brood total
62.5	A	✓	✓	∅	∅5	∅10	●	∅22	37
	B	✓	✓	∅	∅5	∅12	●	∅19	36
	C	✓	✓	∅	∅5	∅11	●	∅20	36
	D	✓	✓	∅	∅4	∅12	●	∅20	36
	E	✓	✓	∅	∅6	∅13	●	∅20	39
	F	✓	✓	∅	∅2	∅9	●	∅13	24
	G	✓	✓	∅	∅5	∅12	●	∅19	36
	H	✓	✓	∅	∅6	∅13	●	∅21	40
	I	✓	✓	∅	∅5	∅13	●	∅21	39
	J	✓	✓	∅	∅5	∅12	●	∅21	38
Total Live Count:		10	10	10	10	10	10	10	361

2nd dilution mg/L	REP	1	2	3	4	5	6	7	1st-3rd brood total
125	A	✓	✓	∅	∅6	∅11	●	∅21	38
	B	✓	✓	∅	∅5	∅12	●	∅20	37
	C	✓	✓	∅	∅6	∅11	●	∅22	39
	D	✓	✓	∅	∅3	∅10	●	∅20	33
	E	✓	✓	∅	∅5	∅11	●	∅20	36
	F	✓	✓	∅	∅6	∅10	●	∅22	38
	G	✓	✓	∅	∅5	∅11	●	∅22	38
	H	✓	✓	∅	∅3	∅11	●	∅19	33
	I	✓	✓	∅	∅5	∅11	●	∅21	37
	J	✓	✓	∅	∅6	∅12	●	∅20	38
Total Live Count:		10	10	10	10	10	10	10	367

3rd dilution mg/L	REP	1	2	3	4	5	6	7	1st-3rd brood total
250	A	✓	✓	∅	∅6	∅11	●	∅20	37
	B	✓	✓	∅	∅6	∅11	●	∅20	37
	C	✓	✓	∅	∅	∅	∅	∅	
	D	✓	✓	∅	∅	∅	∅	∅	
	E	✓	✓	∅	∅6	∅13	●	∅20	39
	F	✓	✓	∅	∅5	∅11	●	∅21	37
	G	✓	✓	∅	∅5	∅12	●	∅21	38
	H	✓	✓	∅	∅5	∅12	●	∅22	39
	I	✓	✓	∅	∅5	∅10	●	∅11	26
	J	✓	✓	∅	∅6	∅12	●	∅21	39
Total Live Count:		10	10	10	8	8	8	8	292

4th dilution mg/L	REP	1	2	3	4	5	6	7	1st-3rd brood total
500	A	✓	✓	∅	∅3	∅	∅8	∅15	26
	B	∅		∅	∅	∅	∅	∅	
	C	∅		∅	∅	∅	∅	∅	
	D	✓	✓	∅	∅2	∅	∅*	∅9	11
	E	✓	✓	∅	∅2	∅3	●	∅10	15
	F	∅		∅	∅	∅	∅	∅	
	G	✓	✓	∅	∅	∅*	∅8	●	8
	H	✓	✓	∅	∅1	∅9	●	∅15	25
	I	✓	✓	∅	∅1	∅4	●	∅8	13
	J	✓	✓	∅	∅	∅8	●	∅15	23
Total Live Count:		7	7	7	7	7	7	7	121

5th dilution mg/L	REP	1	2	3	4	5	6	7	1st-3rd brood total
1000	A	⊗		○	○	○	○	○	
	B	∅		○	○	○	○	○	
	C	∅		○	○	○	○	○	
	D	∅		○	○	○	○	○	
	E	∅		○	○	○	○	○	
	F	∅		○	○	○	○	○	
	G	∅		○	○	○	○	○	
	H	∅		○	○	○	○	○	
	I	∅		○	○	○	○	○	
	J	∅		○	○	○	○	○	
Total Live Count:		0							

	0	1	2	3	4	5	6	7
Initials:	KW	GF	MF	KW	GF	MF	MF	MF
Times:	15:40	1245	1340	12:00	1330	210	1345	1500
YCT #:	118	118	118	118	118	118	118	
S. capricornutum #:	141	141	141	141	141	141	141	

Notes & Comments

Normal CD's: ∅ or ● Adult w/ neonates; ⊛ Adult w/ embryos; ◒ Adult newly deposited embryos; ⦶ Adult w/ eggs in oviducts; # number of live neonates

Abnormal CD's: ⊗ Adult w/ stuck brood; ⦶ Adult, reproductively inactive; ♂ Male; ⊖ Dead Adult; * aborted brood

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	5/3/2011	Test ID:	MAYCD	Sample ID:	REF-Ref Toxicant
End Date:	5/10/2011	Lab ID:	HR-Hydrosphere Research	Sample Type:	KCL-Potassium chloride
Sample Date:		Protocol:	EPAF 91-EPA Freshwater	Test Species:	CD-Ceriodaphnia dubia
Comments:	Chronic				

Conc-mg/L	1	2	3	4	5	6	7	8	9	10
B-Lab Control	39.000	37.000	39.000	40.000	40.000	39.000	40.000	38.000	42.000	40.000
62.5	37.000	36.000	36.000	36.000	39.000	24.000	36.000	40.000	39.000	38.000
125	38.000	37.000	39.000	33.000	36.000	38.000	38.000	33.000	37.000	38.000
250	37.000	37.000	0.000	0.000	39.000	37.000	38.000	39.000	26.000	39.000
500	26.000	0.000	0.000	11.000	15.000	0.000	8.000	25.000	13.000	23.000
1000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
B-Lab Control	39.400	1.0000	39.400	37.000	42.000	3.426	10			39.400	1.0000
*62.5	36.100	0.9162	36.100	24.000	40.000	12.488	10	71.00	75.00	36.400	0.9239
*125	36.700	0.9315	36.700	33.000	39.000	5.752	10	65.50	75.00	36.400	0.9239
*250	29.200	0.7411	29.200	0.000	39.000	54.312	10	68.50	75.00	29.200	0.7411
*500	12.100	0.3071	12.100	0.000	26.000	84.681	10	55.00	75.00	12.100	0.3071
*1000	0.000	0.0000	0.000	0.000	0.000	0.000	10	55.00	75.00	0.000	0.0000

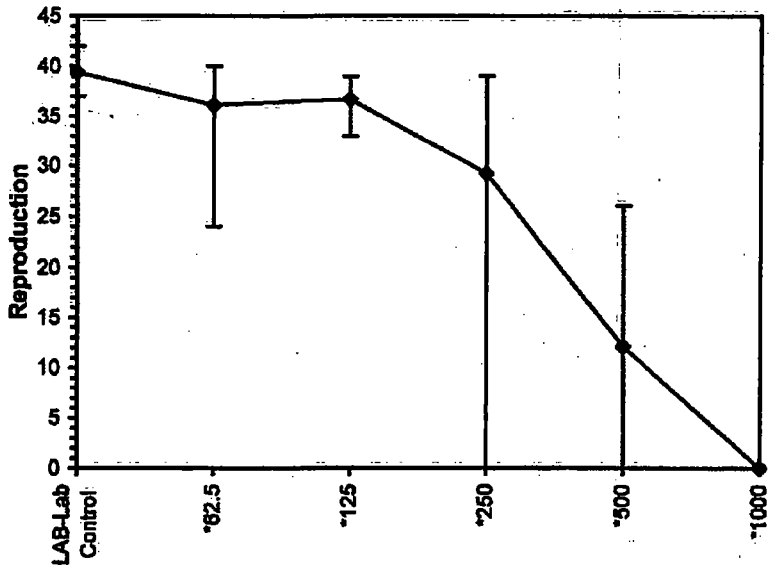
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.93674	1.035	-1.8001	5.98933
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	<62.5	62.5		

Linear Interpolation (200 Resamples)

Point	mg/L	SD	95% CL		Skew
IC25	243.92	46.92	177.04	327.45	0.1878

Dose-Response Plot



ToxCalc v5.0.23

Reviewed by: 5/12/11

SRT: Water Quality I

Chronic Freshwater Method (EPA-821-R-02-013, Method 1002.0)

HYDROSPHERE research

SRT for the Month of (circle one):

Jan Feb Mar Apr (May) Jun Jul Aug Sep Oct Nov Dec

Species: *Ceriodaphnia dubia*

ID #: 5712

Initiation Date: 5/3/11 **Termination Date:** 5.10.11

Toxicant: KCl

Stock Solution (Concentration): 100-gm KCl / L

Test Concentration (Units): gm KCl / L

mLs of Stock / 200-mLs	mg/L	pH (acceptable range for a valid test is 6 to 9)															Dissolved Oxygen (mg/L) (acceptable minimum for a valid test is ≥4.0-mg/L)														
		new	old	new	old	new	old	new	old	new	old	new	old	new	old	new	new	old	new	old	new	old	new	old	new	old	new	old	new	old	new
		0	1		2		3		4		5		6		7		0	1		2		3		4		5		6		7	
Control	0	7.8	7.7	7.6	7.7	7.5	7.7	7.7	7.7	7.7	7.6	7.7	7.8	7.8	7.6		8.5	7.8	8.6	7.6	8.1	7.8	8.5	7.9	8.6	7.6	8.3	7.6	8.1	7.6	
125-µL	62.5	7.8 ~~8.0~~ GF 5/3	7.7	7.7	7.8	7.6	7.7	7.8	7.8	7.8	7.6	7.8	7.8	7.8	7.6		8.5	7.8	8.7	7.6	8.2	7.9	8.6	7.9	8.6	7.6	8.3	7.6	8.1	7.7	
250-µL	125	7.9 ~~8.0~~ GF 5/3	7.8	7.7	7.8	7.7	7.8	7.8	7.8	7.8	7.7	7.8	7.9	7.8	7.7		8.5	7.9	8.7	7.6	8.2	8.0	8.6	7.9	8.6	7.6	8.3	7.6	8.1	7.7	
0.5-mL	250	7.9 ~~8~~ GF 5/3	7.8	7.8	7.9	7.7	7.8	7.9	7.8	7.8	7.7	7.9	7.9	7.9	7.7		8.5	7.9	8.7	7.7	8.3	8.0	8.7	7.9	8.6	7.5	8.3	7.6	8.1	7.6	
1-mL	500	8.0	7.8	7.9	7.9	7.8	7.9	7.9	7.9	7.9	7.8	7.9	8.0	8.0	7.8		8.5	8.0	8.7	7.8	8.3	8.1	8.7	8.0	8.6	7.4	8.4	7.7	8.1	7.6	
2-mL	1000	8.0	7.9														8.6	8.0													
Meter ID:		9	9	5	8	5	5	9	9	9	8	8	8	8	8		8	8	10	7	10	10	8	8	8	8	~~12~~	7	7	7	

Day:	0	1	2	3	4	5	6	7
Stock Solution ID (SLN):	11017	11017	11017	11017	11017	11017	11017	
Dilution ID:	2565	2565	2565	2567	2567	2567	2567	
Initials:	GF	GF KW	MF KW	KW	GF	GF	GF MF	MF MF	MF
Time:	~~10~~ GF 5/3 1115	1305	1130	1210	1015	1200	0950	1340	1120	1210	1010	1315	1115	1500

Notes & Comments

① 9 - MF 5.8

② 8 - MF 5.8

SRT: Water Quality II

Chronic Freshwater Method (EPA-821-R-02-013, Method 1002.0)

HYDROSPHERE research

SRT for the Month of (circle one):

Jan Feb Mar Apr (May) Jun Jul Aug Sep Oct Nov Dec

Species: *Ceriodaphnia dubia*

ID #: 5712

Initiation Date: 5-3-2011 **Termination Date:** 5.10.11

Toxicant: KCl

Stock Solution (Concentration): 100-gm KCl / L

Test Concentration (Units): gm KCl / L

mLs of Stock / 200-mLs	mg/L	Conductivity (µmho/cm) (a Conductivity of 2,150-µmho/cm = a Salinity of 1‰ @ 25°C) Measured in each new sample and control								Temperature (°C) (acceptable range for a valid test is 25±1°C) Measured at the end of each 24-h exposure period							
		0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Control	0	298	306	302	327	327	323	320			25.0 ~~306~~ KW 5/4	25.0	25.0	25.0	25.0	25.0	24.6
125-µL	62.5	413	425	417	452	447	447	443			25.0	25.0	25.0	25.0	25.0	25.0	24.6
250-µL	125	515	539	534	575	574	565	573			25.0	25.2	25.2	25.0	25.0	24.8	24.6
0.5-mL	250	736	774	754	804	818	839	820			25.2	25.2	25.2	25.0	25.0	25.0	24.6
1-mL	500	1164	1,219	1,176	1,284	1,269	1302	1276			25.2	25.2	25.0	25.0	25.0	25.0	24.6
2-mL	1000	1995	—	—	—	—	—	—			25.2						
Meter ID:		8	4	4	8	8	8	7			56	56	56	56	56	56	56

Day:	0	1	2	3	4	5	6	7
Stock Solution ID (SLN):	11017	11017	11017	CF 5/5 ~~8~~ 11017	11017	11017	11017	
Dilution ID:	2565	2565	2565	2567	2567	2567	2567	
Initials:	GF	KW	KW	GF	GF	MF	MF	MF
Time:	13:40	11:30	10:20	09:50	11:20	10:10	11:15	15:00

Notes & Comments

ARCADIS

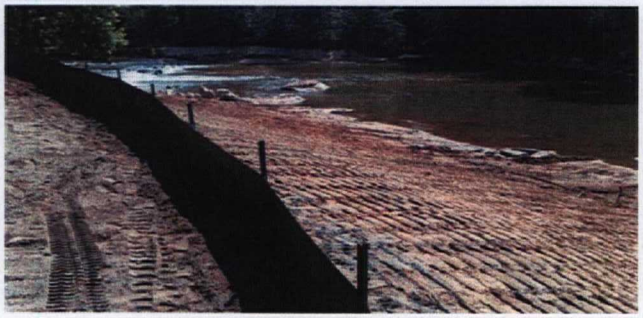
Attachment 3

June Monthly Construction Photo Log

Pump choke which caused delays to dredging activities.

Geotube management.

Debris cleaned out of equipment to mitigate clogging.



Installed silt curtain at Ball's Beach.

Maintaining lowered water surface elevations in WSII impoundment.

WSII dam without flashboards.