

ALNRC 00025
May 15, 2009

Enclosure G

Whole Effluent Toxicity (WET) reports for 2004, 2006, 2007 and 2008

Rate @ 170,0005



STL

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ANALYTICAL REPORT

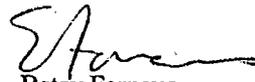
Callaway Nuclear Plant

Lot #: D4K110167

Charlie Riggs

Ameren UE
Callaway Plant
PO Box 620
Fulton, MO 65251

STL DENVER


Betsy Farnaus
Project Manager

November 23, 2004

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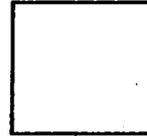
Standard Deliverables

Report Contents

Total Number of Pages

Standard Deliverables

The Cover Letter and the Report Cover page are considered integral parts of this Standard Deliverable package. This report is incomplete unless all pages indicated in this Table of Contents are included.



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Lot #: D4K110167

Case Narrative

Enclosed is the report for two samples received at STL Denver on November 11, 2004. The results included in this report have been reviewed for compliance with STL's Laboratory Quality Manual. The test results shown in this report meet all requirements of NELAC and any exceptions are noted below.

This report may include reporting limits (RLs) less than STL Denver's standard reporting limit. The reported sample results and associated reporting limits are being used specifically to meet the needs of this project. Note that data are not normally reported to these levels without qualification because they are inherently less reliable and potentially less defensible than required by the latest industry standards.

Dilution factors and footnotes have been provided to assist in the interpretation of the results. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at concentrations above the linear calibration curve, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

STL utilizes USEPA approved methods in all analytical work. The samples presented in this report were analyzed for the parameters listed on the analytical methods summary page in accordance with the methods indicated. A summary of quality control parameters is provided below.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Quality Control Summary for Lot D4K110167

Sample Receiving

- The cooler temperatures upon receipt at the Denver laboratory were 3.6°C and 2.7°C.
- The cubitainers were received with headspace.
- All other sample containers were received in acceptable condition.

Holding Times

- All holding times were met.

Method Blanks

- All Method Blank samples were within established control limits.

Laboratory Control Samples (LCS)

- All Laboratory Control Samples were within established control limits.

Matrix Spike (MS) and Matrix Spike Duplicate (MSD)

- All MS and MSD samples were within established control limits.

EXECUTIVE SUMMARY - Detection Highlights

D4K110167

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>	<u>ANALYTICAL METHOD</u>
RAW WATER COMPOSITE 11/10/04 05:00 001				
Ammonia as N	0.031 B	0.10	mg/L	MCAWW 350.1
Specific Conductance	570	2.0	umhos/cm	MCAWW 120.1
Hardness, as CaCO3	230	5.0	mg/L	MCAWW 130.2
pH	8.1	0.10	No Units	MCAWW 150.1
Ceriodaphnia dubia	>100		%	EPA-23 LC-50 C. D
Total Alkalinity	170	5.0	mg/L	MCAWW 310.1
Fathead Minnow (P.promelas)	>100		%	EPA-23 LC-50 Fath
OUTFALL COMPOSITE 11/10/04 05:00 002				
Ammonia as N	0.46	0.10	mg/L	MCAWW 350.1
Specific Conductance	1900	2.0	umhos/cm	MCAWW 120.1
Hardness, as CaCO3	810 Q	25	mg/L	MCAWW 130.2
pH	8.6	0.10	No Units	MCAWW 150.1
Ceriodaphnia dubia	>100		%	EPA-23 LC-50 C. D
Total Alkalinity	250	5.0	mg/L	MCAWW 310.1
Fathead Minnow (P.promelas)	>100		%	EPA-23 LC-50 Fath

METHODS SUMMARY

D4K110167

<u>PARAMETER</u>	<u>ANALYTICAL METHOD</u>	<u>PREPARATION METHOD</u>
pH (Electrometric)	MCAWW 150.1	MCAWW 150.1
Alkalinity	MCAWW 310.1	MCAWW 310.1
LC-50	EPA-23 LC-50 Fa	
LC-50	EPA-23 LC-50 C.	NONE
Nitrogen, Ammonia	MCAWW 350.1	MCAWW 350.1
Residual Chlorine	NONE DPD-HACH	
Specific Conductance	MCAWW 120.1	MCAWW 120.1
Total Hardness (Titrimetric, EDTA)	MCAWW 130.2	MCAWW 130.2

References:

EPA-23 "METHODS FOR MEASURING THE ACUTE TOXICITY OF EFFLUENTS AND RECEIVING WATERS TO FRESHWATER AND MARINE ORGANISMS"
"EPA/600/4-90/027F"

MCAWW "Methods for Chemical Analysis of Water and Wastes",
EPA-600/4-79-020, March 1983 and subsequent revisions.

NONE

METHOD / ANALYST SUMMARY

D4K110167

<u>ANALYTICAL METHOD</u>	<u>ANALYST</u>	<u>ANALYST ID</u>
EPA-23 LC-50 C. Daphnia	Jeff Hoffman	009151
EPA-23 LC-50 Fathead	Jeff Hoffman	009151
MCAWW 120.1	Fougere M. Danielle	006481
MCAWW 130.2	Fougere M. Danielle	006481
MCAWW 150.1	Fougere M. Danielle	006481
MCAWW 310.1	Ewa Kudla	001167
MCAWW 350.1	Claire Likar	004382
NONE DPD-HACH	Jeff Hoffman	009151

References:

EPA-23 "METHODS FOR MEASURING THE ACUTE TOXICITY OF EFFLUENTS AND RECEIVING WATERS TO FRESHWATER AND MARINE ORGANISMS"
"EPA/600/4-90/027F"

MCAWW "Methods for Chemical Analysis of Water and Wastes",
EPA-600/4-79-020, March 1983 and subsequent revisions.

NONE

SAMPLE SUMMARY

D4K110167

<u>WO #</u>	<u>SAMPLE#</u>	<u>CLIENT SAMPLE ID</u>	<u>SAMPLED DATE</u>	<u>SAMP TIME</u>
GWP5H	001	RAW WATER COMPOSITE	11/10/04	05:00
GWP50	002	OUTFALL COMPOSITE	11/10/04	05:00

NOTE(S) :

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

AMEREN SERVICES

Client Sample ID: RAW WATER COMPOSITE

General Chemistry

Lot-Sample #...: D4K110167-001 Work Order #...: GWP5H
 Date Sampled...: 11/10/04 05:00 Date Received...: 11/11/04

Matrix.....: WATER

<u>PARAMETER</u>	<u>RESULT</u>	<u>RL</u>	<u>UNITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
pH	8.1	0.10	No Units	MCAWW 150.1	11/11/04	431646B
				Dilution Factor: 1 Analysis Time...: 12:46		
Ammonia as N	0.031 B	0.10	mg/L	MCAWW 350.1	11/11/04	4319052
				Dilution Factor: 1 Analysis Time...: 19:00		
Ceriodaphnia dubia	>100		‡	EPA-23 LC-50 C. D	11/11-11/20/04	4325081
				Dilution Factor: 1 Analysis Time...: 10:21		
Fathead Minnow (P.pr omelas)	>100		‡	EPA-23 LC-50 Fath	11/11-11/20/04	4325050
				Dilution Factor: 1 Analysis Time...: 10:25		
Hardness, as CaCO3	230	5.0	mg/L	MCAWW 130.2	11/16/04	4321539
				Dilution Factor: 1 Analysis Time...: 14:45		
Specific Conductance	570	2.0	umhos/cm	MCAWW 120.1	11/17/04	4322509
				Dilution Factor: 1 Analysis Time...: 12:30		
Total Alkalinity	170	5.0	mg/L	MCAWW 310.1	11/12/04	4319042
				Dilution Factor: 1 Analysis Time...: 17:18		
Total Residual Chlorine	ND	0.50	mg/L	NONE DPD-HACH	11/11/04	4323555
				Dilution Factor: 1 Analysis Time...: 12:00		

NOTE(S) :

- RL Reporting Limit
- B Estimated result. Result is less than RL.

AMEREN SERVICES

Client Sample ID: **OUTFALL COMPOSITE**

General Chemistry

Lot-Sample #...: D4K110167-002 Work Order #...: GWP50 Matrix.....: WATER
 Date Sampled...: 11/10/04 05:00 Date Received...: 11/11/04

<u>PARAMETER</u>	<u>RESULT</u>	<u>RL</u>	<u>UNITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
pH	8.6	0.10	No Units	MCAWW 150.1	11/11/04	4316468
				Dilution Factor: 1 Analysis Time...: 12:49		
Ammonia as N	0.46	0.10	mg/L	MCAWW 350.1	11/11/04	4319052
				Dilution Factor: 1 Analysis Time...: 19:00		
Ceriodaphnia dubia	>100		‡	EPA-23 LC-50 C. D	11/11-11/20/04	4325078
				Dilution Factor: 1 Analysis Time...: 10:20		
Fathead Minnow (P.pr omelas)	>100		‡	EPA-23 LC-50 Fath	11/11-11/20/04	4325049
				Dilution Factor: 1 Analysis Time...: 10:25		
Hardness, as CaCO3	810 Q	25	mg/L	MCAWW 130.2	11/16/04	4321539
				Dilution Factor: 5 Analysis Time...: 14:45		
Specific Conductance	1900	2.0	umhos/cm	MCAWW 120.1	11/17/04	4322509
				Dilution Factor: 1 Analysis Time...: 12:30		
Total Alkalinity	250	5.0	mg/L	MCAWW 310.1	11/12/04	4319042
				Dilution Factor: 1 Analysis Time...: 17:18		
Total Residual Chlorine	ND	0.50	mg/L	NONE DPD-HACH	11/11/04	4323555
				Dilution Factor: 1 Analysis Time...: 12:00		

NOTE(S):

RL Reporting Limit

Q Elevated reporting limit. The reporting limit is elevated due to high analyte levels.

QC DATA ASSOCIATION SUMMARY

D4K110167

Sample Preparation and Analysis Control Numbers

<u>SAMPLE#</u>	<u>MATRIX</u>	<u>ANALYTICAL METHOD</u>	<u>LEACH BATCH #</u>	<u>PREP BATCH #</u>	<u>MS RUN#</u>
001	WATER	MCAWW 120.1		4322509	4323188
	WATER	MCAWW 130.2		4321539	4322163
	WATER	MCAWW 150.1		4316468	4317300
	WATER	NONE DPD-HACH		4323555	
	WATER	EPA-23 LC-50 C. D		4325081	
	WATER	MCAWW 310.1		4319042	4319017
	WATER	MCAWW 350.1		4319052	4319025
	WATER	EPA-23 LC-50 Fath		4325050	
002	WATER	MCAWW 120.1		4322509	4323188
	WATER	MCAWW 130.2		4321539	4322163
	WATER	MCAWW 150.1		4316468	4317300
	WATER	NONE DPD-HACH		4323555	
	WATER	EPA-23 LC-50 C. D		4325078	
	WATER	MCAWW 310.1		4319042	4319017
	WATER	MCAWW 350.1		4319052	4319025
	WATER	EPA-23 LC-50 Fath		4325049	

METHOD BLANK REPORT

General Chemistry

Client Lot #...: D4K110167

Matrix.....: WATER

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING</u> <u>LIMIT</u>	<u>UNITS</u>	<u>METHOD</u>	<u>PREPARATION-</u> <u>ANALYSIS DATE</u>	<u>PREP</u> <u>BATCH #</u>
Hardness, as CaCO3	ND	5.0	mg/L	MCAWW 130.2	11/16/04	4321539
		Work Order #: GW5031AA MB Lot-Sample #: D4K160000-539				
		Dilution Factor: 1				
		Analysis Time...: 14:45				
Specific Conductance	ND	2.0	umhos/cm	MCAWW 120.1	11/17/04	4322509
		Work Order #: GW91M1AA MB Lot-Sample #: D4K170000-509				
		Dilution Factor: 1				
		Analysis Time...: 12:30				
Total Alkalinity	ND	5.0	mg/L	MCAWW 310.1	11/12/04	4319042
		Work Order #: GW0201AA MB Lot-Sample #: D4K140000-042				
		Dilution Factor: 1				
		Analysis Time...: 17:18				

NOTE(S) :

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT

General Chemistry

Client Lot #....: D4K110167

Matrix.....: WATER

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING</u>		<u>METHOD</u>	<u>PREPARATION-</u>	<u>PREP</u>
		<u>LIMIT</u>	<u>UNITS</u>		<u>ANALYSIS DATE</u>	<u>BATCH #</u>
Ammonia as N	ND	Work Order #: GW0271AA		MB Lot-Sample #:	D4K140000-052	
		0.10	mg/L	MCAWW 350.1	11/11/04	4319052
		Dilution Factor: 1				
		Analysis Time...: 19:00				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #....: D4K110167

Matrix.....: WATER

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>RPD LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
pH	100	(97 - 102)			MCAWW 150.1	11/11/04	4316468
	100	(97 - 102)	0.0	(0-5.0)	MCAWW 150.1	11/11/04	4316468
					Dilution Factor: 1	Analysis Time...: 12:42	

Hardness, as CaCO3						WO#:GW5031AC-LCS/GW5031AD-LCSD LCS Lot-Sample#: D4K160000-539	
	102	(96 - 108)			MCAWW 130.2	11/16/04	4321539
	101	(96 - 108)	0.74	(0-5.0)	MCAWW 130.2	11/16/04	4321539
					Dilution Factor: 1	Analysis Time...: 14:45	

Specific Conductance						WO#:GW91M1AC-LCS/GW91M1AD-LCSD LCS Lot-Sample#: D4K170000-509	
	100	(89 - 109)			MCAWW 120.1	11/17/04	4322509
	99	(89 - 109)	0.71	(0-7.0)	MCAWW 120.1	11/17/04	4322509
					Dilution Factor: 1	Analysis Time...: 12:30	

Total Alkalinity						WO#:GW0201AC-LCS/GW0201AD-LCSD LCS Lot-Sample#: D4K140000-042	
	100	(95 - 110)			MCAWW 310.1	11/12/04	4319042
	99	(95 - 110)	0.61	(0-10)	MCAWW 310.1	11/12/04	4319042
					Dilution Factor: 1	Analysis Time...: 17:18	

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Lot-Sample #...: D4K110167

Matrix.....: WATER

<u>PARAMETER</u>	<u>SPIKE AMOUNT</u>	<u>MEASURED AMOUNT</u>	<u>UNITS</u>	<u>PERCNT RECVRY</u>	<u>RPD</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
pH								
	7.00	7.03	No Units	100		MCAWW 150.1	11/11/04	4316468
	7.00	7.03	No Units	100	0.0	MCAWW 150.1	11/11/04	4316468
			Dilution Factor: 1		Analysis Time...: 12:42			
Hardness, as CaCO3								
	400	407	mg/L	102		MCAWW 130.2	11/16/04	4321539
	400	404	mg/L	101	0.74	MCAWW 130.2	11/16/04	4321539
			Dilution Factor: 1		Analysis Time...: 14:45			
Specific Conductance								
	1410	1410	umhos/cm	100		MCAWW 120.1	11/17/04	4322509
	1410	1400	umhos/cm	99	0.71	MCAWW 120.1	11/17/04	4322509
			Dilution Factor: 1		Analysis Time...: 12:30			
Total Alkalinity								
	200	200	mg/L	100		MCAWW 310.1	11/12/04	4319042
	200	199	mg/L	99	0.61	MCAWW 310.1	11/12/04	4319042
			Dilution Factor: 1		Analysis Time...: 17:18			

NOTE(S) :

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: D4K110167

Matrix.....: WATER

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>RPD LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
Ammonia as N		WO#:GW0271AC-LCS/GW0271AD-LCS			LCS	Lot-Sample#: D4K140000-052	
	100	(90 - 110)			MCAWW 350.1	11/11/04	4319052
	99	(90 - 110)	1.9	(0-10)	MCAWW 350.1	11/11/04	4319052
		Dilution Factor: 1			Analysis Time...: 19:00		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Lot-Sample #....: D4K110167

Matrix.....: WATER

<u>PARAMETER</u>	<u>SPIKE</u> <u>AMOUNT</u>	<u>MEASURED</u> <u>AMOUNT</u>	<u>UNITS</u>	<u>PERCNT</u> <u>RECVRY</u>	<u>RPD</u>	<u>METHOD</u>	<u>PREPARATION-</u> <u>ANALYSIS DATE</u>	<u>PREP</u> <u>BATCH #</u>
Ammonia as N								
	4.00	4.02	mg/L	100		MCAWW 350.1	11/11/04	4319052
	4.00	3.94	mg/L	99	1.9	MCAWW 350.1	11/11/04	4319052
				Dilution Factor: 1			Analysis Time...: 19:00	

NOTE (S) :

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #....: D4K110167

Matrix.....: WATER

Date Sampled....: 11/09/04 08:00 Date Received...: 11/09/04

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
Hardness, as CaCO3			WO#:	GWHJL1AF-MS/GWHJL1AG-MSD	MS Lot-Sample #:	D4K040240-004	
	103	(96 - 108)			MCAWW 130.2	11/16/04	4321539
	102	(96 - 108)	0.65	(0-5.0)	MCAWW 130.2	11/16/04	4321539
			Dilution Factor: 1				
			Analysis Time...: 14:45				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: D4K110167

Matrix.....: WATER

Date Sampled...: 11/09/04 08:00 Date Received...: 11/09/04

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD METHOD	PREPARATION- ANALYSIS DATE	PREP BATCH #
Hardness, as CaCO3	200	400	610	mg/L	103	MCAWW 130.2	11/16/04	4321539
	200	400	606	mg/L	102	0.65 MCAWW 130.2	11/16/04	4321539
Dilution Factor: 1								
Analysis Time...: 14:45								

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: D4K110167

Matrix.....: WATER

Date Sampled...: 11/10/04 05:00 Date Received...: 11/11/04

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>RPD LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
Ammonia as N			WO#:		GWP5H1AL-MS/GWP5H1AM-MSD	MS Lot-Sample #:	D4K110167-001
	98	(44 - 130)			MCAWW 350.1	11/11/04	4319052
	98	(44 - 130)	0.15	(0-30)	MCAWW 350.1	11/11/04	4319052
			Dilution Factor: 1				
			Analysis Time...: 19:00				

NOTE(S) :

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #....: D4K110167

Matrix.....: WATER

Date Sampled....: 11/10/04 05:00 Date Received...: 11/11/04

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION- ANALYSIS DATE	PREP BATCH #
Ammonia as N									
	0.031	4.00	3.94	mg/L	98		MCAWW 350.1	11/11/04	4319052
	0.031	4.00	3.93	mg/L	98	0.15	MCAWW 350.1	11/11/04	4319052

WO#: GWP5H1AL-MS/GWP5H1AM-MSD MS Lot-Sample #: D4K110167-001
 Dilution Factor: 1
 Analysis Time...: 19:00

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #....: D4K110167

Work Order #....: GWP5H-SMP
GWP5H-DUP

Matrix.....: WATER

Date Sampled....: 11/10/04 05:00

Date Received...: 11/11/04

<u>PARAM</u>	<u>RESULT</u>	<u>DUPLICATE</u> <u>RESULT</u>	<u>UNITS</u>	<u>RPD</u>	<u>RPD</u> <u>LIMIT</u>	<u>METHOD</u>	<u>PREPARATION-</u> <u>ANALYSIS DATE</u>	<u>PREP</u> <u>BATCH #</u>
pH	8.1	8.1	No Units	0.0	(0-5.0)	MCAWW 150.1	11/11/04	4316468

SD Lot-Sample #: D4K110167-001
Dilution Factor: 1 Analysis Time...: 12:46

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: D4K110167

Work Order #...: GWQVN-SMP
GWQVN-DUP

Matrix.....: WATER

Date Sampled...: 11/09/04 15:00

Date Received...: 11/11/04

<u>PARAM</u>	<u>RESULT</u>	<u>DUPLICATE RESULT</u>	<u>UNITS</u>	<u>RPD</u>	<u>RPD LIMIT</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
pH	9.0	8.9	No Units	0.34	(0-5.0)	MCAWW 150.1	11/11/04	4316468
			Dilution Factor: 1			Analysis Time...: 14:20		

SD Lot-Sample #: D4K110258-001

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: D4K110167

Work Order #...: GWATJ-SMP
GWATJ-DUP

Matrix.....: WATER

Date Sampled...: 11/04/04 13:00 Date Received...: 11/05/04

<u>PARAM</u>	<u>RESULT</u>	<u>DUPLICATE</u>	<u>UNITS</u>	<u>RPD</u>	<u>RPD</u>	<u>METHOD</u>	<u>PREPARATION-</u>	<u>PREP</u>
		<u>RESULT</u>		<u>RPD</u>	<u>LIMIT</u>		<u>ANALYSIS DATE</u>	<u>BATCH #</u>
Total Alkalinity	20	20	mg/L	0.49	(0-10)	SD Lot-Sample #: D4K050148-001 MCAWW 310.1	11/12/04	4319042
			Dilution Factor: 1			Analysis Time...: 17:18		

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: D4K110167

Work Order #...: GWHJL-SMP
GWHJL-DUP

Matrix.....: WATER

Date Sampled...: 11/09/04 08:00 Date Received...: 11/09/04

<u>PARAM RESULT</u>	<u>DUPLICATE RESULT</u>	<u>UNITS</u>	<u>RPD</u>	<u>RPD LIMIT</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
Hardness, as CaCO3	200	mg/L	0.75	(0-5.0)	MCAWW 130.2	11/16/04	4321539
		Dilution Factor: 1			Analysis Time...: 14:45		



STL-DENVER
AQUATIC TOXICOLOGY DATA INVENTORY CHECKLIST

SAMPLE ID#: D4K110167-1.2

- 1. Pre-test DO check for low levels passed.
2. Aerated samples.
3. Pre-test pH check passed.
4. Pre-test chlorine check passed.
5. Are DO, pH, temperature and conductivity data reviewed for accuracy?
6. Were all the client permit specifications followed?
7. Is sample data included and in the proper order?
8. Has the number of batches been checked to ensure all data is included?
9. Transcriptions verified?
10. Significant figures valid?
11. Calculations verified?
12. Are all bench sheets readable?
13. Is the final report accurate and formatted properly?
14. Is the coversheet for each analysis signed and dated by the analyst?

Analyst: [Signature] Date: 11/22/04
2nd Reviewer: [Signature] Date: 11/22/04

Comments: * samples arrived with headspace in the cube-containers. DO levels were at super saturation. samples were aerated for 10 minutes to bring D.O. levels to acceptable testing criteria (4.0-9.0 mg/L). [Signature]

Anomalies:

Static Acute Toxicity Data Review Checklist

STL Denver

Lab Project and Sample ID Numbers: D4K110167 samples 1, 2

Check Method Used: Renewal Non-renewal
 Check Species Used: Ceriodaphnia D. pulex D. magna Fathead Minnow

Review Items	Level 1			Level 2	Comments & Samples Affected
	Yes	No	N/A		
1. Species used matches client request?	✓			✓	
2. Daphnids < 24 hours old ?	✓			✓	
3. Fathead Minnows 1-14 days old?	✓			✓	
4. Test run with 6 dilution levels + control?	✓			✓	
5. Proper number of replicates run per dilution level (4 daphnids, 2 fish)?	✓			✓	
6. Dilution water used is clearly documented?	✓			✓	
7. Lot numbers of all reagents is traceable in the raw data?	✓			✓	
8. No residual chlorine?	✓			✓	
9. Temperature 20±1 deg. C throughout the test?	X		✓	NA	*Test ran @ 25°C±1°C
10. DO above 4.0 mg/L throughout the test?	✓			✓	
11. Sample pH between 6.0 & 9.0 throughout the test?	✓			✓	
12. Day-to-day conductivity was consistent at each dilution level?	✓			✓	
13. Percent survival in control was ≥ 90%?	✓			✓	
14. Is the pattern of mortalities relatively consistent across dilution levels?	✓			✓	
15. Standard reference toxicant (SRT) run within 30 days?	✓			✓	
16. Last two SRTs were in control?	✓			✓	
17. Results on final report expressed to 3 significant figures?	✓			✓	
18. Are all results manually entered into LIMS verified by 2nd person?	✓			✓	
19. Are nonconformances documented on an NCM?			✓	N/A	
20. Client required report format used?	✓			✓	

1st Level Reviewer: [Signature]

Date: 11/22/04

N:\QA\Forms\Data Review\Aquatic Tox.doc

2nd Level Reviewer: [Signature]

Date: 11/22/04

Version 5/6/03

Reported Data



Severn Trent Laboratories - Denver
4955 Yarrow Street
Arvada, CO 80002

ACUTE TOXICITY REPORT

Ceriodaphnia dubia

Aquatic Toxicology - Biology

CLIENT NAME: Ameren SAMPLE I.D.: D4K110167-001
 50 % MORTALITY TEST: Passed TEST RESULT LC50: >100%
 % SURVIVAL IN 100% DILUTION: 90% CLIENT ID: Raw Water Composite
 SAMPLE DATE: 11/10/04 17:00P
 ORGANISM: Ceriodaphnia dubia AGE: <24 hours old
 TEST START: 11/11/04 1510P TEST FINISH: 11/13/04 1510P
 TYPE OF TEST: LC50, static non-renewal, moderately hard dilution water.

MODERATELY HARD DILUTION WATER CONSTITUENT

AMMONIA: .051 mg/L D.O.: 6.97 mg/L
 HARDNESS: 91 mg/L CHLORINE: ND
 ALKALINITY: 59.3 mg/L TEMPERATURE: 25.2 deg C
 pH: 8.1

SURVIVAL DATA

DATE	(HOURS)	DILUTIONS (%)						
		0	6.25	12.5	25	50	75	100
11/11/2004	INITIAL	20	20	20	20	20	20	20
11/12/2004	24	19	19	20	19	20	18	19
11/13/2004	48	18	18	19	18	20	17	18
MORTALITY:		2	2	1	2	0	3	2
% SURVIVAL:		90%	90%	95%	90%	100%	85%	90%

DAILY CHEMISTRY - (MIN/MAX)

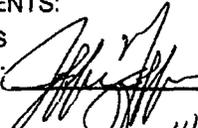
	DILUTIONS (%)						
	0	6.25	12.5	25	50	75	100
CONDUCTIVITY	390/408	377/405	391/431	428/493	500/556	570/601	643/670
D.O.	7.0/7.0	6.8/7.0	6.9/7.0	6.9/7.1	6.9/7.2	6.9/7.1	6.8/7.1
pH	8.1/8.5	8.2/8.3	8.2/8.3	8.2/8.4	8.2/8.4	8.2/8.5	8.2/8.5
TEMPERATURE	25.2/25.3	25.2/25.3	25.2/25.3	25.2/25.3	25.2/25.3	25.2/25.3	25.2/25.3

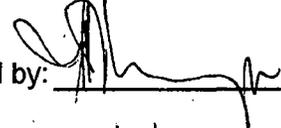
GENERAL CHEMISTRY - SAMPLE

AMMONIA: .031 mg/L D.O.: 6.83 mg/L
 HARDNESS: 230 mg/L CHLORINE: ND
 ALKALINITY: 170 mg/L TEMPERATURE: 25.2 deg C
 pH: 8.2 D.O AFTER AERATION: NA

ANALYSIS	CALCULATION/METHOD	METHOD REFERENCE
100%	SPEARMAN-KARBER	EPA -821-R-02-012 October 2002 pg.78

ADDITIONAL COMMENTS:

Analysis
 Conducted by: 
 Date: 11/22/04

Reviewed by: 
 Date: 11/22/04

1101671C

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

MINIMUM REQUIRED TRIM IS TOO LARGE: 87.5, SO SK IS NOT CALCULABLE.
SPEARMAN-KARBER

TRIM: .00%
LC50: .000
95% CONFIDENCE LIMITS
ARE UNRELIABLE.

CONC. %	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (%)
6.25	20.	2.	10.00	.2012D-01
12.50	20.	1.	5.00	.2003D-02
25.00	20.	2.	10.00	.2012D-01
50.00	20.	0.	.00	.9537D-04
75.00	20.	3.	15.00	.1288D+00
100.00	20.	2.	10.00	.2012D-01

THE BINOMIAL TEST SHOWS THAT 100.00 AND +INFINITY CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9799 PERCENT.
THE LC50 FOR THIS DATA SET IS GREATER THAN 100.00

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS DATA SET BECAUSE NO SPAN WHICH PRODUCES AVERAGE ANGLES BRACKETING 45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

NO CONVERGENCE IN 25 ITERATIONS. PROBIT METHOD PROBABLY CAN NOT BE USE WITH THIS SET OF DATA.

DATE: 11-11-04 TEST NUMBER: 110167-1 DURATION: 48 hours
SAMPLE: Raw Water Composite SPECIES: Ceriodaphnia dubia

METHOD	LC50	CONFIDENCE LIMITS		
		LOWER	UPPER	SPAN
BINOMIAL	*****	100.000	*****	*****
MAA	*****	*****	*****	*****
PROBIT	*****	*****	*****	*****
SPEARMAN	.000	*****	*****	*****

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

**** = LIMIT DOES NOT EXIST



Severn Trent Laboratories - Denver
4955 Yarrow Street
Arvada, CO 80002

ACUTE TOXICITY REPORT
Fathead minnows - *Pimephales promelas*

Aquatic Toxicology - Biology

CLIENT NAME: Ameren SAMPLE I.D.: D4K110167-001
50 % MORTALITY TEST: Passed TEST RESULT LC50: >100%
% SURVIVAL IN 100% DILUTION: 100% CLIENT ID: Raw Water Composite
SAMPLE DATE: 11/10/04 17:00P
ORGANISM: Fathead Minnow AGE: DOH 11/7.8/04
TEST START: 11/11/04 15:05P TEST FINISH: 11/13/04 15:05P
TYPE OF TEST: LC50, static non-renewal, moderately hard dilution water.

MODERATELY HARD DILUTION WATER CONSTITUENT

AMMONIA: .051 mg/L D.O.: 6.97 mg/L
HARDNESS: 91 mg/L CHLORINE: ND
ALKALINITY: 59.3 mg/L TEMPERATURE: 25.2 deg C
pH: 8.1

SURVIVAL DATA

		DILUTIONS (%)						
DATE	(HOURS)	0	6.25	12.5	25	50	75	100
11/11/2004	INITIAL	20	20	20	20	20	20	20
11/12/2004	24	20	20	20	20	20	20	20
11/13/2004	48	20	20	20	20	20	20	20
MORTALITY:		0	0	0	0	0	0	0
% SURVIVAL:		100%	100%	100%	100%	100%	100%	100%

DAILY CHEMISTRY - (MIN/MAX)

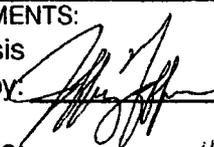
		DILUTIONS (%)						
		0	6.25	12.5	25	50	75	100
CONDUCTIVITY		408/422	377/391	391/429	428/491	500/559	570/656	643/754
D.O.		6.8/7.0	6.6/6.8	6.7/6.9	6.8/6.9	6.8/6.9	6.9/6.9	8.3/8.9
pH		8.1/8.4	8.2/8.2	8.2/8.2	8.2/8.2	8.2/8.3	8.2/8.4	8.2/8.4
TEMPERATURE		25.2/25.3	25.2/25.3	25.2/25.3	25.2/25.3	25.2/25.3	25.2/25.3	25.2/25.3

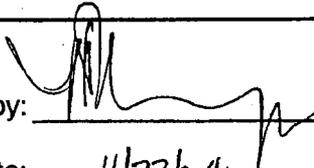
GENERAL CHEMISTRY - SAMPLE

AMMONIA: .031 mg/L D.O.: 6.83 mg/L
HARDNESS: 230 mg/L CHLORINE: ND
ALKALINITY: 170 mg/L TEMPERATURE: 25.2 deg C
pH: 8.2 D.O AFTER AERATION: NA

ANOEC	CALCULATION METHOD	METHOD REFERENCE
100%	SPEARMAN-KARBER	EPA -821-R-02-012 October 2002 pg.78

ADDITIONAL COMMENTS:

Analysis
Conducted by: 
Date: 11/22/04

Reviewed by: 
Date: 11/22/04

1101671P

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

MINIMUM REQUIRED TRIM IS TOO LARGE: 100.0, SO SK IS NOT CALCULABLE.
SPEARMAN-KARBER

TRIM: .00%
LC50: .000
95% CONFIDENCE LIMITS
ARE UNRELIABLE.

CONC. %	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (%)
6.25	20.	0.	.00	.9537D-04
12.50	20.	0.	.00	.9537D-04
25.00	20.	0.	.00	.9537D-04
50.00	20.	0.	.00	.9537D-04
75.00	20.	0.	.00	.9537D-04
100.00	20.	0.	.00	.9537D-04

THE BINOMIAL TEST SHOWS THAT 100.00 AND +INFINITY CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9999 PERCENT. THE LC50 FOR THIS DATA SET IS GREATER THAN 100.00

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

DATE: 11-11-04
SAMPLE: Raw Water Composite

TEST NUMBER: 110167-1 DURATION: 48 hours
SPECIES: Pimephales promelas

METHOD	LC50	CONFIDENCE LIMITS		
		LOWER	UPPER	SPAN
BINOMIAL	*****	100.000	*****	*****
MAA	*****	*****	*****	*****
PROBIT	*****	*****	*****	*****
SPEARMAN	.000	*****	*****	*****

**** = LIMIT DOES NOT EXIST

Bench Sheets

Mortality Benchsheet for 48-Hour Test



STL-Denver

Test Type: 48 hour static renewal

Facility Name: Long Lake

Source: Long Lake - Day 1 Aquatic Tox #1

Lot No.: DYN080159-2

Organism/Age: *Lemniscaphna* 24 hrs old

Dilution Water: municipal water

Analyst(s): Jeffrey Hoffman, Chelsea College

Test Initiation: 11/10/04 13:47

Test Termination: 11/10/04 15:00

Test Duration: 48 hrs

Temperature: 20.5°C

Concentration %	0 Hours (Survival)				24 Hours (Survival)				48 Hours (Survival)				Total Mortality	Percent Survival
	A	B	C	D	A	B	C	D	A	B	C	D		
Lab control (0%)	5	5	5	5	5	5	5	5	5	5	5	5	0	100%
6.25	5	5	5	5	5	5	5	5	5	5	5	5	0	100%
12.5	5	5	5	5	5	5	5	5	5	5	5	5	0	100%
25	5	5	5	5	5	5	5	5	5	5	5	5	0	100%
50	5	5	5	5	5	5	5	5	5	5	4	5	1	95%
75	5	5	5	5	5	5	5	5	5	5	5	5	0	100%
100	5	5	5	5	5	5	5	5	5	5	5	5	0	100%

Test Type: 48 hour static renewal

Facility Name: Amercenter

Source: ~~Long Lake~~ Composite

Lot No.: DYN080167-001

Organism/Age: *Lemniscaphna* 24 hrs old

Dilution Water: municipal water

Analyst(s): Jeffrey Hoffman, Chelsea College

Test Initiation: 11/10/04 13:10

Test Termination: 11/10/04 15:00

Test Duration: 48 hrs

Temperature: 25.2 ± 1°C

Concentration %	0 Hours (Survival)				24 Hours (Survival)				48 Hours (Survival)				Total Mortality	Percent Survival
	A	B	C	D	A	B	C	D	A	B	C	D		
Lab control (0%)	5	5	5	5	5	5	5	4	5	5	4	4	2	90%
6.25	5	5	5	5	5	4	5	5	4	4	5	5	2	90%
12.5	5	5	5	5	5	5	5	5	4	5	5	5	1	95%
25	5	5	5	5	5	5	5	4	5	5	5	3	2	90%
50	5	5	5	5	5	5	5	5	5	5	5	5	0	100%
75	5	5	5	5	5	3	5	5	5	3	5	4	3	85%
100	5	5	5	5	5	4	5	5	5	3	5	5	2	90%

Comments

Daily Chemistry Benchsheet



Facility Name: *St. Albans*

Lot No: *54211*

Organism: *Ceriodaphnia dubia*

Source: *Raw water*

Dilution Water: *MHESW*

Resid. Chlorine	Alkalinity	Ammonia	D.O.	pH	Hardness
<i>UD</i>	<i>440 mg/L</i>	<i>0.31 mg/L</i>	<i>6.83 mg/L</i>	<i>8.24</i>	<i>210 mg/L</i>

Alkalinity: *170 mg/L*
 Ammonia: *0.31 mg/L*
 Hardness: *230 mg/L*

Test Start, Date/Time: *11/11/04 1505 1510* Test Finish, Date/Time: *11/12/04 1505 1510*

EFFLUENT CONCENTRATIONS	CHEMICAL TEST	COMMENT	DAY OF TEST				
			INT	24	48	72	96
LAB	A COND		<i>408</i>		<i>390</i>		
CONTROL	B DO		<i>6.47</i>		<i>7.04</i>		
0% Sample	C pH		<i>8.13</i>		<i>8.44</i>		
	D TEMP		<i>25.2</i>		<i>25.3</i>		
6.25% Sample	A COND		<i>377</i>		<i>405</i>		
	B DO		<i>6.83</i>		<i>7.01</i>		
	C pH		<i>8.18</i>		<i>8.31</i>		
	D TEMP		<i>25.2</i>		<i>25.3</i>		
12.5% Sample	A COND		<i>371</i>		<i>431</i>		
	B DO		<i>6.96</i>		<i>7.04</i>		
	C pH		<i>8.20</i>		<i>8.30</i>		
	D TEMP		<i>25.2</i>		<i>25.3</i>		
25% Sample	A COND		<i>428</i>		<i>493</i>		
	B DO		<i>6.95</i>		<i>7.13</i>		
	C pH		<i>8.22</i>		<i>8.35</i>		
	D TEMP		<i>25.2</i>		<i>25.3</i>		
50% Sample	A COND		<i>500</i>		<i>556</i>		
	B DO		<i>6.86</i>		<i>7.17</i>		
	C pH		<i>8.22</i>		<i>8.44</i>		
	D TEMP		<i>25.2</i>		<i>25.3</i>		
75% Sample	A COND		<i>570</i>		<i>601</i>		
	B DO		<i>6.85</i>		<i>7.13</i>		
	C pH		<i>8.23</i>		<i>8.47</i>		
	D TEMP		<i>25.2</i>		<i>25.3</i>		
100% Sample	A COND		<i>643</i>		<i>670</i>		
	B DO		<i>6.83</i>		<i>7.10</i>		
	C pH		<i>8.24</i>		<i>8.55</i>		
	D TEMP		<i>25.2</i>		<i>25.3</i>		
ANALYST			<i>JA</i>	<i>JA</i>	<i>FG</i>		

11/20/04

Control Limits: D.O. 4.0-Saturated, pH 6.4-8.4, Temperature = 19.0-21.0 deg. C

Final Count	NOEC	Statistical Method Used
<i>7100%</i>	<i>100%</i>	<i>Spearman-Kärber</i>

Mortality Benchsheet for 96-Hour Test



STL-Denver

Test Type: 48 hour static non-renewal
 Facility Name: Ameritas
 Lot No.: DTK110107-001
 Dilution Water: MHEFW 11/13/04
 Test Initiation: 11/13/04 1525
 Test Duration: 48 hours

Source: Raw water Composite
 Organism/Age: *Daphnia pulex* DOH 11/7/04
 Analyst(s): Jeffrey Hoffmann/Felicia Grigo
 Test Termination: 11/13/04 1505
 Temperature: 25°C ± 1°C

Concentration %	0 Hours (Survival)		24 Hours (Survival)		48 Hours (Survival)		72 Hours (Survival)		96 Hours (Survival)		Total Mortality	Percent Survival
	A	B	A	B	A	B	A	B	A	B		
Lab control (0%)	10	10	10	10	10	10					0	100%
6.25	10	10	10	10	10	10					0	100%
12.5	10	10	10	10	10	10					0	100%
25	10	10	10	10	10	10					0	100%
50	10	10	10	10	10	10					0	100%
75	10	10	10	10	10	10					0	100%
100	10	10	10	10	10	10					0	100%

Test Type: 48 hour static non-renewal
 Facility Name: Ameritas
 Lot No.: DTK110107-002
 Dilution Water: MHEFW 11/13/04
 Test Initiation: 11/13/04 1525
 Test Duration: 48 hours

Source: outfall Composite
 Organism/Age: *Daphnia pulex* DOH 11/7/04
 Analyst(s): Jeffrey Hoffmann/Felicia Grigo
 Test Termination: 11/13/04 1525
 Temperature: 25°C ± 1°C

Concentration %	0 Hours (Survival)		24 Hours (Survival)		48 Hours (Survival)		72 Hours (Survival)		96 Hours (Survival)		Total Mortality	Percent Survival
	A	B	A	B	A	B	A	B	A	B		
Lab control (0%)	10	10	10	10	10	10					0	100%
6.25	10	10	10	10	10	10					0	100%
12.5	10	10	10	10	10	10					0	100%
25	10	10	10	10	10	10					0	100%
50	10	10	10	10	10	10					0	100%
75	10	10	10	10	10	10					0	100%
100	10	10	10	10	10	10					0	100%

Comments:

Daily Chemistry Benchsheet



Facility Name: Amesbury

Lot No: DHK1001-1001

Organism: Pseudomonas putida

Dilution Water: MHEs.v 1/10/01

Source: Raw Water Composite

Chemistry for Test Water as Received:

Resid. Chlorine	Alkalinity	Ammonia	D.O.	pH	Hardness
<u>ND</u>	<u>110 mg/L</u>	<u>0.8 mg/L</u>	<u>6.8 mg/L</u>	<u>8.24 mg/L</u>	<u>230 mg/L</u>

Alkalinity: 170 mg/L
 Ammonia: 1031 mg/L
 Hardness: 230 mg/L

Test Start, Date/Time: 11/13/01 15:05 Test Finish, Date/Time: 11/13/01 15:05

EFFLUENT CONCENTRATIONS	CHEMICAL TEST	COMMENT	DAY OF TEST				
			INT.	24	48	72	96
LAB	A COND.		<u>408</u>		<u>422</u>		
CONTROL	B DO		<u>6.97</u>		<u>6.75</u>		
0% Sample	C pH		<u>8.13</u>		<u>8.38</u>		
	D TEMP		<u>25.2</u>		<u>25.3</u>		
6.25% Sample	A COND.		<u>377</u>		<u>391</u>		
	B DO		<u>6.83</u>		<u>6.59</u>		
	C pH		<u>8.18</u>		<u>8.22</u>		
	D TEMP		<u>25.2</u>		<u>25.3</u>		
12.5% Sample	A COND.		<u>371</u>		<u>429</u>		
	B DO		<u>6.86</u>		<u>6.71</u>		
	C pH		<u>8.20</u>		<u>8.19</u>		
	D TEMP		<u>25.2</u>		<u>25.3</u>		
25% Sample	A COND.		<u>428</u>		<u>491</u>		
	B DO		<u>6.85</u>		<u>6.83</u>		
	C pH		<u>8.22</u>		<u>8.23</u>		
	D TEMP		<u>25.2</u>		<u>25.3</u>		
50% Sample	A COND.		<u>500</u>		<u>559</u>		
	B DO		<u>6.86</u>		<u>6.82</u>		
	C pH		<u>8.22</u>		<u>8.32</u>		
	D TEMP		<u>25.2</u>		<u>25.3</u>		
75% Sample	A COND.		<u>570</u>		<u>656</u>		
	B DO		<u>6.85</u>		<u>6.85</u>		
	C pH		<u>8.23</u>		<u>8.37</u>		
	D TEMP		<u>25.2</u>		<u>25.3</u>		
100% Sample	A COND.		<u>643</u>		<u>754</u>		
	B DO		<u>6.83</u>		<u>6.87</u>		
	C pH		<u>8.24</u>		<u>8.43</u>		
	D TEMP		<u>25.2</u>		<u>25.3</u>		
ANALYST			<u>JA</u>		<u>FA</u>		<u>FG</u>

Control Limits: D.O. 4.0-Saturated, pH 6.4-8.4, Temperature = 19.0-21.0 deg. C

Final EC: <u>50</u>	NOEC: <u></u>	Statistical Method Used: <u>Spearman-Kärber</u>
<u>>100%lc</u>	<u>100%lc</u>	

5/22/03 Version

Ameren Services
Environmental, Safety & Health
314.554.3480 (Telephone)
314.554.4182 (Facsimile)
ssweiss@ameren.com

One Ameren Plaza
1901 Chouteau Avenue
PO Box 66149
St. Louis, MO 63166-6149
314.621.3222

October 17, 2006

Department of Natural Resources
Northeast Regional Office
1709 Prospect Drive
Macon, Missouri 63552-2602

Re: **Ameren UE Callaway Power Plant**
NPDES Permit No. MO-0098001
2006 Whole Effluent Toxicity (WET) Test Report



Dear Sir or Madam:

Per Special Condition No. 9 of the Union Electric Company, d/b/a Ameren UE Callaway Power Plant, NPDES Permit MO-0098001, please find enclosed the **2006 Whole Effluent Toxicity (WET) Test**.

The test passes since no mortality was observed with any of the test organisms in the effluent samples.

Please call me at 314-554-3480 if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Steven S. Weiss".

Steven S. Weiss
Environmental Scientist
Environmental, Safety & Health
Ameren Services as Affiliated Agent for Union Electric Company, d/b/a AmerenUE

Attachment

bcc: C.A. Riggs (CA-460)
JCP / SSW
WQ3.1.2.4

SIGNATURE PAGE

Submitted by:

ABC Laboratories, Inc.
7200 E. ABC Lane
Columbia, Missouri 65202

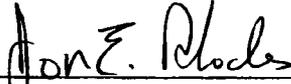
Prepared by:



Ryan Warbritton
Associate Toxicologist/Study Director
ABC Laboratories, Inc.

Sept 22, 06
Date

Approved by:



Jon E. Rhodes, M.S.
Director, ABC Chemical Services
ABC Laboratories, Inc.

22 Sep 06
Date

ACUTE TOXICITY COMPENDIUM

Subject: Acute Toxicity of Ameren UE Composite Outfall To *Ceriodaphnia dubia* and Fathead Minnows (*Pimephales promelas*)

Sponsor: Ameren UE, Callaway Power Plant
P.O. Box 620
Fulton, Missouri 65251

Effluent: Outfall Composite

Concentrations: Synthetic water control, raw water composite control (Receiving water), 10%, and 100% Effluent

Dilution Water: Raw water composite (Receiving water)

Test Dates: Initiated September 13, 2006 Terminated September 15, 2006

Length of Test: 48 Hours

Test Organisms: *Ceriodaphnia dubia* and Fathead Minnows

Organism Source: In-house cultures

Age at Initiation: *Ceriodaphnia dubia*: <24-hour old neonates
Fathead Minnows: 8 days post hatch

Test Procedures and Conditions:

I. *Ceriodaphnia dubia*

Duration:	48 hours
Temperature:	25±1°C
Lighting:	Ambient Laboratory lighting, 16:8-hour light:dark
Observations:	24 and 48 hours
Test chambers:	30 mL
Volume per chamber:	25 mL
Replicates per treatment:	4
Organisms per chamber:	5
Organisms per treatment:	20
Control water:	ABC Synthetic water
Dilution water:	Raw water composite (Receiving water)
Effluents:	10% and 100% Ameren UE composite outfall

II. Fathead Minnow

Duration:	48 hours
Temperature:	25±1 °C
Lighting:	Ambient Laboratory lighting, 16-8 hr. light-dark
Observations:	24 and 48 hours
Test chambers:	900-mL glass jars
Volume per chamber:	400 mL
Replicates per treatment:	4
Organisms per chamber:	10
Organisms per treatment:	40
Control water:	ABC Synthetic water
Dilution water:	Raw water composite (Receiving water)
Effluents:	10% and 100% Ameren UE composite outfall

III. Methods

The methodology used for this effluent test was that described by the U.S. EPA and Ameren UE NPDES Permit referenced below:

Weber, C.I. 2002. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 5th ed. U.S. Environmental Protection Agency, EPA/821/R-02/012.

The Ameren UE NPDES permit Number: MO-0098001

Results:

I. Mortality

PERCENT MORTALITY		
Sample ID	<i>Ceriodaphnia dubia</i>	<i>Pimephales promelas</i>
ABC Synthetic Water Control	0	0
Raw Water Composite (Receiving Water Control)	0	0
10% Outfall Composite	0	0
100% Outfall Composite	0	0

II. Receipt Water Quality

WATER QUALITY ON RECEIPT								
Sample ID	Temp (°C)	DO (mg/L)	pH	Conductivity (µS/cm)	Hardness (mg/L)	Alkalinity (mg/L)	Total Ammonia (mg/L)	Total Chlorine (mg/L)
RAW Water Composite	7.7	10.15	8.43	720	236	180	<0.2	0
Outfall Composite	7.4	10.25	8.53	2,390	850	216	0.8	0

III. Ceriodaphnia dubia water quality Ranges

Treatment	Temperature (°C) ^a	Dissolved Oxygen (mg/L) ^a	pH ^a	Conductivity (µS) ^c
ABC Control	24.4	7.9	8.1 – 8.2	321 – 375
Receiving Water	24.5 – 24.8	7.7 – 7.9	8.4 – 8.6	712 – 831
10% Effluent	24.4 – 24.9	7.8 – 8.0	8.4 – 8.6	876 – 1,034
100% Effluent	24.3 – 25.0	7.8 – 8.0	8.4 – 8.6	2,390 – 2,730

IV. Fathead minnow water quality Ranges

Treatment	Temperature (°C) ^a	Dissolved Oxygen (mg/L) ^a	pH ^a	Conductivity (µS) ^c
ABC Control	24.4 – 25.1	7.3 – 7.8	8.1 – 8.2	327 – 377
Receiving Water	24.4 – 25.1	7.2 – 7.8	8.4 – 8.5	715 – 827
10% Effluent	24.3 – 25.2	7.3 – 7.8	8.4 – 8.5	883 – 1,041
100% Effluent	24.3 – 25.2	7.3 – 7.8	8.4 – 8.5	2,380 – 2,660

Discussion:

There was no mortality or sublethal effects in the controls or effluent concentrations during both the *Ceriodaphnia dubia* and the fathead minnow studies. Since there was no mortality statistical analysis was not necessary. The effluent passes the requirements for an acceptable study for both the *Ceriodaphnia dubia* and the fathead minnow tests by meeting the criterion for survival at the Acceptable Effluent Concentration (AEC).

RAW DATA PACKAGE FOR

Acute Toxicity of Ameren UE Composite Outfall
To *Ceriodaphnia dubia* and Fathead Minnows (*Pimephales promelas*)

AUTHOR

Ryan Warbritton

SPONSOR

Ameren UE, Callaway Power Plant
P.O. Box 620
Fulton, Missouri 65251

PERFORMING LABORATORY

ABC Laboratories, Inc.
7200 E. ABC Lane
Columbia, Missouri 65202

PROJECT IDENTIFICATION

ABC Study No.: 60620

RAW DATA APPENDICES

- I. EFFLUENT RECEIPT AND COMMON DATA
- II. EFFLUENT DAPHNID EXPOSURE
- III. EFFLUENT FATHEAD MINNOW EXPOSURE
- IV. DMRQA 26 COMMON DATA
- V. DMRQA 26 DAPHNID EXPOSURE
- VI. DMRQA 26 FATHEAD MINNOW EXPOSURE

I. EFFLUENT RECEIPT AND COMMON DATA

D. SPECIAL CONDITIONS (continued)

6. Changes in Discharges of Toxic Substances

The permittee shall notify the Director as soon as it knows or has reason to believe:

- (a) That any activity has occurred or will occur which would result in the discharge of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:"
 - (1) One hundred micrograms per liter (100 µg/L);
 - (2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,5 dinitrophenol and for 2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
 - (3) Five (5) times the maximum concentration value reported for the pollutant in the permit application;
 - (4) The level established in Part A of the permit by the Director.
 - (b) That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant, which was not reported in the permit application.
7. Permittee is exempt from section 311 and superfund reporting under 40CFR117.12(a)1-3 for the following chemicals: Ammonium Hydroxide, Boric Acid, Dispersants, Ethylene Glycol, Hydrazine, Hydrogen Peroxide, Lithium Hydroxide, Nitrate/Borate Products, Coagulants, Sodium Hydroxide, Sodium Hypochlorite, Sodium Molybdate, Sodium Sulfate, Sodium Tolytriazole, Sulfuric Acid, Monoethanolamine, Sodium Bromide, Titanium Dioxide, (1-Hydroxythylidene) diphosphonic acid, Potassium Hydroxide (HEDP), Dimethylamide (DMAD), Phosphoric Acid, Glutheraldehyde, Diethylhydroxylamine (DEHA), Proprietary Methylene Bis based biocide, and Proprietary Quaternary ammonium compound.
8. The 316 (B) study was done in 1984 and 1986. Since there have been no changes to the intake structure, the study is approved for this permit cycle.
9. Whole Effluent Toxicity (WET) tests will be conducted as follows:

SUMMARY OF WET TESTING FOR THIS PERMIT					
OUTFALL	LIMIT	A.E.C. %	FREQUENCY	SAMPLE TYPE	MONTH
#001, #002, #003, #007, #009 & #016 combined at the River Discharge	Insignificant Mortality	10%	Annually, when molluscicide is used	24 hr. composite	Any but report in December

(a) Test Schedule and Follow-Up Requirements

- (1) Perform a single-dilution test in the months and at the frequency specified above. If the effluent passes the test, do not repeat the test until the next test period.
 Submit test results along with complete copies of the test reports as received from the laboratory within 30 calendar days of availability to the WPCP, Planning Section, P.O. Box 176, Jefferson City, MO 65102.
- (2) If the effluent fails the test, a multiple dilution test shall be performed within 30 calendar days, and biweekly thereafter, until one of the following conditions are met:
 - (a) THREE CONSECUTIVE MULTIPLE-DILUTION TESTS PASS. No further tests need to be performed until next regularly scheduled test period.
 - (b) A TOTAL OF THREE MULTIPLE-DILUTION TESTS FAIL.

D. SPECIAL CONDITIONS (continued)

9. Whole Effluent Toxicity (WET) (continued)

(a) Test Schedule and Follow-Up Requirements (continued)

- (3) The permittee shall submit a summary of all test results for the test series along with complete copies of the test reports as received from the laboratory to the WPCP, Planning Section, P.O. Box 176, Jefferson City, MO 65102 within 14 calendar days of the third failed test.
- (4) Additionally, the following shall apply upon failure of the third test: A toxicity identification evaluation (TIE) or toxicity reduction evaluation (TRE) is automatically triggered. The permittee shall contact WPCP, Planning Section to ascertain as to whether a TIE or TRE is appropriate. The permittee shall submit a plan for conducting a TIE or TRE to the Planning Section of the WPCP within 60 calendar days of the date of DNR's direction to perform either a TIE or TRE. This plan must be approved by DNR before the TIE or TRE is begun. A schedule for completing the TIE or TRE shall be established in the plan approval.
- (5) Upon DNR's approval, the TIE/TRE schedule may be modified if toxicity is intermittent during the TIE/TRE investigations. A revised WET test schedule may be established by DNR for this period.
- (6) If a previously completed TIE has clearly identified the cause of toxicity, additional TIEs will not be required as long as effluent characteristics remain essentially unchanged and the permittee is proceeding according to a DNR approved schedule to complete a TRE and reduce toxicity. Regularly scheduled WET testing as required in the permit, without the follow-up requirements, will be required during this period.
- (7) All failing test results shall be reported to WPCP, Planning Section, P.O. Box 176, Jefferson City, MO 65102 within 14 calendar days of the availability of the results.
- (8) When WET test sampling is required to run over one DMR period, each DMR report shall contain information generated during the reporting period.
- (9) Submit a concise summary of all test results with the annual report.

(b) PASS/FAIL procedure and effluent limitations:

- (1) To pass a single-dilution test, mortality observed in the AEC test concentration shall not be significantly different (at the 95% confidence level; $p = 0.05$) than that observed in the upstream receiving-water control sample. The appropriate statistical tests of significance will be those outlined in the most current USEPA acute toxicity manual or those specified by the MDNR.
- (2) To pass a multiple-dilution test:
 - (a) the computed percent effluent at the edge of the zone of initial dilution, Acceptable Effluent Concentration (AEC), must be less than three-tenths (0.3) of the LC_{50} concentration for the most sensitive of the test organisms; or,
 - (b) all dilutions equal to or greater than the AEC must be nontoxic. Failure of one multiple-dilution test is an effluent limit violation.

D. SPECIAL CONDITIONS (continued)

9. Whole Effluent Toxicity (WET) (continued)

(c) Test Conditions

- (1) Test Type: Acute Static non-renewal
- (2) Test species: Ceriodaphnia dubia and Pimephales promelas (fathead minnow). Organisms used in WET testing shall come from cultures reared for the purpose of conducting toxicity tests and cultured in a manner consistent with the most current USEPA guidelines. All test animals shall be cultured as described in the most current edition of Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.
- (3) Test period: 48 hours at the "Acceptable Effluent Concentration" (AEC) specified above.
- (4) When dilutions are required, upstream receiving stream water shall be used as dilution water. If upstream water is unavailable or if mortality in the upstream water exceeds 10%, "reconstituted" water will be used as dilution water. Procedures for generating reconstituted water will be supplied by the MDNR upon request.
- (5) Single-dilution tests will be run with:
 - (a) Effluent at the AEC concentration;
 - (b) 100% receiving-stream water (if available), collected upstream of the outfall at a point beyond any influence of the effluent; and
 - (c) reconstituted water.
- (6) Multiple-dilution tests will be run with:
 - (a) 100%, 50%, 25%, 12.5%, and 6.25% effluent, unless the AEC is less than 25% effluent, in which case dilutions will be 4 times the AEC, two times the AEC, AEC, 1/2 AEC and 1/4 AEC;
 - (b) 100% receiving-stream water (if available), collected upstream of the outfall at a point beyond any influence of the effluent; and
 - (c) reconstituted water.
- (7) If reconstituted-water control mortality for a test species exceeds 10%, the entire test will be rerun.

SUMMARY OF TEST METHODOLOGY FOR WHOLE-EFFLUENT TOXICITY TESTS

Whole-effluent-toxicity test required in NPDES permits shall use the following test conditions when performing single or multiple dilution methods. Any future changes in methodology will be supplied to the permittee by the Missouri Department of Natural Resources (MDNR). Unless more stringent methods are specified by the DNR, the procedures shall be consistent with the most current edition of Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms,

Test conditions for Ceriodaphnia dubia:

Test duration:	48 h
Temperature:	25 ± 1°C Temperatures shall not deviate by more than 3°C during the test.
Light Quality:	Ambient laboratory illumination
Photoperiod:	16 h light, 8 h dark
Size of test vessel:	30 mL (minimum)
Volume of test solution:	15 mL (minimum)
Age of test organisms:	<24 h old
No. of animals/test vessel:	5
No. of replicates/concentration:	4
No. of organisms/concentration:	20 (minimum)
Feeding regime:	None (feed prior to test)
Aeration:	None
Dilution water:	Upstream receiving water; if no upstream flow, synthetic water modified to reflect effluent hardness.
Endpoint:	Pass/Fail (Statistically significant Mortality when compared to upstream receiving water control or synthetic control if upstream water was not available at $p < 0.05$)
Test acceptability criterion:	90% or greater survival in controls

Test conditions for (Pimephales promelas):

Test duration:	48 h
Temperature:	25 ± 1°C Temperatures shall not deviate by more than 3°C during the test.
Light Quality:	Ambient laboratory illumination
Photoperiod:	16 h light/ 8 h dark
Size of test vessel:	250 mL (minimum)
Volume of test solution:	200 mL (minimum)
Age of test organisms:	1-14 days (all same age)
No. of animals/test vessel:	10
No. of replicates/concentration:	4 (minimum) single dilution method 2 (minimum) multiple dilution method
No. of organisms/concentration:	40 (minimum) single dilution method 20 (minimum) multiple dilution method
Feeding regime:	None (feed prior to test)
Aeration:	None, unless DO concentration falls below 4.0 mg/L; rate should not exceed 100 bubbles/min.
Dilution water:	Upstream receiving water; if no upstream flow, synthetic water modified to reflect effluent hardness.
Endpoint:	Pass/Fail (Statistically significant Mortality when compared to upstream receiving water control or synthetic control if upstream water was not available at $p < 0.05$)
Test Acceptability criterion:	90% or greater survival in controls

DATA CORRECTION CODES AND FACILITY RECORDS**Data Correction Codes**

The following correction codes may have been used to correct errors in the raw data:

A - Addition	I - Illegible
C - Calculation error	R - Recording error
D - Dating error	S - Spelling error
F - Form change	T - Transcription error
G - Grammatical error	W - Write over

Other - _____ Date: _____ Initials: _____

Other - _____ Date: _____ Initials: _____

Facility Record Statement

Some of the records that appear in the raw data may have been provided as photocopies of the original records maintained on file at ABC Laboratories as facility records. This was done by necessity for data that are common to several studies.

EQUIPMENT IDENTIFICATION LIST

Balances

- B-1: Sartorius R300S #1621-43 (940)
 B-2: Mettler PM460-#1905-1020 (956)
 B-3: Mettler PM200 #1905-320 (934)
 B-4: Mettler BP3260 #163-1120 (934)
 B-5: Mettler AG245 #1630-981346 (934)
 B-6: Mettler PM480 #1626-141 (940)
 B-7: Mettler PM200 #1714-280 (940)
 B-8: Mettler AJ100 #1626-4030 (940)
(Retired)
 B-9: Mettler PM480 #1626-107 (940)
 B-10: Mettler PM480 #1626-94 (940)
 B-11: Mettler AT261 #1626-2040 (928)
 B-12: Mettler PM480 #1624-28C (GH)
 B-13: Mettler PM400 #1630-200101 (GH)
(Retired)
 B-15: Mettler PM11-K #1622-172 (719)
 B-16: Sartorius 1702MPB #1714-145A (722)
 B-17: Mettler BB2440 #1716-295 (721)
 B-18: Mettler BB2440 #1625-540 (721)
 B-19: Mettler PM-400 #1227-3570 (721)
 B-20: Mettler PM-400 #1625-530 (721)
 B-21: Fisher XD-8K #163-320 (919)
 B-22: Mettler PM 400 #4570-23 (GH)
 B-23: Mettler UMX5 (SN 1125141099)

Centrifuges

- CE-1: IEC Clinical #1905-290
 CE-2: IEC CR 6000 #163-309
 CE-3: IEC Clinical #1713-430
 CE-4: IEC-2K #1715-765
 CE-5: IEC Centra-HN #1626-191
 CE-6: IEC Centra-HN #1626-190
 CE-7: IEC B-22 #1626-580
 CE-8: Beckman Model J2-21 #1704-200

Waterbath

- W-1: Fisher Model 9510 #1626-4055
 W-2: Fisher Model 9110 #1626-360A
 W-3: Fisher Model 9101 #1626-4040
 W-4: Neslab RTE 100 #1626-990048
 W-5: Fisher #1626-133
 W-6: Labline Imperial III
 W-7: VWR Scientific Model 1203

Sonicators

- S-1: Branson 5200 #1905-465
 S-3: Fisher FS110 #129-3020
 S-4: Baxter S/P Brand #163-343
 S-5: Baxter Brand C6450-11 #163-347A
 S-6: Baxter #163-347B
 S-7: Fisher Model FS110H #RVB0600607088
 S-8: Branson Model 5200 #B52OU R-4

Environmental Chamber

- EC-2: BioCold #163-313
 EC-3: Norlake Scientific #1626-1070
 EC-4: Norlake Scientific #175-277

pH Meters

- pH-1: Beckman Φ 34 #163-640 *(Retired)*
 pH-2: Accumet Model 25 #1630-96-1282
 pH-4: Accumet Model 50 #1626-95-4590 *(Retired)*
 pH-5: Denver Instruments #1630-000000 *(Retired)*
 pH-6: Denver Instruments #1630-010050
 pH-7: Corning 240 #1625-115
 pH-8: Accumet Model AR50 #AR93314000
 pH-9: WTW Model pH 330i #03300091
 pH-10: WTW Model pH 330i #03310029

Incubators

- INC-1: Percival Scientific #163-1122
 INC-2: Lab-Line 3597-3 #1900-000 *(Retired)*
 INC-3: Bevco #163-370 *(Retired)*
 INC-4: True Manufacturing #055-1030
 INC-5: Percival Scientific #163-1123
 INC-6: Fisher Isotemp Model 5160 #1626-820
 INC-7: Percival Scientific Model I-36NL
 #1626-974738
 INC-8: VWR 1910 #1713-915
 INC-9: VWR 1910 #1713-860
 INC-10: True Manufacturing #054-1030
 INC-11: Percival Scientific Model I-37LLVLX
 #1626-96-4656
 INC-12: Percival Scientific Model I-37LLVLX
 #1626-4488
 INC-13: Manitowoc AV3A #163-910A
 INC-14: Fisher Scientific 146E #1630-0100006
 INC-15: Fisher Scientific 146E #1630-0100008

Product Chemistry

- PC-2: Koehler Model K-16200 Flashpoint Apparatus
 #1626-4190
 PC-3: Brookfield Model DV-1+ Viscometer
 #1626-4492
 PC-4: Mettler FP-90 Central Processor #1626-410
 Mettler FP81HT MBC Cell #1626-411
 PC-5: AccuPyc 1330 Gas Pycnometer #1626-4135A
 PC-6: Fisher Scientific Surface Tensiomat Model 21
 #1626-95-4560
 PC-7: Mel-Temp II Melting Point Apparatus
 #1626-974748
 PC-8: Princo Mercury Barometer #046-3020
 PC-9: Fisher U-tube Manometer #084-3020
 PC-10: Brookfield R/S Rheometer #1630-010024A
 Brookfield PTR Thermoregulator
 #1630-010024B
 PC-11: Mel-Temp II Apparatus Model 1001D
 #1187040915168

MORTALITY AND BEHAVIORAL OBSERVATIONS							
Test Substance: Effluent				Study No.: 60620			
<input type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Screen							
Test Species: <u>Ceriodaphnia dubia</u>				Date Initiated: <u>Sept 13, 06</u>			
Time Test Organism Addition Started: <u>3pm</u>				Completed: <u>3:50</u>			
Prepared by: <u>hw</u>				Date: <u>Sept 13, 06</u>			
Test Concentration (percent)	REP	Event: 24-hour			Event: 48-hour		
		# Alive	Cum. # D ¹	Sublethal Obs. ^a	# Alive	Cum. # D ¹	Sublethal Obs. ^a
100% Control (ACC)	A	5	0	SN	5	0	SN
	B	5	0	SN	5 ¹	0	SN
	C	5	0	SN	5	0	SN
	D	5	0	SN	5	0	SN
100% RAW Comp Side	A	5	0	SN	5	0	SN
	B	5	0	SN	5	0	SN
	C	5	0	SN	5	0	SN
	D	5	0	SN	5	0	SN
Observer		hw			R		
Date		Sept 14, 06			Sept 15, 06		
Time		3pm			2:50p		
Note: Dead organisms removed and discarded after each observation period. Notes (initial & date all entries): DR for Sept 15, 06 ^a See Form CDG 018/CDG 019 for Code Key.							

MORTALITY AND BEHAVIORAL OBSERVATIONS							
Test Substance: Effluent				Study No.: 60620			
<input type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Screen							
Test Species: <u>Ceriodaphnia dubia</u>				Date Initiated: <u>Sept 13, 06</u>			
Time Test Organism Addition Started: _____				Completed: _____			
Prepared by: <u>RW</u>				Date: <u>Sept 13, 06</u>			
Test Concentration (Percent)	REP	Event: <u>24-hour</u>			Event: <u>48-hour</u>		
		# Alive	Cum. # D ^a	Sublethal Obs. ^a	# Alive	Cum. # D ^a	Sublethal Obs. ^a
<u>10% outfall</u>	A	5	0	SN	5	0	SN
	B	5	0	SN	5	0	SN
	C	5	0	SN	5	0	SN
	D	5	0	SN	5	0	SN
<u>100% outfall</u>	A	5	0	SN	5	0	SN
	B	5	0	SN	5	0	SN
	C	5	0	SN	5	0	SN
	D	5	0	SN	5	0	SN
Observer		<u>RW</u>			<u>RW</u>		
Date		<u>Sept 14, 06</u>			<u>Sept 15, 06</u>		
Time		<u>3pm</u>			<u>2:50p</u>		
Note: Dead organisms removed and discarded after each observation period. Notes (initial & date all entries): ^a See Form <u>CDG 018/CDG 019</u> for Code Key.							

Key to Morphological And Behavioral Observations For Invertebrate Toxicity Tests

Test Substance: Effluent

Study No.: 60620

UNIVERSAL

Dead (D) - Animals exhibiting no response to a physical stimulus (e.g., gentle prodding or stream of water/air from a pipet). **Not used in daphnid tests.**

Discoloration (DC) - Animals exhibiting abnormal color patterns when compared to the control(s). This may include complete or partial light or dark discoloration.

Normal (N) - Animals not exhibiting behavioral or morphological abnormalities.

Not Found (NF) - An animal not observed as dead. It may have died without being detected, was trapped or stuck on the side of a retention or test chamber and not found, or simply not observed. Animals not found may be treated as dead at the end of the test.

Erratic Movement (E) - Animals moving in a rapid disorderly fashion.

Lethargic (L) - Live animals display abnormal slow movement/reduced activity. Not used in daphnid tests.

AQUATIC INVERTEBRATES

Immobile (I) - No observed movement of appendages or postabdomen within 15 seconds after gentle agitation of the test chamber or gentle disturbance of the daphnid itself.

Used exclusively in daphnid tests.

On Bottom (B) - Animals resting on the bottom of the test chamber. **Not used in daphnid tests.**

Quiescent (Q) - Movement of one or more appendages or postabdomen within 15 seconds after gentle agitation of the test chamber or gentle disturbance of the daphnid itself.

Used exclusively in daphnid tests.

Trailing Extraneous Material (T) - Animal observed with extraneous material trailing from the body.

Floating on Surface (F) - Animals floating on the surface of the test solution.

SOIL INVERTEBRATES

Elongated (EL) - Animal is elongated in an abnormal fashion.

Flacid (FL) - Animal is observed to be abnormally soft, lacking normal turgidity.

Lesions on Body Surface (LE) - Animals observed with ulcers or lesions on the body surface.

Surfacing (S) - Animals are observed on the surface of the soil.

Swellings (SW) - Animal observed with abnormal midsegmented swellings.

BENEFICIAL ARTHROPODS

On Back (OB) - Live animals on their backs. **Used exclusively for honeybee tests.**

WATER QUALITY FOR EFFLUENT SAMPLES

Effluent Designation: Ameren UE Species: Ceriodaphnia dubia/Fathead Minnow Study #: 60620

Extra replicate prepared for water chemistry Measurements made in test beakers

Concentration (%)	Date/ID/REP <u>Sept 13, 06 RW -</u>				Date/ID/REP <u>Sept 14, 06 RW -</u>				Date/ID/REP <u>Sept 15, 06 RW -</u>				Date/ID/REP			
	Temp' (°C)	DO (mg/L)	pH	Cond. (µS)	Temp' (°C)	DO (mg/L)	pH	Cond. (µS)	Temp' (°C)	DO (mg/L)	pH	Cond. (µS)	Temp' (°C)	DO (mg/L)	pH	Cond. (µS)
ABC Control	24.4	7.94	8.11	321	24.4	7.85	8.22	352	24.3	7.93	8.09	375				
Receiving Water (RW)	24.8	7.67	8.40	712	24.4	7.87	8.58	779	24.4	7.75	8.55	831				
10% dilution (RW)	24.9	7.99	8.41	876	24.3	7.91	8.58	958	24.3	7.77	8.56	1034				
100% Outfall	25.0	7.98	8.41	2390	24.2	7.84	8.56	2540	24.3	7.83	8.58	2730				
Device ID	^① PH9	DO-10	PH9	CM3	^① DO-10	DO-10	PH-10	CM3	^① DO-10	DO-10	PH-9	CM-3				

Notes: * Correction Factor @ °C
 ① correction for temp = 0.0 °C Sept 13, 06 RW Sept 18, 06
 correction for temp = +0.1 °C Sept 14-15, 06 RW Sept 18, 06

III. FATHEAD MINNOW EXPOSURE

TEST ORGANISM ADDITION

Test Substance: Effluent

Study No.: 60620

 Preliminary Screen DefinitiveSpecies Added: Fathead minnowLot No.: 1806 FHMNumber Added/Test Chamber: 10Total Number/Treatment: 40

Check appropriate method of addition:

- Added test organisms by ones and/or twos (no more than 10% at a time if <20 organisms per chamber or no more than 20% at a time if ≥ 20 organisms per chamber) proceeding from control(s), low to high test substance treatments, and repeating steps as necessary until the required number of individuals were added to each test chamber.
- One individual was added to each container containing only dilution water proceeding from containers labeled control(s), low to high test substance treatments and replicate I.D., if needed. The process was repeated until each container contained the required number of individuals. The test organisms within each container were then released from container/transferred via pipet (circle one) into the corresponding test chamber.
- Impartially added the required number of individuals to a set of labeled containers; each container representing one treatment or treatment replicate, if treatment replicated. Each container was randomly assigned to a treatment or treatment replicate by random number generator or lottery assignment. The individuals within each container were then released from container/transferred via pipet (circle one) into the corresponding test chamber.
- Other (Describe):

Comments:Prepared by: hDate: Sept 13, 06

FISH CULTURE RECORD

Species: Fathead Minnow Lot No: 1806 FHM
 Tank/Aquarium No.: FHM20 Source: ABC In House SPC No. 1606
 Water Type: Well/Blended Food Lot No.: 55071706 BS02506 FF07206
 Date Received: Sept 5, 06 No. Received: ~1500
 Thermometer ID No.: CR-4, CR-5, CR-6, CR-7 Other: _____
 Photoperiod: 16 hours light; 8 hours darkness; 30 minute transition period
 Prepared by: RJ Date: Sept 5, 06

Date	ID	Mort.	Feeding		°C Temp.	Treatment and/or Comments
			AM	PM		
Sept 05, 06	RJ	-	-	-	24	Moth at 9:15am
Sept 06, 06	KB	/	✓	✓	25	
Sept 07, 06	KB	-	✓	✓	25	
Sept 08, 06	KB	0	✓	✓	25	
Sept 9, 06	KB	0	✓	-	25	
Sept 10, 06	KB	0	✓	-	25	
Sept 11, 06	KB	0	✓	✓	25	
Sept 12, 06	KB	0	✓	✓	25	
Sept 13, 06	KB	0	✓	✓	25	hsal 160 for study 60620 RW Sept 13, 06
						"THIS IS AN EXACT COPY OF THE ORIGINAL DOCUMENT"
						BY <u>RJ</u> DATE <u>Sept 13, 06</u>

*SS = Salmon Starter FF = Flake Food BS = Brine Shrimp BP = Brachionus plicatilis

TEST SOLUTION OBSERVATIONS						
Test Substance: Effluent <i>FHM</i>			Study No.: 60620			
<input type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Screen						
Test Concentration (Percent)	REP	Observations ^a				
		Initiation:	Event: 24hr	Event: 48hr	Event:	Event:
Control	A-D	N	N	N		
Raw Composite influ	A-D	cc yellow Brown	cc Brown	cc Brown		
10% outfall	A-D	cc yellow Brown	cc Brown	cc Brown		
100% outfall	A-D	cc yellow Brown with pm	cc Brown pm	cc Brown pm		
Observer		<i>FLW</i>	<i>FLW</i>	<i>FLW</i>		
Date		<i>Sept 13, 06</i>	<i>Sept 14, 06</i>	<i>Sept 15, 06</i>		
Time		<i>3pm</i>	<i>3:15p</i>	<i>2:45p</i>		
Notes:						

^a see Form CDG 020 for code key

MORTALITY AND BEHAVIORAL OBSERVATIONS							
Test Substance: Effluent				Study No.: 60620			
<input type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Screen							
Test Species: <u>Fathad maron</u>				Date Initiated: <u>Sept 13, 06</u>			
Time Test Organism Addition Started: <u>3:25p</u>				Completed: <u>3:45p</u>			
Prepared by: <u>RJ</u>				Date: <u>Sept 13, 06</u>			
Test Concentration (Percent)	REP	Event: <u>24-Hour</u>			Event: <u>48-Hour</u>		
		# Alive	Cum. # <u>DI</u>	Sublethal Obs. ^a	# Alive	Cum. # <u>DI</u>	Sublethal Obs. ^a
Control (100%) (ABC)	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
	C	10	0	10N	10	0	10N
	D	10	0	10N	10	0	10N
RAW Composite	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
	C	10	0	10N	10	0	10N
	D	10	0	10N	10	0	10N
Observer		<u>RJ</u>			<u>RJ</u>		
Date		<u>Sept 14, 06</u>			<u>Sept 15, 06</u>		
Time		<u>2:45p</u>			<u>2:55p</u>		
Note: Dead organisms removed and discarded after each observation period. Notes (initial & date all entries): ^a See Form CDG 018/ <u>CDG 019</u> for Code Key.							

MORTALITY AND BEHAVIORAL OBSERVATIONS							
Test Substance: Effluent				Study No.: 60620			
<input type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Screen							
Test Species: <u>Fathead Minnow</u>				Date Initiated: <u>Sept 13, 06</u>			
Time Test Organism Addition Started: <u>3:05 p</u>				Completed: <u>3:15 p</u>			
Prepared by: <u>RW</u>				Date: <u>Sept 13, 06</u>			
Test Concentration (<u>Percent</u>)	REP	Event: <u>24-Hour</u>			Event: <u>48-Hour</u>		
		# Alive	Cum. # <u>D/I</u>	Sublethal Obs. ^a	# Alive	Cum. # <u>D/I</u>	Sublethal Obs. ^a
<u>10% Outfall</u>	<u>A</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>B</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>C</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>D</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
<u>100% Outfall</u>	<u>A</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>B</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>C</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>D</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
Observer		<u>RW</u>			<u>RW</u>		
Date		<u>Sept 14, 06</u>			<u>Sept 15, 06</u>		
Time		<u>2:45 p</u>			<u>2:55 p</u>		
Note: Dead organisms removed and discarded after each observation period. Notes (initial & date all entries):							
^a See Form CDG 018/ <u>CDG 019</u> for Code Key.							

EQUIPMENT IDENTIFICATION LIST

Pipets

PI-1: Oxford Macroset 5-10 mL (D) *(Retired)*
 PI-2: Gilson 100-1000 μ L (E 8415486)
 PI-3: Eppendorf 100-1000 μ L (09450P)
 PI-4: Gilson 10-100 μ L (H84 11398)
 PI-5: Gilson 1-10 mL (N05409D)
 PI-7: Gilson P1000 (H137514)
 PI-8: Oxford Benchmate 100-1000 μ L
 (498753)
 PI-10: Oxford Benchmate 100-1000 μ L
 (498701)
 PI-12: Rainin EDP Plus (D41111)
 PI-14: Gilson P200 (L8415256)
 PI-15: Rainin EDP Plus (D40453)
 PI-20: Rainin EDP Plus (E42105)
 PI-22: Gilson 100-1000 μ L (S682810)
 PI-23: Gilson 10-100 μ L (S691520)
 PI-24: Gilson 1-10 mL (S559756)
 PI-25: Gilson 1000 μ L (447507)
 PI-26: Eppendorf 10-100 μ L (2147081)
 PI-27: Finnpiquette 0.5-10 μ L (G03479)
 PI-28: Eppendorf 500 μ L
 PI-29: Eppendorf 50 μ L
 PI-30: Eppendorf 100 μ L (43977-N) *(Retired)*
 PI-31: Eppendorf 1000 μ L (51984-N)
 PI-32: Eppendorf Pipetman 100-1000 μ L
 (J215300)
 PI-33: Eppendorf Pipetman 100-1000 μ L
 (J215191)
 PI-34: Oxford Sampler 1 mL
 PI-35: Wheaton 20-200 μ L *(Retired)*
 PI-36: Wheaton 50-200 μ L *(Retired)*

Ovens/Furnaces

Oven-1: Fisher Isotemp 500 Series #1621-100
 Oven-2: Fisher Isotemp #163-96-1806
 Oven-3: Fisher Vacuum Oven 285
 #1626-96-4644
 Oven-4: VWR 1310 Drying Oven
 #1628-970008
 Oven-5: Napco Model 430 #1704-900
 Oven-6: American Scientific Products DK 62
 #3570-1045
 Oven-7: Scientific Products DK 63 #3570-1047
 Oven-8: Hotpack #1905-280
 Oven-9: Thermolyne B2700 Furnace
 #1628-970010
 Oven-10: Blue M Muffle Furnace #1704-400
 Oven-11: VWR 1390 FM #1628-980126
 Oven-12: VWR 1390 fm #1628-980052

Refrigerators/Freezers

A: Walk-In Freezer #1715-740
 B: Walk-In Freezer #1650-0046

Refrigerators/Freezers (cont.)

E: Walk-In Freezer #1650-140B
 F-1: Mr. Winter Freezer #166-13
 F-2: Masterbilt Freezer # 1630-99-0010
 I: Walk-In Refrigerator #1713-625
 R-1: Mr. Winter Refrigerator #166-12
 R-1A: True Refrigerator #1715-840
 R-2: Labline Refrigerator/Freezer 3551
 #1715-100
 R-2A: Sample Prep Refrigerator #1625-635
 R-3: True Refrigerator GDM-40 #1626-4010
 R-3A: Sample Prep Refrigerator #1622-100
 R-4: Jordan Refrigerator #1716-480 *(Retired)*
 R-5: True Refrigerator #1905-625
 RF-1: Estate Refrigerator/Freezer TT18EKR00
 #1626-350
 RF-2: Fisher Scientific Refrigerator/Freezer
 ET18NK #1630-010010
 U-1: Upright True Freezer #1715-845
 U-2: Upright Freezer #1905-895
 U-3: Upright Freezer #ABC 201520
 U-4: Upright Freezer #1805-810

Miscellaneous

DFM-1: Fisher Model 650 Digital Flowmeter
 #1626-2030
 DFM-2: Fisher Model 520 Digital Flowmeter
 (SN #291146)
 DFM-3: Agilent ADM 1000 Digital Flowmeter
 (SN #220737458)
 DFM-4: Agilent ADM 1000 Digital Flowmeter
 (#1630-030004)
 MM-1: Mitutoyo Digital Micrometer (SN #911083)
 MX-1: Thermolyne Speci-Mix #1715-727
 NE-1: Meyer N-EVAP 112 #192-4070
 PT-1: Kinematica AG Ploytron #1626-990050
 PT-2: Brinkman Polytron
 RT-1: Pierce Reacti-Therm Heating Module
 Model 18870/Evaporating unit 18780
 (S/N 548911237883)
 RT-2: Pierce Reacti-Therm Heating Module
 Model 18800/Evaporating unit 18780 (S/N
 5421)
 RT-3: Pierce Reacti-Therm Heating Module
 Model 18835/Evaporating unit 18785 #160-
 010040
 SM-1: Shearmill, Divtech #163-95-1162
 SP-1: Sonicator Probe #163-1065
 UV-1: Perkin Elmer Lambda 3B #1905-715
(Retired)
 V-1: Vortex-Genie #1715-730
 V-2: Vortex Genie 2, Fisher Scientific Model
 G-560 (S/N 2-189839)
 V-3: Vortex Labline Supermixer (No. 1290)
 VS-1: Virtis Virtishear #1625-750
 VS-2: Virtis Virtishear #1715-455

EQUIPMENT IDENTIFICATION LIST

Oxidizer

- O-1: Harvey Oxidizer OX 500 #1626-88
(Retired)
O-2: Harvey Oxidizer OX 500 #1626-4035
O-3: Harvey Oxidizer OX-500 #D5-0037

Total Organic Carbon Analyzer

- TOC-3: OI Analytical TOC 1020 #1630-000002
Autosampler #1630-000004 (Retired)

Scintillation Counter

- FD: Beckman (LS 6000 IC) #1626-74A
FE: Beckman (LS 6000 IC) #1626-91A
FF: Beckman (LS 6000 IC) #1626-000006

Thin Layer Chromatography

- TLC 1: Ambis Scanner 4000 CA4570-14 (Retired)
TLC 2: AIS Multispotter #1716-965
TLC 3: AIS Multispotter #1715-545

Environmental Fate

- EF-1: Mettler Toledo HR73 Halogen Moisture
Analyzer #1630-010032
EF-2: Strathkelvin ASR System Oxygen
Interface 928 #1630-010034A Stirplate
#1630-010034B
EF-3: Columbus Instruments Respirometer
System Pump #1630-010036A
Carbon Dioxide Sensor #1630-010036B
Oxygen Sensor #1635-020004
Expansion Unit #1630-010036C
Condenser Power Supply #1630-010036D
Condenser #1630-010036E
EF-4: Bioscience COD Reactor
Model 163-446 #1626-96-4684

Shaker Tables

- ST-1: Innova 2100 #163-1110
ST-2: Innova 2100 #163-1111
ST-3: Innova 2100 #163-1114
ST-4: Lab-Line #163-95-1224B
ST-5: Lab-Line #1630-981328
ST-7: Lab-Line #163-95-1224A
ST-8: VWR Scientific #1905-480
ST-9: Eberbach 6010 #1713-810
ST-10: Eberbach 6010 #1626-4060A
ST-11: Lab-Line Model 3590 #1905-1045
ST-12: Eberbach #1626-106
ST-13: Lab-Line Model 3590 # 1626-4050
ST-14: Burrell Wrist Action Model 75 #1626-000

Light Meters

- LM-1: LI-COR Model LI-189 #163-341with
Photometric Sensor
LM-2: LI-COR Model LI-189 #1630-199501
w/Quantum Sensor

Microscopes

- M-1: Olympus BH-2 #163-384
M-2: Olympus CH #1900-800
M-3: Olympus VM #1903-700
M-4: Fisher Micromaster II 12-561-4B
#1625-980060

Conductivity Meters

- CM-1: Orion Model 140 #150-4070 (Retired)
CM-2: Corning Checkmate 90 #1905-895
(Retired)
CM-3: WTW Cond 330i #04250007

Dissolved Oxygen Meters

- DO-1: YSI Model 54A #1905-730
DO-4: YSI Model 58 #1627-13
DO-5: Corning Checkmate 90 #109-3020
DO-6: YSI Model 95 #1630-991318
DO-7: YSI Model 95 #1626-990090
DO-8: WTW OXi 330 #1630-010004
DO-9: WTW OXi 330i # 1635-020006
DO-10: WTW OXi 330i # 05070021

Micro/Fate Miscellaneous

- AU-1: Market Forge Sterilmatic Autoclave
#1626-79
AU-2: Market Forge Sterilmatic Autoclave
#1626-4474A
AZR-1: Fisher-Lilly Antibiotic Zone Reader
#185 98602
BSC-1: Labconco Purifier Class II Biosafety
Cabinet #1630-010014
CR-1: Cole Parmer Chart Recorder 2D20-0000
#1626-984762
DBI-1: Fisher Scientific Dry Bath Incubator
#1630-010012
LFH-1: Labconco Purifier Clean Bench #1627-24
LFH-2: Labconco Purifier Clean Bench
#1626-4476
OS-1: Lab-line 3540 Orbital Shaker Waterbath
#1626-105
TR-1: Biolog Turbidity Reader
#1630-010047A
UV-2: Genesys 20 Spectrophotometer,
Model 4001/4 #1635-040000

EQUIPMENT IDENTIFICATION LIST

HPLC ComponentPump

P-1: Shimadzu LC-6A #1716-390B (Retired)
P-2: Shimadzu LC-6A #1715-320B
P-3: Shimadzu LC-6A #1621-64A
P-4: Shimadzu LC-6A #1621-40D
P-5: Shimadzu LC-10AS #163-1104A
P-6: Shimadzu LC-10AS #163-1104B
P-7: Shimadzu LC-6A #1623-78A
P-9: Varian 9010 #1626-640
P-11: Varian 9010 #1623-102C2
P-12: Varian 9010 #1626-2060A
P-15: Shimadzu LC-6A #1626-72C
P-16: Varian 9010 #1626-700A
P-17: Shimadzu LC-6A #1716-115A
P-18: Shimadzu LC-6A #1716-180A
P-19: Shimadzu LC-10AS #1626-4502B
P-20: Shimadzu LC-10AS #16126-4502A
P-21: Shimadzu LC-6A #1716-185A
P-23: Shimadzu LC-6A #1715-780B
P-24: Shimadzu LC-6A #1716-315B
P-25: Shimadzu LC-6A #1625-128B (Retired)
P-26: Shimadzu LC-6A #1625-136 (Retired)
P-27: Shimadzu LC-6A #1622-83 (Retired)
P-28: Shimadzu LC-6A #1622-77A (Retired)
P-29: Shimadzu LC-10AT #1622-96-0196
P-30: Shimadzu LC-10AT #1622-96-0206
P-31: HP Series 1100 G1312A
#1625-980046H
P-32: Agilent G1311A #1635-020002A
P-33: Shimadzu LC-10AT #1625-980024
P-34: Shimadzu LC-10AT #1625-98022
P-35: HP Series 1100 G1311A
#1626-990026A
P-36: Shimadzu LC-10AT #1622-96-0194
P-37: Shimadzu LC-10AS #1625-812A
P-38: Shimadzu LC-10AT #1623-96-0864
P-39: Shimadzu LC-10AT #1623-96-0862
P-40: Agilent G1311A #1629-010168B
P-41: Agilent G1311A #1629-010006I
P-42: Shimadzu LC-10AT VP #1625-980022
P-43: Shimadzu LC-10AT VP #1625-980024
(Retired)
P-44: KDS Syringe Pump #1630-010048
P-45: Shimadzu LC-10AS (SN#40319A)
P-46: Shimadzu LC-10AS (SN#40313A)
P-47: Shimadzu LC-10AT #1623-97-4716
P-48: Shimadzu LC-10AT #1623-97-4718
P-49: KDS Syringe pump (SN# 104955)

System Controller

SC-1: Shimadzu SCL-6A #1715-650A
SC-3: Shimadzu SCL-10A #163-1104C
SC-4: Shimadzu SCL-6A #1715-920

System Controller (cont.)

SC-6: Shimadzu SCL-6B #1626-72D (Retired)
SC-7: Shimadzu SCL-6B #1716-185E
SC-8: Shimadzu SCL-6B #1716-115E
SC-9: Shimadzu SCL-10A #1626-4502D
SC-11: Shimadzu SCL-6B #1625-128D (Retired)
SC-12: Shimadzu SCL-10A vp #1625-980026
SC-13: Shimadzu SCL-6B #1625-138 (Retired)
SC-14: Shimadzu SCL-6A #1715-795B (Retired)
SC-15: HP Series 1100 G1323 A #1626-990026F
SC-16: Agilent Control Module G1323B
#1635-020002F
SC-17: Shimadzu SCL-10A #1622-96-0198
SC-18: Shimadzu SCL-10A #1623-96-0866
SC-19: Agilent G1323B #DE05014297
SC-20: Shimadzu SCL-10A #1626-4732A
SC-21: Shimadzu SCL-10A (SN#70024E)
SC-22: Agilent G1323B # CN 40413281
SC-23: Agilent G1323B # CN 40413252

Detectors

D-1: Shimadzu SPD-6A #1715-830
D-2: Shimadzu SPD-6A #1621-40C (Retired)
D-3: Shimadzu SPD-10AV #163-1104E
D-4: Shimadzu SPD-6A #1623-78D (Retired)
D-5: Shimadzu RID6A #1630-1118
D-6: Shimadzu RF-551 #1625-0285
D-7: Varian 9050 #1626-641
D-8: Varian 9050 #1626-551
D-9: Varian 9050 #1626-2050B
D-11: Shimadzu SPD-6A #1716-390F (Retired)
D-14: Shimadzu SPD-6A #1715-300D
D-15: Shimadzu SPD-6A #1716-185F
D-16: Shimadzu SPD-10A #1626-4502C
D-17: Shimadzu SPD-6A #1625-128A (Retired)
D-18: Shimadzu SPD-6A #1905-1015F (Retired)
D-19: HP Series 1100 G1314A #1626-990026E
D-20: Agilent G1315A #1635-020002E
D-21: Shimadzu RID-6A #1626-72E
D-22: Shimadzu RF-10A #1625-788E
D-23: Shimadzu RF-551 #1625-140
D-24: HP Series 1100 DAD G1315A
#1625-980046E
D-25: Shimadzu RF-10Axl #1625-980030
D-26: Shimadzu SPD-10A #1625-812E
D-27: Shimadzu SPD-10AV #100205
D-28: Agilent G1314A #1629-010168E
D-29: Agilent G1315A DAD #1629-010006D
D-30: Shimadzu SPD-10A #1623-97-4724
D-31: Shimadzu SPD-10AV #1626-97-4732C
D-32: Shimadzu SPD-10A #1625-95-0865
D-33: Agilent G1314A #1635-040002
D-34: Agilent G1321A (fluorescence) #06-0011

EQUIPMENT IDENTIFICATION LIST

HPLC ComponentInjector

I-1: Varian 9100 #1626-4434 (*Retired*)
 I-2: Shimadzu SIL-6B #1621-40B (*Retired*)
 I-3: Shimadzu SIL-10A #163-1104F
 I-4: Shimadzu SIL-10A #1626-4502E
 I-14: Shimadzu SIL-6B #163-361B (*Retired*)
 I-15: HP Series 1100 G1313A #1626-990026C
 I-16: Shimadzu SIL-10A # 1622-96-0204
 I-19: HP Series 1100 ALS (G1313A)
 #1625-980046G
 I-22: Agilent G1313A ALS #1635-020002C
 I-23: Shimadzu SIL-10A #1625-980028 and
 Shimadzu Sample Cooler #1625-980034
 I-24: Shimadzu SIL-10A #1628-98-0112
 I-25: Agilent G1313A ALS #1629-010168C
 I-26A: Agilent G1329A ALS #1629-010006E
 I-26B: Agilent G1330A ALS Therm
 #1629-010006H
 I-27: Shimadzu SIL-10A #1623-720A
 I-28: Shimadzu SIL-10A (SN#40022F)

Column Heater/Controller

H-1: Eppendorf (CH-30/TC-50)
 #1621-270B/1623-698
 H-2: Eppendorf (CH-30/TC-50)
 #163-980A/980B
 H-3: Eppendorf (CH-30/TC-50)
 #163-1107/1106
 H-4: Eppendorf (CH-30/TC-50)
 #163-1084/1085
 H-5: Timberline #1623-580
 H-6: Timberline #1626-974746
 H-7: Timberline #1625-000006
 H-8: HP Series 1100 G1316A #1625-980046F
 H-9: Agilent G1316A #1635-020002D
 H-10: HP Series 1100 G1316A #1626-990026D
 H-11: Timberline #1625-000008
 H-12: Timberline #1625-132
 H-13: Agilent G1316A #1629-010168D
 H-14: Agilent G1316A 1629-010006C
 H-15: Eppendorf (CH-30/TC-50) #1623-97-0892
 H-16: Eppendorf (CH-30/TC-50) #1623-97-0900

Raytest

RA-1: Ramona #1626-95-4576A
 RA-2: Ramona 92 #1626-4000A
 RA-3: Ramona #1623-530A
 RA-4: Ramona #1626-4498
 RA-9: Ramona 90 #1626-570
 RA-10: Ramona 92 #1623-500

Degassers

DG-1: HP Series 1100 G1322A #1625-980046I
 DG-2: HP Series 1100 G1322A
 #1626-990026B
 DG-3: Agilent G1322A #1635-020002B
 DG-4: Agilent G1322A #1629-010168A
 DG-5: Agilent G1322A #1629-010006G
 DG-6: Shimadzu Degasser DGU-14A
 #1628-980182

Analog Convertors

AC-1: Raytest Steffi #1626-4486
 AC-2: Raytest Anna #1626-4499
 AC-3: Raytest Steffi (SN#975N39)
 AC-4: Raytest Anna #1623-95-0758
 AC-5: Raytest Anna #1626-95-4576B
 AC-7: Raytest Steffi (SN# 91SN17)

Fraction Collectors

FC-1: Gilson 202 #1626-600
 FC-2: Gilson 202 #1626-380
 FC-3: Gilson 202 #1626-2000
 FC-4: Gilson 202 #1626-76
 FC-5: Gilson 202 #1716-165
 FC-6: Gilson 202 #1626-116
 FC-7: Gilson 202 #1626-2070
 FC-8: Gilson 202 #1626-2080
 FC-9: Gilson 202 #1626-89
 FC-10: Gilson 202 #1626-370
 FC-11: Gilson 202 (SN#150L0247)

HPLC - Misc.

IC-1: Dionex DX500 #1630-990000

Shimadzu FCV-12AH Switching Valves

FCV-1: Valve Interface #1622-96-0192 &
 FCV-12AH
 Valves #1622-96-0208 and #1622-96-0210

EQUIPMENT IDENTIFICATION LIST

GC ComponentUnit (Detectors)

GC-1: HP 5890 A (ECD, NPD) #1905-790A
(Retired)
GC-3: HP 5890 Series II (1990) (FID, FPD)
#1621-67a
GC-4: HP 5890 Series II (1989) (FID, ECD)
#1621-47a
GC-5: HP 5890 Series II # 1652-0120
GC-6: HP 5890 Series II #1716-130A
(Retired)
GC-7: HP 6890 Series (system)
#1625-000014A, B & C
GC-8: HP 5890 Series II #1212-3570
GC-9: HP 5890 (ECD, NPD) #1715-860A
GC-10: HP 6980N (System) #05-0029
GC-11: HP 5890 Series II SN#3310A49331

Injector

AI-1: HP 7673A #1630-990006
AI-2: HP 7673 #1621-47D
AI-3: HP 7673 #1621-67B
AI-4: HP 7673 #1621-47B
AI-5: HP 7373 #1212-3570B
AI-6: HP 7673 #1630-CA 2000003
AI-7: HP 7673 #1623-430
AI-8: HP 7673 #1630-CA 2000002
AI-9: HP 7673 #1625-380
AI-10: HP 7673 #1625-970976
AI-11: HP 7673 #1625-106B
AI-12: HP 7673A #1716-130C

Controller

CO-1: HP 7673A #1905-790C (Retired)
CO-2: HP 7673 #1630-981338
CO-3: HP 7673 #1621-67D
CO-4: HP 7673BG1512A #1630-990028
CO-5: HP 7673BG1512A #1630-990026
CO-6: HP 7673 #1218-3570F
CO-7: HP 7673 #1652-0115B
CO-8: HP7673 #1630-CA200001
CO-9: HP 7673 #1625-970077
CO-10: HP 7673 S#3207A28329
CO-11: HP 7673 S#3435A36472
CO-12: HP 7673 S#3113A25310
CO-13: HP 7673 S#2730A08203

Controller (cont.)

CO-14: HP 7673 S#3113A26295
CO-15: HP 7673A S#2929A15282

Integrator

IN-1: HP 3392A #1714-575
IN-2: HP 3392A S#2736A12834 (Retired)
IN-3: HP 3396A #1630-981340
IN-4: HP 3392A #1905-785
IN-5: HP 3392A #1626-530
IN-6: HP 3392A # 1621-67C (Retired)
IN-7: HP 3392A #1714-030
IN-8: HP 3392A #1715-855B
IN-9: HP 3392A #1715-275 (Retired)
IN-10: HP 3396A #1716-380
IN-11: HP 3396 S# 3112P26675
IN-12: HP 3396A S#3021P06221
IN-13: HP 3396 #1622-80
IN-14: HP 3396 #1626-113
IN-15: HP 3392A #1714-182

GC/MSD

GC/MSD1: HP 5890 Series II Unit #1625-382 HP
5971 MSD #1625-381 (Retired)
GC/MSD2: HP 5890 Series II #1625-802B HP
5972 MSD #1625-802C
GC/MSD4: HP 5890 Series II #1625-970975
HP 5971 MSD #1625-970974
GC/MSD5: HP 5890 Series II 1217-3570
HP 5972 MSD Series 3329A00556
GC/MSD6: HP 6890N #05-0026A
HP 5973 MSD #05-0026D

GC - Misc.

PT-1: Tekmar Purge & Trap LSC
2000/ALS2016 #1621-72/1621-73

DATA CORRECTION CODES AND FACILITY RECORDS

Data Correction Codes

The following correction codes may have been used to correct errors in the raw data:

- | | |
|-----------------------|-------------------------|
| A - Addition | I - Illegible |
| C - Calculation error | R - Recording error |
| D - Dating error | S - Spelling error |
| F - Form change | T - Transcription error |
| G - Grammatical error | W - Write over |

Other - _____ Date: _____ Initials: _____

Other - _____ Date: _____ Initials: _____

Facility Record Statement

Some of the records that appear in the raw data may have been provided as photocopies of the original records maintained on file at ABC Laboratories as facility records. This was done by necessity for data that are common to several studies.

**KEY TO TEST SOLUTION OBSERVATIONS DURING
AQUATIC TOXICITY TESTS**

Test Substance: Effluent

Study No.: 60620

Clear (CC) – Test solution is clear but has a tint of color due to the presence of the test substance. Coloration observation should be noted.

Cloudy (C) – Test solution is murky in appearance.

Foam (F) – Foam on surface of test solution.

None (N) – Test solution is clear and colorless (i.e., no coloration associated with test substance) with no visible particulates, surface film, undissolved test substance, or precipitate.

Particulate Matter (PM) – Test solution which has solids present, either in suspension or on the bottom of the test chamber. The solids are not believed to be a component of the test substance.

Precipitate (PR) – Solid substance present either floating at the surface of the test solution or settled on the bottom of the test chamber. The substance is assumed to be a component of the test substance which has become separated from the test solution by the action of a chemical or physical change. Never used when observation is made immediately after addition of the test substance stock.

Surface Film (SF) – Test solution with a substance partially or entirely covering the surface of the solution. The substance may have an oily or scum-like appearance.

Undissolved Test Substance (UTS) – Used in two instances: 1) when the test substance falls out of solution immediately upon addition to the dilution water; 2) when the test substance is added directly into the dilution water and it does not completely dissolve.

ENVIRONMENTAL SAMPLE RECEIPT

Data by: hw Date: Sept 13, 06 Study No.: 60620

Sponsor: Ameron UE Contact: Charlie Riggs

Sample Type/ID
 Effluent ID(s) Outfall Composite Receiving Water ID Raw Water Composite
 Sediment ID(s) _____ Soil ID _____
 Other ID _____

Number of containers one each Mass/Volume each ~ 2gallon

Comments/Sample Description each sample kept in an ~ 2gallon nalgene container on ice
each sample clear in color with brown color

STORAGE

Used immediately upon receipt
 Stored at ~4°C Cooler ID R-1 R-2 Other _____

CHEMISTRY ON RECEIPT

Sample ID	Temp ^a (°C)	DO (mg/L)	pH	Cond. (µS/cm)	Hard ^{b,c} (mg/L)	Alk ^{b,c} (mg/L)	NH ₃ ^d (mg/L)	Cl ₂ ^d (mg/L)
<u>Raw Water</u>	<u>7.7</u>	<u>10.15</u>	<u>8.43</u>	<u>720</u>	<u>11.8</u> / <u>236</u>	<u>9.0</u> / <u>180</u>	<u><0.2</u>	<u>0</u>
<u>Outfall</u>	<u>7.4</u>	<u>10.25</u>	<u>8.53</u>	<u>2390</u>	<u>42.5</u> / <u>850</u>	<u>10.8</u> / <u>216</u>	<u>0.8</u>	<u>0</u>
Device ID	<u>1534</u>	<u>D0-10</u>	<u>PH-9</u>	<u>CM-3</u>				

^a Correction factor 0.0 °C @ 14.2 °C

^b Colorimetric titration procedure adapted from APHA Standard Methods (mg/L as CaCO₃)

^c 1st number is mL of titrant second number is mg/L hardness

^d Colorimetric method by HACH Co. for total ammonia and total chlorine

PREPARATION OF EFFLUENT CONCENTRATIONS (Volume/Volume)

Effluent ID: Ameron UE Study No.: 60620

Preparation/Transfer By: AW Time: 2:45 p Date: Sept 13, 06

Effluent Sample ID	Aliquot Volume (mL)	Dilution water Volume (mL) ^a	Total Volume (mL)	Final Concentration (%) ^b
ABC control	2000	—	2000	100% ABC control
Raw Water Composite	2000	—	2000	100% RAW water composite
Outfall Composite	180 200	1800	2000	10% Outfall
Outfall Composite	2000	—	2000	100% outfall

Controls: 100% ABC synthetic water ① RAW Sept 13, 06
 100% receiving water

^aDilution water type: ABC synthetic water
 Effluent receiving water RAW composite
 Other _____

^b These solutions used for: *Ceriodaphnia dubia* test
 Fathead minnow test
 Other _____

Remarks: ABC control = clear & colorless
 10% RAW water Composite = clear with yellow/brown color and outfall
 100% outfall = clear Brown with some precipitate

Ceriodaphnia dubia test:
 Test chamber: 30-mL Plastic _____ mL Glass beaker
 Number of replicates: 4 Solution volume per replicate: 200 mL

Fathead minnow test:
 Test chamber: 300-mL Plastic 900 mL Glass beaker
 Number of replicates: 4 Solution volume per replicate: 400 mL

Other:
 Test chamber: _____ ① correction 20
 Number of replicates: _____ Sept 23, 06
 Solution volume per replicate: _____ mL

Prepared By: AW Date: Sept 13, 06

PREPARATION AND CHARACTERIZATION OF ABC SYNTHETIC WATER

PREPARATION

Water is generally prepared in 20, 60, or 120 liter increments. Calcium sulfate should be dissolved separately then added to the container. The water should be vigorously aerated for ~24 hours prior to conducting water chemistry. The water will expire four weeks from the date prepared. The following target weights, in grams, should be used except for sodium selenate where a 400 mg/L stock solution is prepared in a 100mL volumetric. Sodium selenate may only be utilized as required by the individual project requirements.

Balance used: B2 B5 Other B-3

Chemical	20 liters	60 liters	120 liters	Actual weight (g)	Supplier	Lot Number
MgSO ₄	1.20	3.60	7.20	7.200 g	Acros	B0119120
NaHCO ₃	1.92	5.76	11.52	11.523 g	Acros	A0222859
KCl	0.08	0.24	0.48	.484 g	Acros	B0113189
CaSO ₄	1.20	3.60	7.20	7.215 g	Acros	A0222867
Na ₂ SeO ₄	0.1 mL	0.3 mL	0.6 mL	—	—	—

Weighed By: KLB RW Date: 8/15/06

Prepared By: KLB RW Date: 8/15/06

CHARACTERIZATION

Hardness^d: 4.5 mL^b 90 mg/L^c

The acceptable range for hardness is 80-100 mg/L if out of this range see notes below.

Acceptable Unacceptable

Notes:

^a HACH buffer solution hardness 1 lot number: A6152 & HACH ManVer 2 hardness indicator lot number: A663

^b Milliliters of titrant times twenty equals mg/L as CaSO₄.

^c Total alkalinity and hardness measured using a titrimetric method adapted from standard methods (mg/L as CaCO₃)

Batch was discarded

Batch was adjusted by the addition of the following: _____

Analysis By: RW

Date: Aug 16, 06

PHOTOPERIOD AND LIGHT MEASUREMENTS

Test Substance: Effluent

Study No.: 60620

Photoperiod: 16 Hours Light; 8 Hours Darkness; Transition Period: 2-30 min period

Location: Diluter # _____ Waterbath # 24
 Environmental Chamber # _____

Type of Lighting: Fluorescent Other: _____

Photoperiod Initiation Date/Time: already on

Prepared By: HW Date: Sept 13, 06

LIGHT READINGS

Study Day	Date	Initials	LUX	Measurement Position
1	Sept 14, 06	HW	585.0	Level's
1	Sept 14, 06	HW	627.0	Flm

Location of Sensor: Level of Test Media
 Other: Top of containers/buckets/trays/cups

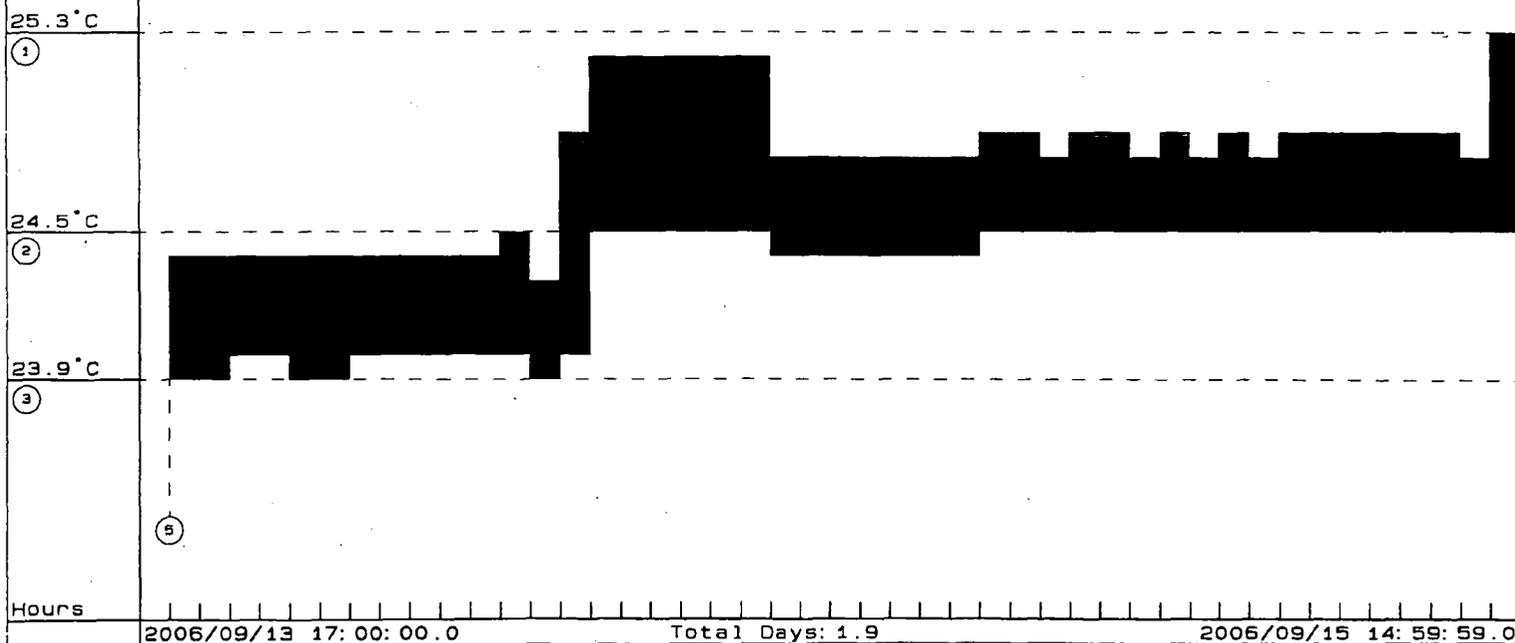
Meter Used: LI-COR Model LI-189 ABC material control #163-341 used with photometric sensor Serial No. (PH 4721)
 Other: _____

Study 60620 RW Sept 1, 06

ABC Laboratories, Inc.

Program: MultiScan_Root: (000000) MultiGraph.Com Version: 2.2g

Probe Location: EFE 058
Printout Date: 2006/9/22 10:06
Units: Temperature Celsius
Periodic Average: 24.5 ± 0.3 (4)
Total Days: 1.9



II. DAPHNID EXPOSURE

CLADOCERAN CULTURE RECORD

Species: Ceriodaphnia dubia Lot No.: 06-00-28
 Date Initiated: Sept 06 No. Used to Initiate: 1 per vial; 24 per Lot
 Initiated from: 06-022 Thermometer No.: CR-1 Water Type: Age Blended
 Food Type/Lot No.: DS091206 SEL 091206
 Note: Original source received from USGS-CERC on March 13, 2001
 Prepared By: [Signature] Date: Sept 13, 06

Date/ID	Temp/Fed	No. Young					
25	25 ✓	16					
26		10					
27		4					
28		0					
29		6					
30		10					
31		0					
32		10					
33		4					
34		10					
35		0					
36		6					
37		8					
38		6					
39		7					
40		4					
41		2					
42		10					
43		8					
44		10					
45		8					
46		4					
47		10					
48		2					
		Combined accounts with 06-027 used 80 for 6020 RW Sept 13, 06					

THIS IS AN EXACT COPY OF
THE ORIGINAL DOCUMENT

BY [Signature] DATE Sept 13, 06

Notes: DS = Daphnia Supplement SEL = Selenastrum sp. (aka pseudokirchneriella sp.)

CLADOCERAN CULTURE RECORD

Species: Ceriodaphnia dubia Lot No.: 06-CD-22028
 Date Initiated: 06 Sep, 06 No. Used to Initiate: 1 per vial; 24 per Lot
 Initiated from: 06-CD-22 Thermometer No.: CR-1 Water Type: Age Blended
 Food Type/Lot No.: DS082206, SEL082206
 Note: Original source received from USGS-CERC on March 13, 2001
 Prepared By: dm Date: 06 Sep, 06

Date/ID	06 Sep, 06 ^{dm}	07 Sep, 06	08 Sep, 06 ^{dm}	09 Sep, 06 ^{dm}	10 Sep, 06 ^{dm}	11 Sep, 06 ^{dm}	12 Sep, 06 ^{dm}
Temp/Fed	25 ✓	26 ✓	26 ✓	26 ✓	25 ✓	25 ✓	25 ✓
No. Young			0				
25			0			8	10
26			0			10	0
27			5			12	20
28			3			20	13
29			0			10	12
30			0			8	8
31			6			15	6
32			0			10	10
33			0			12	4
34			2			8	8
35			3			11	11
36			0			15	12
37			0			10	7
38			2			8	0
39			0			16	0
40			0			6	8
41			5			12	6
42			4			18	10
43			3			20	6
44			2			18	15
45			0			11	12
46			6			15	14
47			2			12	10
48			0			8	4

DA. 06 Sep 06
dm

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DR. 11 Sep 06
dm

BY R2 DATE Sept 13, 06

Notes: DS = Daphnia Supplement SEL = *Selenastrum* sp. (aka *pseudokirchneriella* sp.)

CLADOCERAN CULTURE RECORD

Species: Ceriodaphnia dubia Lot No.: 06 CD 27
 Date Initiated: Sept 6, 06 No. Used to Initiate: 1 per vial; 24 per Lot
 Initiated from: 06-CD-21 Thermometer No.: CR-1 Water Type: Age Blended
 Food Type/Lot No.: PSO 1206 SEL 1206 1 R/W Sept 13, 06
 Note: Original source received from USGS-CERC on March 13, 2001
 Prepared By: RW Date: Sept 13, 06

Date/ID	Sept 13, 06						
Temp/Fed	15 ✓						
No. Young							
1	5						
2	7						
3	10						
4	4						
5	4						
6	8						
7	10						
8	8						
9	10						
10	12						
11	8						
12	4						
13	8						
14	0						
15	4						
16	4						
17	8						
18	8						
19	2						
20	12						
21	16						
22	12						
23	8						
24	12						
combined records with 06 CD 29 used SD for 60620 RW Sept 13, 06				"THIS IS AN EXACT COPY OF THE ORIGINAL DOCUMENT"		BY <u>RW</u> DATE <u>Sept 13, 06</u>	

Notes: DS = Daphnia Supplement SEL = Selenastrum sp. (aka pseudokirchneriella sp.)

CLADOCERAN CULTURE RECORD

Species: Ceriodaphnia dubia Lot No.: 00-CD-2527
 Date Initiated: 06 Sep, 06 No. Used to Initiate: 1 per vial; 24 per Lot
 Initiated from: 00-CD-21 Thermometer No.: CR-1 Water Type: Age Blended
 Food Type/Lot No.: DS52200, SEL52200
 Note: Original source received from USGS-CERC on March 13, 2001
 Prepared By: dm Date: 00 Sep, 06

Date/ID	06 Sep 06 ^{dm}	07 Sep 06	08 Sep 06 ^{dm}	09 Sep 06 ^{dm}	10 Sep 06 ^{dm}	11 Sep 06 ^{dm}	12 Sep 06 ^{dm}
Temp/Fed	25 ✓	24 ✓	26 ✓	24 ✓	25 ✓	25 ✓	25 ✓
No. Young							
1			0			10	7
2			4			15	8
3			2			18	6
4			0			12	10
5			0			11	0
6			5			6	5
7			0			15	4
8			0			20	10
9			0			12	6
10			0			15	10
11			0			10	8
12			0			12	2
13			0			20	0
14			0			8	12
15			2			13	8
16			0			10	0
17			0			15	0
18			3			18	8
19			6			6	6
20			2			15	10
21			4			12	8
22			0			8	6
23			0			13	13
24			6			15	8

OR. 06 Sep 06^{dm}

"THIS IS AN EXACT COPY OF THE ORIGINAL DOCUMENT"

BY h2 DATE Sept 13, 06

Notes: DS = Daphnia Supplement SEL = Selenastrum sp. (aka pseudokirchneriella sp.)

TEST SOLUTION OBSERVATIONS						
Test Substance: Effluent <i>Cerios</i>			Study No.: 60620			
<input type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Screen						
Test Concentration (Percent)	REP	Observations ^a				
		Initiation:	Event: <i>24hr</i>	Event: <i>48hr</i>	Event:	Event:
Control	A-D	N	N	N		
RAW composite Control	A-D	cc yellow Brown	cc Brown	cc Brown		
10% outfall	A-D	cc yellow Brown	cc Brown	cc Brown		
100% outfall	A-D	cc yellow Brown with pm	cc Brown pm	cc Brown pm		
Observer		RW	RW	RW		
Date		Sept 13, 06	Sept 14, 06	Sept 15, 06		
Time		3pm	3:15p	2:45p		
Notes:						
^a see Form CDG 020 for code key						

**KEY TO MORPHOLOGICAL AND BEHAVIORAL OBSERVATIONS FOR
VERTEBRATE TOXICITY TESTS**

Test Substance: Effluent

Study No.: 60620

Dead (D) - Animals exhibiting no gill movement and no response to a physical stimulus (e.g., gentle prodding or stream of water from a pipet).

Discoloration (DC) - Animals exhibiting abnormal color patterns when compared to the control(s). This may include complete or partial light or dark discoloration.

Edema (ED) - Animals that appear to be retaining water and have a bloated appearance.

Erratic Swimming Pattern (E) - Animals moving in a rapid disorderly fashion.

Exopthalmia (EX) - Abnormal protrusion of the eyeball.

Floating on Surface (FL) - Animals floating on the surface of the test solution.

Fungus (FU) - Egg and/or animal exhibiting fungal infection.

Hemorrhagic (H) - Animals that are bleeding internally and/or subcutaneously.

Hypersensitivity (HP) - Animals that appear to be hypersensitive to physical stimuli.

Irregular Respiration (I) - Animals that exhibit rapid, slow, or irregular opercular movement.

Jaw Deformity (J) - Abnormal morphological development of the mouth and/or jaw usually observed in rainbow trout.

Loss of Equilibrium (LE) - Animals that have lost the ability to maintain normal orientation in the water column (e.g., nose up, nose down, listing to one side, etc.).

Normal (N) - Animals not exhibiting behavioral or morphological abnormalities. In tests where positive counts are not performed on a daily basis, an N indicates that **all remaining** animals in a test chamber are not exhibiting behavioral or morphological abnormalities.

Not Found (NF) - It is possible that an animal may die and never be observed as dead, get trapped on a drain screen or the side of the test chamber and not found, or simply not observed. Animals not found will be considered as dead unless later observed at a subsequent observation.

On Bottom (B) - Animals laying on the bottom of the test chamber.

Spinal Curvature (C) - An animal exhibiting lateral or dorsal curvature of the spine.

Surfacing (S) - Animals observed breaking the surface of the test solution. This condition can be associated with low dissolved oxygen concentrations or is the result of exposure to a test substance which interferes with oxygen uptake across the gills.

Swim-Up (U) - Animals swimming up into the water column from the bottom of the test chamber. Normal behavior exhibited by salmonids as they deplete their yolk-sac and begin to accept an external diet.

TEST ORGANISM MEASUREMENTS

Test Substance: Effluent

Study No.: 60620

Group Measured: Control A, B, C, D
 Balance Used: B-3
 Measured by: AS Date: Sept 5, 06

Number	Standard Length (mm)	Total Length (mm)	Blotted Wet Weight (g)
1	/		CA = 0.039 (10 fish)
2			CB = 0.047 (10 fish)
3			
4			
5			
6			
7			
8			
9			
10			
Mean (±SD)			

Biomass loading calculation

Date/ID: _____

Dynamic: $\frac{[Mean\ Weight\ (g)][No.\ Organisms/Test\ Container]}{Mean\ Flow\ Rate\ (L/day)} = \underline{\quad r \quad} g/L/day$

Instantaneous: $\frac{[Mean\ Weight\ (g)][No.\ Organisms/Test\ Container]}{Test\ Solution\ Volume\ (L)} = \underline{\quad \quad} g/L$

Organisms euthanized using: MS-222 Weskm Chemical lot 010307
 and appropriately discarded.

Reviewed by: NA Date: NA

WATER QUALITY FOR EFFLUENT SAMPLES

Effluent Designation: Ameron UE

Species: Ceriodaphnia dubia Fathead Minnow

Study #: 60620

Extra replicate prepared for water chemistry Measurements made in test beakers

Concentration (%)	Date/ID/REP <u>Sept 13, 06 RW A</u>				Date/ID/REP <u>Sept 14, 06 RW B</u>				Date/ID/REP <u>Sept 15, 06 RW C</u>				Date/ID/REP			
	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)
ABC Control	25.1	7.77	8.18	327	24.3	7.39	8.08	359	24.4	7.29	8.06	377				
Receiving Water (RW)	25.1	7.79	8.36	715	24.3	7.51	8.48	768	24.4	7.19	8.42	827				
10% Dilution (RW)	25.2	7.84	8.40	883	24.2	7.42	8.49	964	24.2	7.34	8.45	1041				
100% Outfall	25.2	7.82	8.40	2380	24.2	7.26	8.49	2500	24.2	7.29	8.49	2660				
Device ID	PH-9 ^②	DO-10	PH-9	CM-3	DO-10 ^②	DO-10	PH-10	CM-3	DO-10 ^②	DO-10	PH-9	CM-3				

ORW Sept 13, 06

Notes: * Correction Factor _____ @ _____ °C

② correction factor for temp = 0.0 °C Sept 13, 06 RW Sept 12, 06

correction factor for temp = +0.1 °C Sept 14-15, 06 RW Sept 18, 06

IV. DMRQA 26 COMMON DATA

Study Director/Principal Investigator Inspection Form		
Test Substance: REF-TOX		Study No.: DMRQA
Date	Initials	Raw Data Inspected/Comments
4/16/00	hw	DMRQA Data
Comments:		

DATA CORRECTION CODES AND FACILITY RECORDSData Correction Codes

The following correction codes may have been used to correct errors in the raw data:

A - Addition	I - Illegible
C - Calculation error	R - Recording error
D - Dating error	S - Spelling error
F - Form change	T - Transcription error
G - Grammatical error	W - Write over

Other - _____ Date: _____ Initials: _____

Other - _____ Date: _____ Initials: _____

Facility Record Statement

Some of the records that appear in the raw data may have been provided as photocopies of the original records maintained on file at ABC Laboratories as facility records. This was done by necessity for data that are common to several studies.

EQUIPMENT IDENTIFICATION LIST

Pipets

PI-1: Oxford Macroset 5-10 mL (D) (*Retired*)
 PI-2: Gilson 100-1000 μ L (E 8415486)
 PI-3: Eppendorf 100-1000 μ L (09450P)
 PI-4: Gilson 10-100 μ L (H84 11398)
 PI-5: Gilson 1-10 mL (N05409D)
 PI-7: Gilson P1000 (H137514)
 PI-8: Oxford Benchmate 100-1000 μ L (498753)
 PI-10: Oxford Benchmate 100-1000 μ L (498701)
 PI-12: Rainin EDP Plus (D41111)
 PI-14: Gilson P200 (L8415256)
 PI-15: Rainin EDP Plus (D40453)
 PI-20: Rainin EDP Plus (E42105)
 PI-22: Gilson 100-1000 μ L (S682810)
 PI-23: Gilson 10-100 μ L (S691520)
 PI-24: Gilson 1-10 mL (S559756)
 PI-25: Gilson 1000 μ L (447507)
 PI-26: Eppendorf 10-100 μ L (2147081)
 PI-27: Finnpiquette 0.5-10 μ L (G03479)
 PI-28: Eppendorf 500 μ L
 PI-29: Eppendorf 50 μ L
 PI-30: Eppendorf 100 μ L (43977-N) (*Retired*)
 PI-31: Eppendorf 1000 μ L (51984-N)
 PI-32: Eppendorf Pipetman 100-1000 μ L (J215300)
 PI-33: Eppendorf Pipetman 100-1000 μ L (J215191)
 PI-34: Oxford Sampler 1 mL
 PI-35: Wheaton 20-200 μ L (*Retired*)
 PI-36: Wheaton 50-200 μ L (*Retired*)

Ovens/Furnaces

Oven-1: Fisher Isotemp 500 Series #1621-100
 Oven-2: Fisher Isotemp #163-96-1806
 Oven-3: Fisher Vacuum Oven 285 #1626-96-4644
 Oven-4: VWR 1310 Drying Oven #1628-970008
 Oven-5: Napco Model 430 #1704-900
 Oven-6: American Scientific Products DK 62 #3570-1045
 Oven-7: Scientific Products DK 63 #3570-1047
 Oven-8: Hotpack #1905-280
 Oven-9: Thermolyne B2700 Furnace #1628-970010
 Oven-10: Blue M Muffle Furnace #1704-400
 Oven-11: VWR 1390 FM #1628-980126
 Oven-12: VWR 1390 fm #1628-980052

Refrigerators/Freezers

A: Walk-In Freezer #1715-740
 B: Walk-In Freezer #1650-0046

Refrigerators/Freezers (cont.)

E: Walk-In Freezer #1650-140B
 F-1: Mr. Winter Freezer #166-13
 F-2: Masterbilt Freezer # 1630-99-0010
 I: Walk-In Refrigerator #1713-625
 R-1: Mr. Winter Refrigerator #166-12
 R-1A: True Refrigerator #1715-840
 R-2: Labline Refrigerator/Freezer 3551 #1715-100
 R-2A: Sample Prep Refrigerator #1625-635
 R-3: True Refrigerator GDM-40 #1626-4010
 R-3A: Sample Prep Refrigerator #1622-100
 R-4: Jordan Refrigerator #1716-480 (*Retired*)
 R-5: True Refrigerator #1905-625
 RF-1: Estate Refrigerator/Freezer TT18EKR00 #1626-350
 RF-2: Fisher Scientific Refrigerator/Freezer ET18NK #1630-010010
 U-1: Upright True Freezer #1715-845
 U-2: Upright Freezer #1905-895
 U-3: Upright Freezer #ABC 201520
 U-4: Upright Freezer #1805-810

Miscellaneous

DFM-1: Fisher Model 650 Digital Flowmeter #1626-2030
 DFM-2: Fisher Model 520 Digital Flowmeter (SN #291146)
 DFM-3: Agilent ADM 1000 Digital Flowmeter (SN #220737458)
 DFM-4: Agilent ADM 1000 Digital Flowmeter (#1630-030004)
 MM-1: Mitutoyo Digital Micrometer (SN #911083)
 MX-1: Thermolyne Speci-Mix #1715-727
 NE-1: Meyer N-EVAP 112 #192-4070
 PT-1: Kinematica AG Ploytron #1626-990050
 PT-2: Brinkman Polytron
 RT-1: Pierce Reacti-Therm Heating Module Model 18870/Evaporating unit 18780 (S/N 548911237883)
 RT-2: Pierce Reacti-Therm Heating Module Model 18800/Evaporating unit 18780 (S/N 5421)
 RT-3: Pierce Reacti-Therm Heating Module Model 18835/Evaporating unit 18785 #160-010040
 SM-1: Shearmill, Divtech #163-95-1162
 SP-1: Sonicator Probe #163-1065
 UV-1: Perkin Elmer Lambda 3B #1905-715 (*Retired*)
 V-1: Vortex-Genie #1715-730
 V-2: Vortex Genie 2, Fisher Scientific Model G-560 (S/N 2-189839)
 V-3: Vortex Labline Supermixer (No. 1290)
 VS-1: Virtis Virtishear #1625-750
 VS-2: Virtis Virtishear #1715-455

EQUIPMENT IDENTIFICATION LIST

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 PI-27: Finnpiette 0.5-10 µL (G03479)
 PI-28: Eppendorf 500 µL
 PI-29: Eppendorf 50 µL
 PI-30: Eppendorf 100 µL (43977-N) (Retired)
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 PI-32: Eppendorf Pipetman 100-1000 µL (J215300)
 PI-33: Eppendorf Pipetman 100-1000 µL (J215191)
 PI-34: Oxford Sampler 1 mL
 PI-35: Wheaton 20-200 µL (Retired)
 PI-36: Wheaton 50-200 µL (Retired)

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 RF-2: Fisher Scientific Refrigerator/Freezer ET18NK #1630-010010
 U-1: Upright True Freezer #1715-845
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 RT-3: Pierce Reacti-Therm Heating Module Model 18835/Evaporating unit 18785 #160-010040
 SM-1: Shearmill, Divtech #163-95-1162
 SP-1: Sonicator Probe #163-1065
 UV-1: Perkin Elmer Lambda 3B #1905-715 (Retired)
 V-1: Vortex-Genie #1715-730
 V-2: Vortex Genie 2, Fisher Scientific Model G-560 (S/N 2-189839)
 V-3: Vortex Labline Supermixer (No. 1290)
 VS-1: Virtis Virtishear #1625-750
 VS-2: Virtis Virtishear #1715-455

EQUIPMENT IDENTIFICATION LIST

Oxidizer

- O-1: Harvey Oxidizer OX 500 #1626-88
(Retired)
O-2: Harvey Oxidizer OX 500 #1626-4035
O-3: Harvey Oxidizer OX-500 #D5-0037

Total Organic Carbon Analyzer

- TOC-3: OI Analytical TOC 1020 #1630-000002
Autosampler #1630-000004 (Retired)

Scintillation Counter

- FD: Beckman (LS 6000 IC) #1626-74A
FE: Beckman (LS 6000 IC) #1626-91A
FF: Beckman (LS 6000 IC) #1626-000006

Thin Layer Chromatography

- TLC 1: Ambis Scanner 4000 CA4570-14 (Retired)
TLC 2: AIS Multispotter #1716-965
TLC 3: AIS Multispotter #1715-545

Environmental Fate

- EF-1: Mettler Toledo HR73 Halogen Moisture
Analyzer #1630-010032
EF-2: Strathkelvin ASR System Oxygen
Interface 928 #1630-010034A Stirplate
#1630-010034B
EF-3: Columbus Instruments Respirometer
System Pump #1630-010036A
Carbon Dioxide Sensor #1630-010036B
Oxygen Sensor #1635-020004
Expansion Unit #1630-010036C
Condenser Power Supply #1630-010036D
Condenser #1630-010036E
EF-4: Bioscience COD Reactor
Model 163-446 #1626-96-4684

Shaker Tables

- ST-1: Innova 2100 #163-1110
ST-2: Innova 2100 #163-1111
ST-3: Innova 2100 #163-1114
ST-4: Lab-Line #163-95-1224B
ST-5: Lab-Line #1630-981328
ST-7: Lab-Line #163-95-1224A
ST-8: VWR Scientific #1905-480
ST-9: Eberbach 6010 #1713-810
ST-10: Eberbach 6010 #1626-4060A
ST-11: Lab-Line Model 3590 #1905-1045
ST-12: Eberbach #1626-106
ST-13: Lab-Line Model 3590 # 1626-4050
ST-14: Burrell Wrist Action Model 75 #1626-000

Light Meters

- LM-1: LI-COR Model LI-189 #163-341 with
Photometric Sensor
LM-2: LI-COR Model LI-189 #1630-199501
w/Quantum Sensor

Microscopes

- M-1: Olympus BH-2 #163-384
M-2: Olympus CH #1900-800
M-3: Olympus VM #1903-700
M-4: Fisher Micromaster II 12-561-4B
#1625-980060

Conductivity Meters

- CM-1: Orion Model 140 #150-4070 (Retired)
CM-2: Corning Checkmate 90 #1905-895
(Retired)
CM-3: WTW Cond 330i #04250007

Dissolved Oxygen Meters

- DO-1: YSI Model 54A #1905-730
DO-4: YSI Model 58 #1627-13
DO-5: Corning Checkmate 90 #109-3020
DO-6: YSI Model 95 #1630-991318
DO-7: YSI Model 95 #1626-990090
DO-8: WTW OXi 330 #1630-010004
DO-9: WTW OXi 330i # 1635-020006
DO-10: WTW OXi 330i # 05070021

Micro/Fate Miscellaneous

- AU-1: Market Forge Sterilmatic Autoclave
#1626-79
AU-2: Market Forge Sterilmatic Autoclave
#1626-4474A
AZR-1: Fisher-Lilly Antibiotic Zone Reader
#185 98602
BSC-1: Labconco Purifier Class II Biosafety
Cabinet #1630-010014
CR-1: Cole Parmer Chart Recorder 2D20-0000
#1626-984762
DBI-1: Fisher Scientific Dry Bath Incubator
#1630-010012
LFH-1: Labconco Purifier Clean Bench #1627-24
LFH-2: Labconco Purifier Clean Bench
#1626-4476
OS-1: Lab-line 3540 Orbital Shaker Waterbath
#1626-105
TR-1: Biolog Turbidity Reader
#1630-010047A
UV-2: Genesys 20 Spectrophotometer,
Model 4001/4 #1635-040000

EQUIPMENT IDENTIFICATION LIST

HPLC Component	System Contoller (cont.)
Pump	SC-6: Shimadzu SCL-6B #1626-72D (<i>Retired</i>)
P-1: Shimadzu LC-6A #1716-390B (<i>Retired</i>)	SC-7: Shimadzu SCL-6B #1716-185E
P-2: Shimadzu LC-6A #1715-320B	SC-8: Shimadzu SCL-6B #1716-115E
P-3: Shimadzu LC-6A #1621-64A	SC-9: Shimadzu SCL-10A #1626-4502D
P-4: Shimadzu LC-6A #1621-40D	SC-11: Shimadzu SCL-6B #1625-128D (<i>Retired</i>)
P-5: Shimadzu LC-10AS #163-1104A	SC-12: Shimadzu SCL-10A vp #1625-980026
P-6: Shimadzu LC-10AS #163-1104B	SC-13: Shimadzu SCL-6B #1625-138 (<i>Retired</i>)
P-7: Shimadzu LC-6A #1623-78A	SC-14: Shimadzu SCL-6A #1715-795B (<i>Retired</i>)
P-9: Varian 9010 #1626-640	SC-15: HP Series 1100 G1323 A #1626-990026F
P-11: Varian 9010 #1623-102C2	SC-16: Agilent Control Module G1323B #1635-020002F
P-12: Varian 9010 #1626-2060A	SC-17: Shimadzu SCL-10A #1622-96-0198
P-15: Shimadzu LC-6A #1626-72C	SC-18: Shimadzu SCL-10A #1623-96-0866
P-16: Varian 9010 #1626-700A	SC-19: Agilent G1323B #DE05014297
P-17: Shimadzu LC-6A #1716-115A	SC-20: Shimadzu SCL-10A #1626-4732A
P-18: Shimadzu LC-6A #1716-180A	SC-21: Shimadzu SCL-10A (SN#70024E)
P-19: Shimadzu LC-10AS #1626-4502B	SC-22: Agilent G1323B # CN 40413281
P-20: Shimadzu LC-10AS #16126-4502A	SC-23: Agilent G1323B # CN 40413252
P-21: Shimadzu LC-6A #1716-185A	
P-23: Shimadzu LC-6A #1715-780B	Detectors
P-24: Shimadzu LC-6A #1716-315B	D-1: Shimadzu SPD-6A #1715-830
P-25: Shimadzu LC-6A #1625-128B (<i>Retired</i>)	D-2: Shimadzu SPD-6A #1621-40C (<i>Retired</i>)
P-26: Shimadzu LC-6A #1625-136 (<i>Retired</i>)	D-3: Shimadzu SPD-10AV #163-1104E
P-27: Shimadzu LC-6A #1622-83 (<i>Retired</i>)	D-4: Shimadzu SPD-6A #1623-78D(<i>Retired</i>)
P-28: Shimadzu LC-6A #1622-77A (<i>Retired</i>)	D-5: Shimadzu RID6A #1630-1118
P-29: Shimadzu LC-10AT #1622-96-0196	D-6: Shimadzu RF-551#1625-0285
P-30: Shimadzu LC-10AT #1622-96-0206	D-7: Varian 9050 #1626-641
P-31: HP Series 1100 G1312A #1625-980046H	D-8: Varian 9050 #1626-551
P-32: Agilent G1311A #1635-020002A	D-9: Varian 9050 #1626-2050B
P-33: Shimadzu LC-10AT #1625-980024	D-11: Shimadzu SPD-6A #1716-390F (<i>Retired</i>)
P-34: Shimadzu LC-10AT #1625-98022	D-14: Shimadzu SPD-6A #1715-300D
P-35: HP Series 1100 G1311A #1626-990026A	D-15: Shimadzu SPD-6A #1716-185F
P-36: Shimadzu LC-10AT #1622-96-0194	D-16: Shimadzu SPD-10A #1626-4502C
P-37: Shimadzu LC-10AS #1625-812A	D-17: Shimadzu SPD-6A #1625-128A (<i>Retired</i>)
P-38: Shimadzu LC-10AT #1623-96-0864	D-18: Shimadzu SPD-6A #1905-1015F (<i>Retired</i>)
P-39: Shimadzu LC-10AT #1623-96-0862	D-19: HP Series 1100 G1314A #1626-990026E
P-40: Agilent G1311A #1629-010168B	D-20: Agilent G1315A #1635-020002E
P-41: Agilent G1311A #1629-010006I	D-21: Shimadzu RID-6A #1626-72E
P-42: Shimadzu LC-10AT VP #1625-980022	D-22: Shimadzu RF-10A #1625-788E
P-43: Shimadzu LC-10AT VP #1625-980024 (<i>Retired</i>)	D-23: Shimadzu RF-551 #1625-140
P-44: KDS Syringe Pump #1630-010048	D-24: HP Series 1100 DAD G1315A #1625-980046E
P-45: Shimadzu LC-10AS (SN#40319A)	D-25: Shimadzu RF-10Axl #1625-980030
P-46: Shimadzu LC-10AS (SN#40313A)	D-26: Shimadzu SPD-10A #1625-812E
P-47: Shimadzu LC-10AT #1623-97-4716	D-27: Shimadzu SPD-10AV #100205
P-48: Shimadzu LC-10AT #1623-97-4718	D-28: Agilent G1314A #1629-010168E
P-49: KDS Syringe pump (SN# 104955)	D-29: Agilent G1315A DAD #1629-010006D
System Contoller	D-30: Shimadzu SPD-10A #1623-97-4724
SC-1: Shimadzu SCL-6A #1715-650A	D-31: Shimadzu SPD-10AV #1626-97-4732C
SC-3: Shimadzu SCL-10A #163-1104C	D-32: Shimadzu SPD-10A #1625-95-0865
SC-4: Shimadzu SCL-6A #1715-920	D-33: Agilent G1314A #1635-040002
	D-34: Agilent G1321A (fluorescence) #06-0011

EQUIPMENT IDENTIFICATION LIST

HPLC ComponentInjector

I-1: Varian 9100 #1626-4434 (Retired)
 I-2: Shimadzu SIL-6B #1621-40B (Retired)
 I-3: Shimadzu SIL-10A #163-1104F
 I-4: Shimadzu SIL-10A #1626-4502E
 I-14: Shimadzu SIL-6B #163-361B (Retired)
 I-15: HP Series 1100 G1313A #1626-990026C
 I-16: Shimadzu SIL-10A # 1622-96-0204
 I-19: HP Series 1100 ALS (G1313A)
 #1625-980046G
 I-22: Agilent G1313A ALS #1635-020002C
 I-23: Shimadzu SIL-10A #1625-980028 and
 Shimadzu Sample Cooler #1625-980034
 I-24: Shimadzu SIL-10A #1628-98-0112
 I-25: Agilent G1313A ALS #1629-010168C
 I-26A: Agilent G1329A ALS #1629-010006E
 I-26B: Agilent G1330A ALS Therm
 #1629-010006H
 I-27: Shimadzu SIL-10A #1623-720A
 I-28: Shimadzu SIL-10A (SN#40022F)

Column Heater/Controller

H-1: Eppendorf (CH-30/TC-50)
 #1621-270B/1623-698
 H-2: Eppendorf (CH-30/TC-50)
 #163-980A/980B
 H-3: Eppendorf (CH-30/TC-50)
 #163-1107/1106
 H-4: Eppendorf (CH-30/TC-50)
 #163-1084/1085
 H-5: Timberline #1623-580
 H-6: Timberline #1626-974746
 H-7: Timberline #1625-000006
 H-8: HP Series 1100 G1316A #1625-980046F
 H-9: Agilent G1316A #1635-020002D
 H-10: HP Series 1100 G1316A #1626-990026D
 H-11: Timberline #1625-000008
 H-12: Timberline #1625-132
 H-13: Agilent G1316A #1629-010168D
 H-14: Agilent G1316A 1629-010006C
 H-15: Eppendorf (CH-30/TC-50) #1623-97-0892
 H-16: Eppendorf (CH-30/TC-50) #1623-97-0900

Raytest

RA-1: Ramona #1626-95-4576A
 RA-2: Ramona 92 #1626-4000A
 RA-3: Ramona #1623-530A
 RA-4: Ramona #1626-4498
 RA-9: Ramona 90 #1626-570
 RA-10: Ramona 92 #1623-500

Degassers

DG-1: HP Series 1100 G1322A #1625-980046I
 DG-2: HP Series 1100 G1322A
 #1626-990026B
 DG-3: Agilent G1322A #1635-020002B
 DG-4: Agilent G1322A #1629-010168A
 DG-5: Agilent G1322A #1629-010006G
 DG-6: Shimadzu Degasser DGU-14A
 #1628-980182

Analog Convertors

AC-1: Raytest Steffi #1626-4486
 AC-2: Raytest Anna #1626-4499
 AC-3: Raytest Steffi (SN#975N39)
 AC-4: Raytest Anna #1623-95-0758
 AC-5: Raytest Anna #1626-95-4576B
 AC-7: Raytest Steffi (SN# 91SN17)

Fraction Collectors

FC-1: Gilson 202 #1626-600
 FC-2: Gilson 202 #1626-380
 FC-3: Gilson 202 #1626-2000
 FC-4: Gilson 202 #1626-76
 FC-5: Gilson 202 #1716-165
 FC-6: Gilson 202 #1626-116
 FC-7: Gilson 202 #1626-2070
 FC-8: Gilson 202 #1626-2080
 FC-9: Gilson 202 #1626-89
 FC-10: Gilson 202 #1626-370
 FC-11: Gilson 202 (SN#150L0247)

HPLC - Misc.

IC-1: Dionex DX500 #1630-990000

Shimadzu FCV-12AH Switching Valves

FCV-1: Valve Interface #1622-96-0192 &
 FCV-12AH
 Valves #1622-96-0208 and #1622-96-0210

EQUIPMENT IDENTIFICATION LIST

GC ComponentUnit (Detectors)

GC-1: HP 5890 A (ECD, NPD) #1905-790A
(Retired)
GC-3: HP 5890 Series II (1990) (FID, FPD)
#1621-67a
GC-4: HP 5890 Series II (1989) (FID, ECD)
#1621-47a
GC-5: HP 5890 Series II # 1652-0120
GC-6: HP 5890 Series II #1716-130A
(Retired)
GC-7: HP 6890 Series (system)
#1625-000014A, B & C
GC-8: HP 5890 Series II #1212-3570
GC-9: HP 5890 (ECD, NPD) #1715-860A
GC-10: HP 6980N (System) #05-0029
GC-11: HP 5890 Series II SN#3310A49331

Injector

AI-1: HP 7673A #1630-990006
AI-2: HP 7673 #1621-47D
AI-3: HP 7673 #1621-67B
AI-4: HP 7673 #1621-47B
AI-5: HP 7373 #1212-3570B
AI-6: HP 7673 #1630-CA 2000003
AI-7: HP 7673 #1623-430
AI-8: HP 7673 #1630-CA 2000002
AI-9: HP 7673 #1625-380
AI-10: HP 7673 #1625-970976
AI-11: HP 7673 #1625-106B
AI-12: HP 7673A #1716-130C

Controller

CO-1: HP 7673A #1905-790C (Retired)
CO-2: HP 7673 #1630-981338
CO-3: HP 7673 #1621-67D
CO-4: HP 7673BG1512A #1630-990028
CO-5: HP 7673BG1512A #1630-990026
CO-6: HP 7673 #1218-3570F
CO-7: HP 7673 #1652-0115B
CO-8: HP7673 #1630-CA200001
CO-9: HP 7673 #1625-970077
CO-10: HP 7673 S#3207A28329
CO-11: HP 7673 S#3435A36472
CO-12: HP 7673 S#3113A25310
CO-13: HP 7673 S#2730A08203

Controller (cont.)

CO-14: HP 7673 S#3113A26295
CO-15: HP 7673A S#2929A15282

Integrator

IN-1: HP 3392A #1714-575
IN-2: HP 3392A S#2736A12834 (Retired)
IN-3: HP 3396A #1630-981340
IN-4: HP 3392A #1905-785
IN-5: HP 3392A #1626-530
IN-6: HP 3392A # 1621-67C (Retired)
IN-7: HP 3392A #1714-030
IN-8: HP 3392A #1715-855B
IN-9: HP 3392A #1715-275 (Retired)
IN-10: HP 3396A #1716-380
IN-11: HP 3396 S# 3112P26675
IN-12: HP 3396A S#3021P06221
IN-13: HP 3396 #1622-80
IN-14: HP 3396 #1626-113
IN-15: HP 3392A #1714-182

GC/MSD

GC/MSD1: HP 5890 Series II Unit #1625-382 HP
5971 MSD #1625-381 (Retired)
GC/MSD2: HP 5890 Series II #1625-802B HP
5972 MSD #1625-802C
GC/MSD4: HP 5890 Series II #1625-970975
HP 5971 MSD #1625-970974
GC/MSD5: HP 5890 Series II 1217-3570
HP 5972 MSD Series 3329A00556
GC/MSD6: HP 6890N #05-0026A
HP 5973 MSD #05-0026D

GC - Misc.

PT-1: Tekmar Purge & Trap LSC
2000/ALS2016 #1621-72/1621-73

**KEY TO TEST SOLUTION OBSERVATIONS DURING
AQUATIC TOXICITY TESTS**

Test Substance: REF-TOX

Study No.: DMRQA

Clear (CC) – Test solution is clear but has a tint of color due to the presence of the test substance. Coloration observation should be noted.

Cloudy (C) – Test solution is murky in appearance.

Foam (F) – Foam on surface of test solution.

None (N) – Test solution is clear and colorless (i.e., no coloration associated with test substance) with no visible particulates, surface film, undissolved test substance, or precipitate.

Particulate Matter (PM) – Test solution which has solids present, either in suspension or on the bottom of the test chamber. The solids are not believed to be a component of the test substance.

Precipitate (PR) – Solid substance present either floating at the surface of the test solution or settled on the bottom of the test chamber. The substance is assumed to be a component of the test substance which has become separated from the test solution by the action of a chemical or physical change. Never used when observation is made immediately after addition of the test substance stock.

Surface Film (SF) – Test solution with a substance partially or entirely covering the surface of the solution. The substance may have an oily or scum-like appearance.

Undissolved Test Substance (UTS) – Used in two instances: 1) when the test substance falls out of solution immediately upon addition to the dilution water; 2) when the test substance is added directly into the dilution water and it does not completely dissolve.



ENVIRONMENTAL
RESOURCE ASSOCIATES,®

DMR-QA 26 Data Reporting Form

NPDES Permit #: MO0098001

Permittee Name: Ameren Union Electric Company

Laboratory: Analytical Biochemistry Laboratory

USEPA Lab Code: MO00024

Customer Number: A6588-48

Anal. No.	Analyte	Result	Units	Method Description	Analysis Date MM/DD/YY	Report* For DMRQA
<i>Fathead minnow (EPA Test Code 13) - Method 1</i>						
0754	Fathead minnow - MHSF 25° C - LC50	43.5	%	EPA 2000	08/11/06	<input type="checkbox"/>
<i>Ceriodaphnia dubia (EPA Test Code 19) - Method 1</i>						
0764	Ceriodaphnia - MHSF 25° C - LC50	70.7	%	EPA 2002	08/11/06	<input type="checkbox"/>

*** Permittees**

If using for DMR-QA 26, place an "X" in the box to the right of each analyte that is required in routine NPDES monitoring and should be included on the final permittee report.

PREPARATION AND CHARACTERIZATION OF ABC SYNTHETIC WATER

PREPARATION

Water is generally prepared in 20, 60, or 120 liter increments. Calcium sulfate should be dissolved separately then added to the container. The water should be vigorously aerated for ~24 hours prior to conducting water chemistry. The water will expire four weeks from the date prepared. The following target weights, in grams, should be used except for sodium selenate where a 400 mg/L stock solution is prepared in a 100mL volumetric. Sodium selenate may only be utilized as required by the individual project requirements.

Balance used: B2 B5 Other _____

Chemical	20 liters	60 liters	120 liters	Actual weight (g)	Supplier	Lot Number
MgSO ₄	1.20	3.60	7.20	7.2000	Acros	B0119120
NaHCO ₃	1.92	5.76	11.52	11.5201	Acros	A0222859
KCl	0.08	0.24	0.48	0.4801	Acros	B0113189
CaSO ₄	1.20	3.60	7.20	7.2001	Acros	A0222861
Na ₂ SeO ₄	0.1 mL	0.3 mL	0.6 mL	0.0400	Sigma	

Weighed By: MA Date: 07 July 06
 Prepared By: MA Date: 07 July 06

CHARACTERIZATION

Hardness^d: 4.4 mL^b 58 mg/L^c

The acceptable range for hardness is 80-100 mg/L if out of this range see notes below.

Acceptable Unacceptable

Notes:

- ^a HACH buffer solution hardness 1 lot number: A6152 & HACH ManVer 2 hardness indicator lot number: A6037
- ^b Milliliters of titrant times twenty equals mg/L as CaSO₄
- ^c Total alkalinity and hardness measured using a titrimetric method adapted from standard methods (mg/L as CaCO₃)

Batch was discarded
 Batch was adjusted by the addition of the following: _____

Analysis By: RJ Date: July 9, 06

CHEMICAL/PHYSICAL MEASUREMENTS OF DILUTION WATER

DILUTION WATER: FW (blended) FW (aged) NSW FW (well) Salt
 Other (describe): Synthetic water

TEMPERATURE: 21.2 °C

DO: 8.04 mg/L

pH: 8.21

ALKALINITY^a: 3.1 mL^b 62 mg/L^c Station 1 Station 2

HARDNESS^d: 45 mL^b 90 mg/L^c Station 1 Station 2

CONDUCTIVITY: 296 μS or mS

OTHER: _____

INSTRUMENTS:

Thermometer ID: D09 Correction factor: 0.0 °C

Dissolved Oxygen Meter ID: D09

pH Meter ID: PH9

Conductivity and/or Salinity Meter ID: CM3

COMMENTS:

^aHach Bromcresol Green - Methyl Red Indicator Solution Lot # A3321

^bNumber mL of titrant (mL of titrant x 20 = mg/L as CaCO₃)

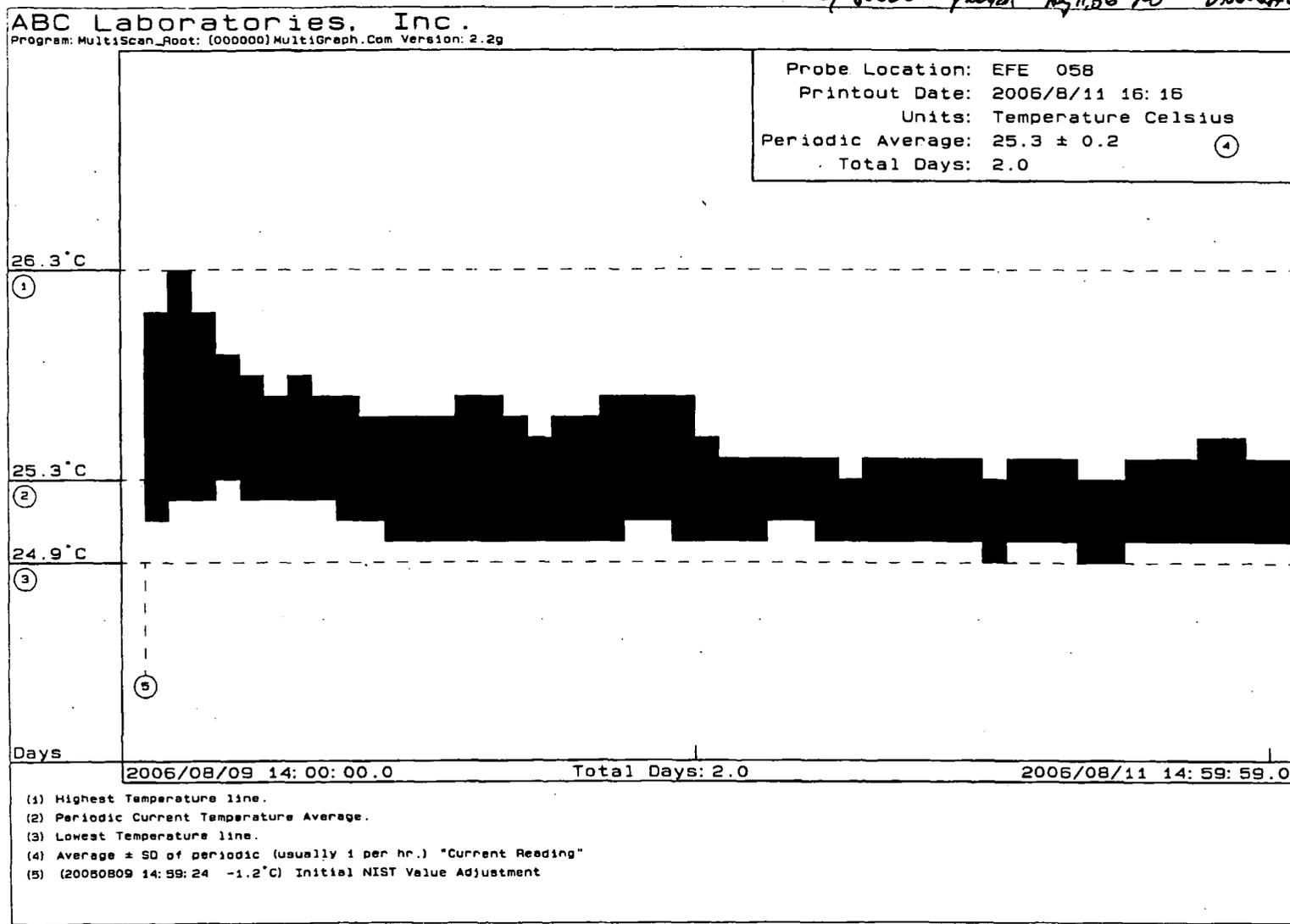
^cTotal alkalinity and hardness measured using a titrimetric method adapted from Standard Methods (mg/L as CaCO₃)

^dHach Buffer Solution Hardness 1 Lot # A16 A452 & Hach ManVer 2 Hardness Indicator Lot # A6163

DRW Aug 9, 06

Analysis by: RW Date: Aug 9, 06

Study 60620 printed Aug 11 2006 RW DNRQA26 Study



V. DMRQA 26 DAPHNID EXPOSURE

AQUATIC TOXICITY TEST DESIGN			
Test Substance: REF-TOX	Study No.: DMRQA		
Type of Exposure: <input checked="" type="checkbox"/> Static (Waterbath No. <u>7524</u>) <input type="checkbox"/> Static-Renewal (Renew every: _____ Waterbath No.: _____) <input type="checkbox"/> Flow-Through (Diluter No. _____ and delivery volume: _____)			
Test Chamber Description (from reference chart): <table style="width:100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <input type="checkbox"/> Glass Aquarium Width: _____ Length: _____ Height: _____ Solution Depth: _____ Solution Volume: _____ </td> <td style="width: 50%; border: none; vertical-align: top;"> <input type="checkbox"/> Glass Jar <input type="checkbox"/> Glass Beaker <i>Plastic cup</i> Height: _____ Diameter: _____ Solution Depth: <u>25</u> Solution Volume: <u>~20ml</u> ① Jar/Beaker Volume: <u>~25ml</u> ① <input type="checkbox"/> Notched overflow covered with stainless steel mesh screen </td> </tr> </table>		<input type="checkbox"/> Glass Aquarium Width: _____ Length: _____ Height: _____ Solution Depth: _____ Solution Volume: _____	<input type="checkbox"/> Glass Jar <input type="checkbox"/> Glass Beaker <i>Plastic cup</i> Height: _____ Diameter: _____ Solution Depth: <u>25</u> Solution Volume: <u>~20ml</u> ① Jar/Beaker Volume: <u>~25ml</u> ① <input type="checkbox"/> Notched overflow covered with stainless steel mesh screen
<input type="checkbox"/> Glass Aquarium Width: _____ Length: _____ Height: _____ Solution Depth: _____ Solution Volume: _____	<input type="checkbox"/> Glass Jar <input type="checkbox"/> Glass Beaker <i>Plastic cup</i> Height: _____ Diameter: _____ Solution Depth: <u>25</u> Solution Volume: <u>~20ml</u> ① Jar/Beaker Volume: <u>~25ml</u> ① <input type="checkbox"/> Notched overflow covered with stainless steel mesh screen		
Test Chambers: <input type="checkbox"/> covered with: _____ <i>① correction per Aug 14 06</i> <input checked="" type="checkbox"/> not covered			
Test Chamber Placement (method of positioning): <input type="checkbox"/> Placed according to computer-generated random number table. <input type="checkbox"/> Other (describe): _____ <input checked="" type="checkbox"/> Grouped in waterbath by treatment.			
Test Chamber Labeling: <input type="checkbox"/> Study No. <input checked="" type="checkbox"/> Replicate <input checked="" type="checkbox"/> Treatment <input type="checkbox"/> Other (describe): _____			
Diluter System Labeling: <input checked="" type="checkbox"/> Study No. <input type="checkbox"/> Treatments			
Dilution Water: <input type="checkbox"/> FW (blended) <input type="checkbox"/> FW (aged-blended) <input type="checkbox"/> FW (well) <input type="checkbox"/> SW (Saltwater) <input checked="" type="checkbox"/> Other (describe): <u>Synthetic water</u>			
Pretreatment: <input type="checkbox"/> Filtration <u>5</u> μ m <input checked="" type="checkbox"/> UV Irradiation <input checked="" type="checkbox"/> Aeration <input type="checkbox"/> Heated <input type="checkbox"/> Cooled			
Prepared by: _____ <i>[Signature]</i> Date: <u>Aug 9, 06</u>			

TEST SUBSTANCE STANDARD PREPARATIONS					
Test Substance: REF-TOX		Study No.: DMRQA			
Lot/Batch No:		Purity:		% ABC Ref No:	
PREPARATION OF PRIMARY STANDARD					
Weighed by: _____		Date: _____			
Target Weight: _____ g					
Net Weight: _____ g		Dilution Volume _____ mL of _____			
Adj. Net Weight: _____ g*		Concentration _____ mg/mL			
		Carrier: _____ (lot No: _____)			
*Corrected for purity of test substance.		Carrier Manufacturer: _____			
Balance Used: _____		Vessel Type: _____			
PREPARATION OF WORKING STANDARD(S)					
Prepared by: <u>KJ</u>		Date: <u>Aug 9, 06 ~ 2:40 pm</u>			
Conc. of Primary Standard ① (mg/mL) %	Aliquot Vol. (mL)	Dilution Vol. (mL)	Dilution Carrier	Vessel Type	Final Concentration ① (mg/mL) %
100	1000	—	—	volumetric flask	100%
100	500	500	MHSF ②	↓	50.0
50	500	500	↓	↓	25.0
25	500	500	↓	↓	12.5
12.5	500	500	↓	↓	6.25
0 %	MHSF 1000	—	—	↓	0% control
Carrier/Lot No./Supplier: <u>NA</u>					
Storage conditions of remaining solutions: <u>discarded</u>					
Standard Solution(s) Observations: <u>clear, colorless, no particulates</u>					
Special Preparation Procedures and Notes: ① F RW Aug 9, 06 ② MHSF = moderately hard synthetic freshwater RW Aug 9, 06 <u>Steady Institution - prep per DMRQA-26 Instructions</u>					
Calculations by: <u>NA</u>		Date: <u>NA</u>			
Calculations Checked by: <u>NA</u>		Date: <u>NA</u>			

PHOTOPERIOD AND LIGHT MEASUREMENTS				
Test Substance: REF-TOX		Study No.: DMRQA		
Photoperiod: <u>16</u> Hours Light; <u>8</u> Hours Darkness; Transition Period: <u>30 min</u>				
Location: <input type="checkbox"/> Diluter # _____ <input checked="" type="checkbox"/> Waterbath # <u>7521</u>				
<input type="checkbox"/> Environmental Chamber # _____				
Type of Lighting: <input checked="" type="checkbox"/> Fluorescent <input type="checkbox"/> Other: _____				
Photoperiod Initiation Date/Time: <u>Already on</u>				
Prepared By: <u>PW</u> Date: <u>Aug 9, 06</u>				
LIGHT READINGS				
Study Day	Date	Initials	LUX	Measurement Position
1	Aug 10, 06	PW	665.0	Control A
↓	↓	PW	650.5	12.5% A
↓	↓	PW	631.5	100% B
Location of Sensor: <input type="checkbox"/> Level of Test Media				
<input type="checkbox"/> Other: <u>Top of Jar</u>				
Meter Used: <input checked="" type="checkbox"/> LI-COR Model LI-189 ABC material control #163-341 used with photometric sensor Serial No. (<u>PH 4721</u>)				
<input type="checkbox"/> Other: _____				

TEST ORGANISM ADDITION

Test Substance: REF-TOX

Study No.: DMRQA

 Preliminary Screen Definitive REF-TOX

Species Added: Feathered minnow

Lot No.: 1706 FHM

Number Added/Test Chamber: 10

Total Number/Treatment: 20

Check appropriate method of addition:

- Added test organisms by ones and/or twos (no more than 10% at a time if <20 organisms per chamber or no more than 20% at a time if ≥ 20 organisms per chamber) proceeding from control(s), low to high test substance treatments, and repeating steps as necessary until the required number of individuals were added to each test chamber.
- One individual was added to each container containing only dilution water proceeding from containers labeled control(s), low to high test substance treatments and replicate I.D., if needed. The process was repeated until each container contained the required number of individuals. The test organisms within each container were then released from container/transferred via pipet (circle one) into the corresponding test chamber.
- Impartially added the required number of individuals to a set of labeled containers; each container representing one treatment or treatment replicate, if treatment replicated. Each container was randomly assigned to a treatment or treatment replicate by random number generator or lottery assignment. The individuals within each container were then released from container/transferred via pipet (circle one) into the corresponding test chamber.
- Other (Describe):

Comments:Prepared by: kwDate: Aug 2, 2002

FISH CULTURE RECORD

Species: Fathead Minnow Lot No: 1706 FHM
 Tank/Aquarium No.: FHM 18 Source: ABC In House SPC No. 1506
 Water Type: Well/Blended Food Lot No.: 85012506 FF 071306 SS071706
 Date Received: July 31 06 No. Received: 1500
 Thermometer ID No.: CR-4, CR-5, CR-6, CR-7 Other: _____
 Photoperiod: 16 hours light; 8 hours darkness; 30 minute transition period
 Prepared by: KJ Date: July 31 06

Date	ID	Mort.	Feeding		°C Temp.	Treatment and/or Comments
			AM	PM		
July 31, 06	KJ	—	—	—	24	Hatched @ 10am to 10:15am
Aug 01, 06	KJ	—	✓	✓	24	
Aug 02, 06	KJ	—	✓	✓	25	
Aug 03, 06	KJ	0	✓	✓	25	
Aug 4, 06	JM	0	✓	✓	25	
05 Aug 06	Ca	0	✓	✓	25	BY <u>KJ</u> DATE <u>Aug 16, 06</u>
06 Aug 06	Ca	0	✓	✓	25	
07 Aug 06	Pr	0	✓	✓	25	
08 Aug 06	MT	0	✓	✓	25	
09 Aug 06	MT	0	✓	✓	25	used 120 for OMR0A-26 Reflex
Aug 10, 06	KJ	0	✓	✓	25	
Aug 11, 06	KBL	0	✓	✓	25	
Aug 12, 06	KBL	0	✓	✓	25	
Aug 13, 06	MT	0	✓	✓	25	

*SS = Salmon Starter FF = Flake Food BS = Brine Shrimp BP = *Brachionus plicatilis*

MORTALITY AND BEHAVIORAL OBSERVATIONS							
Test Substance: REF-TOX				Study No.: DMRQA			
<input checked="" type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input type="checkbox"/> Screen							
Test Species: <u>Fathead minnow</u>				Date Initiated: <u>Aug 9, 06</u>			
Time Test Organism Addition Started: <u>2:20p</u>				Completed: <u>~3p</u>			
Prepared by: <u>KV</u>				Date: <u>Aug 9, 06</u>			
Test Concentration (%)	REP	Event: <u>24 hr</u>			Event: <u>48 hr</u>		
		# Alive	Cum. # D/I	Sublethal Obs. ^a	# Alive	Cum. # D/I	Sublethal Obs. ^a
Control	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
6.25	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
12.5	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
25	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
50	A	6	4	^{4D} 6N	3	7	^{3D} 3N
	B	3	7	^{7D} 3N	3	7	3N
100	A	0	10	10D	0	10	—
	B	0	10	10D	0	10	—
Observer		<u>KV</u>			<u>KV</u>		
Date		<u>Aug 10, 06</u>			<u>Aug 11, 06</u>		
Time		<u>2:25 pm</u>			<u>2:50 p</u>		
Note: Dead organisms removed and discarded after each observation period. Notes (initial & date all entries):							
^a See Form CDG 018/CDG 019 for Code Key.							

**KEY TO MORPHOLOGICAL AND BEHAVIORAL OBSERVATIONS FOR
VERTEBRATE TOXICITY TESTS**

Test Substance: REF-TOX

Study No.: DMRQA

Dead (D) - Animals exhibiting no gill movement and no response to a physical stimulus (e.g., gentle prodding or stream of water from a pipet).

Discoloration (DC) - Animals exhibiting abnormal color patterns when compared to the control(s). This may include complete or partial light or dark discoloration.

Edema (ED) - Animals that appear to be retaining water and have a bloated appearance.

Erratic Swimming Pattern (E) - Animals moving in a rapid disorderly fashion.

Exophthalmia (EX) - Abnormal protrusion of the eyeball.

Floating on Surface (FL) - Animals floating on the surface of the test solution.

Fungus (FU) - Egg and/or animal exhibiting fungal infection.

Hemorrhagic (H) - Animals that are bleeding internally and/or subcutaneously.

Hypersensitivity (HP) - Animals that appear to be hypersensitive to physical stimuli.

Irregular Respiration (I) - Animals that exhibit rapid, slow, or irregular opercular movement.

Jaw Deformity (J) - Abnormal morphological development of the mouth and/or jaw usually observed in rainbow trout.

Loss of Equilibrium (LE) - Animals that have lost the ability to maintain normal orientation in the water column (e.g., nose up, nose down, listing to one side, etc.).

Normal (N) - Animals not exhibiting behavioral or morphological abnormalities. In tests where positive counts are not performed on a daily basis, an N indicates that **all remaining** animals in a test chamber are not exhibiting behavioral or morphological abnormalities.

Not Found (NF) - It is possible that an animal may die and never be observed as dead, get trapped on a drain screen or the side of the test chamber and not found, or simply not observed. Animals not found will be considered as dead unless later observed at a subsequent observation.

On Bottom (B) - Animals laying on the bottom of the test chamber.

Spinal Curvature (C) - An animal exhibiting lateral or dorsal curvature of the spine.

Surfacing (S) - Animals observed breaking the surface of the test solution. This condition can be associated with low dissolved oxygen concentrations or is the result of exposure to a test substance which interferes with oxygen uptake across the gills.

Swim-Up (U) - Animals swimming up into the water column from the bottom of the test chamber. Normal behavior exhibited by salmonids as they deplete their yolk-sac and begin to accept an external diet.

TEST ORGANISM MEASUREMENTS			
Test Substance: REF-TOX		Study No.: DMRQA	
Group Measured: <u>Control A</u>			
Balance Used: <u>0-3</u>			
Measured by: <u>As</u>		Date: <u>Aug 11, 20</u>	
Number	Standard Length (mm)	Total Length (mm)	Blotted Wet Weight (g)
1			0.005
2			10 fish = 0.033g
3			
4			
5			
6			
7			
8			
9			
10			
Mean (±SD) Date/ID			
Biomass loading calculation			
Date/ID: _____			
Dynamic : $\frac{[\text{Mean Weight (g)}][\text{No. Organisms/Test Container}]}{\text{Mean Flow Rate (L/day)}} = \text{---} \text{ g/L/day}$			
Instantaneous : $\frac{[\text{Mean Weight (g)}][\text{No. Organisms/Test Container}]}{\text{Test Solution Volume (L)}} = \text{---} \text{ g/L}$			
Organisms euthanized using: <u>MS-222 Western Chemical lot D10307</u>			
and appropriately discarded.			
Reviewed by: _____		NA	Date: <u>NA</u>

TEST SOLUTION OBSERVATIONS						
Test Substance: REF-TOX			Study No.: DMRQA			
<input checked="" type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input type="checkbox"/> Screen						
Test Concentration (%)	REP	Observations ^a				
		Initiation:	Event: Day 1	Event: Day 2	Event:	Event:
Control	A-B	N	N	N		
6.25	A-B	N	N	N		
12.5	A-B	N	N	N		
25	A-B	N	N	N		
50	A-B	N	N	N		
100	A-B	N	N	N		
Observer		h	h	h		
Date		Aug 9, 06	Aug 10, 06	Aug 11, 06		
Time		3:20p	2pm	2p		
Notes:						

^a see Form CDG 020 for code key

ABC LABORATORIES, INC.
 SAS PROGRAM LC_EC50 (VER 2.3) RUN ON 11AUG06
 STUDY NUMBER: DMRQA-26 WITH TEST MATERIAL: UNKNOWN TOXICANT
 Fathead Acute Study USING DATA FILE: U:\WARBRITTONR\STATS\DMRQA26F.prn

PRINTOUT OF RAW DATA
 BY EXPOSURE PERIOD

----- EXP_PERD=24-Hour -----

TREATMENT GROUP	CONCENTRATION	NUMBER EXPOSED	NUMBER RESPONDING
Control	0.00	10	0
Control	0.00	10	0
6.25	6.25	10	0
6.25	6.25	10	0
12.5	12.50	10	0
12.5	12.50	10	0
25	25.00	10	0
25	25.00	10	0
50	50.00	10	4
50	50.00	10	7
100	100.00	10	10
100	100.00	10	10

----- EXP_PERD=48-Hour -----

TREATMENT GROUP	CONCENTRATION	NUMBER EXPOSED	NUMBER RESPONDING
Control	0.00	10	0
Control	0.00	10	0
6.25	6.25	10	0
6.25	6.25	10	0
12.5	12.50	10	0
12.5	12.50	10	0
25	25.00	10	0
25	25.00	10	0
50	50.00	10	7
50	50.00	10	7
100	100.00	10	10
100	100.00	10	10

ABC LABORATORIES, INC.
SAS PROGRAM LC_EC50 (VER 2.3) RUN ON 11AUG06
STUDY NUMBER: DMRQA-26 WITH TEST MATERIAL: UNKNOWN TOXICANT
Fathead Acute Study USING DATA FILE:
U:\WARBRITTONR\STATS\DMRQA26F.prn

ANALYSIS FOR Fathead Minnows AT 24-Hour

NUMBER OF PROPORTIONS BETWEEN 0 AND 1 = 1
ESTIMATES BASED ON THE PROBIT MODEL CAN NOT BE CALCULATED.

ANALYSIS FOR Fathead Minnows AT 24-Hour

RESULTS CALCULATED USING THE SPEARMAN-KARBER METHOD

Conc. (Percent)	Number Exposed	Number Resp.	Observed Proportion Responding	Smoothed/Adj. Proportion Responding
0.0000	20	0	0.0000	0.0000
6.2500	20	0	0.0000	0.0000
12.5000	20	0	0.0000	0.0000
25.0000	20	0	0.0000	0.0000
50.0000	20	11	0.5500	0.5500
100.0000	20	20	1.0000	1.0000

UNTRIMMED SPEARMAN-KARBER ESTIMATES:

LC50: 48.297 Percent
95% LOWER CONFIDENCE LIMIT: 41.395 Percent
95% UPPER CONFIDENCE LIMIT: 56.350 Percent

THE AUTOMATIC TRIM IS EQUAL TO ZERO.
UNTRIMMED AND TRIMMED SPEARMAN-KARBER ESTIMATES ARE THE SAME.

ABC LABORATORIES, INC.
SAS PROGRAM LC_EC50 (VER 2.3) RUN ON 11AUG06
STUDY NUMBER: DMRQA-26 WITH TEST MATERIAL: UNKNOWN TOXICANT
Fathead Acute Study USING DATA FILE: U:\WARBRITTONR\STATS\DMRQA26F.prn

ANALYSIS FOR Fathead Minnows AT 48-Hour

NUMBER OF PROPORTIONS BETWEEN 0 AND 1 = 1

ESTIMATES BASED ON THE PROBIT MODEL CAN NOT BE CALCULATED.

ANALYSIS FOR Fathead Minnows AT 48-Hour

RESULTS CALCULATED USING THE SPEARMAN-KARBER METHOD

Conc. (Percent)	Number Exposed	Number Resp.	Observed Proportion Responding	Smoothed/Adj. Proportion Responding
0.0000	20	0	0.0000	0.0000
6.2500	20	0	0.0000	0.0000
12.5000	20	0	0.0000	0.0000
25.0000	20	0	0.0000	0.0000
50.0000	20	14	0.7000	0.7000
100.0000	20	20	1.0000	1.0000

UNTRIMMED SPEARMAN-KARBER ESTIMATES:

LC50: 43.528 Percent
95% LOWER CONFIDENCE LIMIT: 37.763 Percent
95% UPPER CONFIDENCE LIMIT: 50.171 Percent

THE AUTOMATIC TRIM IS EQUAL TO ZERO.

UNTRIMMED AND TRIMMED SPEARMAN-KARBER ESTIMATES ARE THE SAME.

THIS COMPLETE ANALYSIS WAS CONDUCTED

BY: Ryan Warbritton ON: 11AUG06

THE ANALYSIS WAS REVIEWED

BY: dm ON: 18 Sep, 06

Ameren Services
Environmental, Safety & Health
314.554.3170 (Phone)
314.554.4182 (Facsimile)
jputz@ameren.com

One Ameren Plaza
1901 Chouteau Avenue
PO Box 66149
St. Louis, MO 63166-6149
314.621.3222

October 23, 2007

CERTIFIED MAIL: 7004 2890 0003 6116 7071

bcc:

D. Schultz (CA-460)
SCW/JCP/FLP
File: WQ 3.1.2.4

Dept of Natural Resources
Northeast Regional Office
1709 Prospect Dr.
Macon, MO 63552-2602



Re: AmerenUE Callaway Power Plant
NPDES Permit No: MO-0098001
2007 Whole Effluent Toxicity (WET) Test Report

Dear Sir or Madam:

Per Special Condition No. 9 of the Union Electric Company, d/b/a Ameren UE, Callaway Power Plant, NPDES Permit MO-0098001, please find enclosed the 2007 Whole Effluent Toxicity (WET) Test.

The test passes since no mortality was observed with any of the test organisms in the effluent samples.

Please call me at 314-554-3170 if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Frank Putz".

Frank L. Putz, Biologist
Environmental
Ameren Services As Affiliated Agent for Union Electric Company d/b/a AmerenUE

Attachment

SPONSOR

Ameren UE, Callaway Power Plant
P.O. Box 620
Fulton, Missouri 65251

STUDY TITLE

Acute Toxicity of Ameren UE Composite Sample
To *Ceriodaphnia dubia* and Fathead Minnows (*Pimephales promelas*)

NPDES PERMIT NO.

MO-0098001

AUTHOR

Ryan Warbritton

REPORT COMPLETED ON

September 19, 2007

PERFORMING LABORATORY

ABC Laboratories, Inc.
Chemical Services
7200 E. ABC Lane
Columbia, Missouri 65202

PROJECT ID

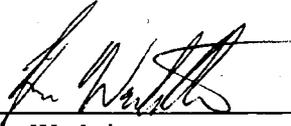
Final Report No. 63115

SIGNATURE PAGE

Submitted by:

ABC Laboratories, Inc.
7200 E. ABC Lane
Columbia, Missouri 65202

Prepared by:



Ryan Warbritton
Toxicologist/Study Director
ABC Laboratories, Inc.

Sept 19, 07
Date

Approved by:



Jon E. Rhodes, M.S.
Director, ABC Chemical Services
ABC Laboratories, Inc.

19 Sep 07
Date

ACUTE TOXICITY COMPENDIUM

Subject: Acute Toxicity of Ameren UE Composite Sample To *Ceriodaphnia dubia* and Fathead Minnows (*Pimephales promelas*)

Sponsor: Ameren UE, Callaway Power Plant
Junction Hwy CC & Route O
P.O. Box 620
Fulton, Missouri 65251

Effluent: Composite Sample

Concentrations: Synthetic water control, raw water control (Receiving water), 10%, and 100% Composite Sample (Effluent)

Dilution Water: Raw water (Receiving water)

Test Dates: Initiated September 13, 2007 Terminated September 15, 2007

Length of Test: 48 Hours

Test Organisms: *Ceriodaphnia dubia* and Fathead Minnows

Organism Source: In-house cultures

Age at Initiation: *Ceriodaphnia dubia*: <24-hour old neonates
Fathead Minnows: 8 days post hatch

Test Procedures and Conditions:

I. *Ceriodaphnia dubia*

Duration:	48 hours
Temperature:	25±1°C
Lighting:	Ambient Laboratory lighting, 16:8-hour light:dark
Observations:	24 and 48 hours
Test chambers:	30 mL
Volume per chamber:	25 mL
Replicates per treatment:	4
Organisms per chamber:	5
Organisms per treatment:	20
Control water:	ABC Synthetic water
Dilution water:	Raw water (Receiving water)
Effluents:	10% and 100% Ameren UE Composite Sample

II. Fathead Minnow

Duration:	48 hours
Temperature:	25±1°C
Lighting:	Ambient Laboratory lighting, 16-8 hr. light-dark
Observations:	24 and 48 hours
Test chambers:	1,00-mL glass jars
Volume per chamber:	400 mL
Replicates per treatment:	4
Organisms per chamber:	10
Organisms per treatment:	40
Control water:	ABC Synthetic water
Dilution water:	Raw water (Receiving water)
Effluents:	10% and 100% Ameren UE Composite Sample

III. Methods

The methodology used for this effluent test was that described by the U.S. EPA and Ameren UE NPDES Permit referenced below:

Weber, C.I. 2002. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 5th ed. U.S. Environmental Protection Agency, EPA/821/R-02/012.

The Ameren UE NPDES permit Number: MO-0098001

Results:

I. Mortality

PERCENT MORTALITY		
Sample ID	<i>Ceriodaphnia dubia</i>	<i>Pimephales promelas</i>
ABC Synthetic Water Control	0	0
Raw Water (Receiving Water Control)	0	0
10% Outfall Composite	0	0
100% Outfall Composite	0	0

II. Receipt Water Quality

WATER QUALITY ON RECEIPT								
Sample ID	Temp (°C)	DO (mg/L)	pH	Conductivity (µS/cm)	Hardness (mg/L)	Alkalinity (mg/L)	Total Ammonia (mg/L)	Total Chlorine (mg/L)
RAW Water	11.1	10.19	8.24	657	242	180	0.4	0
Composite Sample	10.8	9.98	8.51	2,590	992	236	1.8	0

III. Ceriodaphnia dubia water quality Ranges

Treatment	Temperature (°C)	Dissolved Oxygen (mg/L) ^a	pH	Conductivity (µS)
ABC Control	24.4 – 24.5	8.1	8.2	311 – 347
Receiving Water	24.4 – 24.6	7.9 – 8.2	8.2 – 8.6	659 – 708
10% Effluent	24.4 – 24.6	7.9 – 8.1	8.2 – 8.6	882 – 954
100% Effluent	24.5 – 24.6	7.9 – 8.2	8.4 – 8.5	2,580 – 2,760

^a 100% oxygen saturation at 24 and 25°C is 8.1 and 7.9 mg/L respectively

IV. Fathead minnow water quality Ranges

Treatment	Temperature (°C)	Dissolved Oxygen (mg/L) ^a	pH	Conductivity (µS)
ABC Control	24.6 – 24.8	7.4 – 8.1	8.0 – 8.2	311 – 400
Receiving Water	24.4 – 24.8	7.3 – 8.2	8.2 – 8.5	659 – 758
10% Effluent	24.4 – 24.8	7.2 – 8.1	8.2 – 8.5	880 – 989
100% Effluent	24.6 – 24.9	7.2 – 8.1	8.4 – 8.5	2,580 – 2,800

^a 100% oxygen saturation at 24 and 25°C is 8.1 and 7.9 mg/L respectively

Discussion:

There was no mortality or sublethal effects in the controls or effluent concentrations during both the *Ceriodaphnia dubia* and the fathead minnow studies. Since there was no mortality statistical analysis was not necessary. The effluent passes the requirements for an acceptable study for both the *Ceriodaphnia dubia* and the fathead minnow tests by meeting the criterion for survival at the Acceptable Effluent Concentration (AEC).

RAW DATA PACKAGE FOR

Acute Toxicity of Ameren UE Composite Sample
To *Ceriodaphnia dubia* and Fathead Minnows (*Pimephales promelas*)

AUTHOR

Ryan Warbritton

SPONSOR

Ameren UE, Callaway Power Plant
Junction Hwy CC & Route O
P.O. Box 620
Fulton, Missouri 65251

PERFORMING LABORATORY

ABC Laboratories, Inc.
7200 E. ABC Lane
Columbia, Missouri 65202

PROJECT IDENTIFICATION

ABC Study No.: 63115

RAW DATA APPENDICES

- I. EFFLUENT RECEIPT AND COMMON DATA
- II. EFFLUENT DAPHNID EXPOSURE
- III. EFFLUENT FATHEAD MINNOW EXPOSURE
- IV. DMRQA 27 COMMON DATA
- V. DMRQA 27 DAPHNID EXPOSURE
- VI. DMRQA 27 FATHEAD MINNOW EXPOSURE

I. EFFLUENT RECEIPT AND COMMON DATA

TABLE 12. SUMMARY OF TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA FOR *CERIODAPHNIA DUBLIA* ACUTE TOXICITY TESTS WITH EFFLUENTS AND RECEIVING WATERS (TEST METHOD 2002.0)¹

1. Test type:	Static non-renewal, static-renewal, or flow-through (available options)
2. Test duration:	24, 48, or 96 h (available options)
3. Temperature: ²	20°C ±1°C; or 25°C ±1°C (recommended) Test temperatures must not deviate (i.e., maximum minus minimum temperature) by more than 3°C during the test (required)
4. Light quality:	Ambient laboratory illumination (recommended)
5. Light intensity:	10-20 μE/m ² /s (50-100 ft-c) (recommended) (ambient laboratory levels)
6. Photoperiod:	16 h light, 8 h darkness (recommended)
7. Test chamber size:	30 mL (recommended minimum)
8. Test solution volume:	15 mL (recommended minimum)
9. Renewal of test solutions:	After 48 h (required minimum)
10. Age of test organisms:	Less than 24-h old (required)
11. No. organisms per test chamber:	5 for effluent and receiving water tests (required minimum)
12. No. replicate chambers per concentration:	4 for effluent and receiving water tests (required minimum)
13. No. organisms per concentration:	20 for effluent and receiving water tests (required minimum)
14. Feeding regime:	Feed YCT and <i>Selenastrum</i> while holding prior to the test; newly-released young should have food available a minimum of 2 h prior to use in a test; add 0.1 mL each of YCT and <i>Selenastrum</i> 2 h prior to test solution renewal at 48 h (recommended)
15. Test chamber cleaning:	Cleaning not required
16. Test chamber aeration:	None (recommended)

¹ For the purposes of reviewing WET test data submitted under NPDES permits, each test condition listed above is identified as required or recommended (see Subsection 12.2 for more information on test review). Additional requirements may be provided in individual permits, such as specifying a given test condition where several options are given in the method.

² Acute and chronic toxicity tests performed simultaneously to obtain acute/chronic ratios must use the same temperature and dilution water.

TABLE 12. SUMMARY OF TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA FOR *CERIODAPHNIA DUBIA* ACUTE TOXICITY TESTS WITH EFFLUENTS AND RECEIVING WATERS (TEST METHOD 2002.0) (CONTINUED)

17. Dilution water:	Moderately hard synthetic water prepared using MILLIPORE MILLI-Q® or equivalent deionized water and reagent grade chemicals or 20% DMW (see Section 7, Dilution Water), receiving water, ground water, or synthetic water, modified to reflect receiving water hardness (available options)
18. Test concentrations:	Effluents: 5 and a control (required minimum) Receiving Waters: 100% receiving water and a control (recommended)
19. Dilution series:	Effluents: ≥0.5 dilution series (recommended) Receiving Waters: None, or ≥0.5 dilution series (recommended)
20. Endpoint:	Effluents: Mortality (required) Receiving Waters: Mortality (required)
21. Sampling and sample holding requirements:	Effluents: Grab or composite sample first used within 36 h of completion of the sampling period (required) Receiving Waters: Grab or composite sample first used within 36 h of completion of the sampling period (recommended)
22. Sample volume required:	1 L (recommended)
23. Test acceptability criterion:	90% or greater survival in controls (required)

TABLE 14. SUMMARY OF TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA FOR FATHEAD MINNOW, *PIMEPHALES PROMELAS*, ACUTE TOXICITY TESTS WITH EFFLUENTS AND RECEIVING WATERS (TEST METHOD 2000.0)^{1,2}

1. Test type:	Static non-renewal, static-renewal, or flow-through (available options)
2. Test duration:	24, 48, or 96 h (available options)
3. Temperature: ³	20°C ±1°C; or 25°C ±1°C (recommended) Test temperatures must not deviate (i.e., maximum minus minimum temperature) by more than 3°C during the test (required)
4. Light quality:	Ambient laboratory illumination (recommended)
5. Light intensity:	10-20 µE/m ² /s (50-100 ft-c) (ambient laboratory levels) (recommended)
6. Photoperiod:	16 h light, 8 h darkness (recommended)
7. Test chamber size:	250 mL (recommended minimum)
8. Test solution volume:	200 mL (recommended minimum)
9. Renewal of test solutions:	After 48 h (required minimum)
10. Age of test organisms:	1-14 days; less than or equal to 24-h range in age (required)
11. No. organisms per test chamber:	10 for effluent and receiving water tests (required minimum)
12. No. replicate chambers per concentration:	2 for effluent tests (required minimum) 4 for receiving water tests (required minimum)
13. No. organisms per concentration:	20 for effluent tests (required minimum) 40 for receiving water tests (required minimum)
14. Feeding regime:	<i>Artemia</i> nauplii are made available while holding prior to the test; add 0.2 mL <i>Artemia</i> nauplii concentrate 2 h prior to test solution renewal at 48 h (recommended)
15. Test chamber cleaning:	Cleaning not required
16. Test solution aeration:	None, unless DO concentration falls below 4.0 mg/L; rate should not exceed 100 bubbles/min (recommended)

¹ *Cyprinella leedsii* (Bannerfish shiner, formerly *Notropis leedsii*; AFS, 1991) can be used with the test conditions in this table, where it is the required test organism in NPDES permits.

² For the purposes of reviewing WET test data submitted under NPDES permits, each test condition listed above is identified as required or recommended (see Subsection 12.2 for more information on test review). Additional requirements may be provided in individual permits, such as specifying a given test condition where several options are given in the method.

³ Acute and chronic toxicity tests performed simultaneously to obtain acute/chronic ratios must use the same temperature and dilution water.

TABLE 14. SUMMARY OF TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA FOR FATHEAD MINNOW, *PIMEPHALES PROMELAS*, ACUTE TOXICITY TESTS WITH EFFLUENTS AND RECEIVING WATERS¹ (TEST METHOD 2000.0) (CONTINUED)

17. Dilution water:	Moderately hard synthetic water prepared using MILLIPORE MILLI-Q® or equivalent deionized water and reagent grade chemicals or 20% DMW (see Section 7, Dilution Water), receiving water, ground water, or synthetic water, modified to reflect receiving water hardness. (available options)
18. Test concentrations:	Effluents: 5 and a control (required minimum) Receiving Waters: 100% receiving water and a control (recommended)
19. Dilution series:	Effluents: ≥0.5 dilution series (recommended) Receiving Waters: None, or ≥ 0.5 dilution series (recommended)
20. Endpoint:	Effluents: Mortality (required) Receiving Waters: Mortality (required)
21. Sampling and sample holding requirements:	Effluents: Grab or composite sample first used within 36 h of completion of the sampling period (required) Receiving Waters: Grab or composite sample first used within 36 h of completion of the sampling period (recommended)
22. Sample volume required:	2 L for effluents and receiving waters (recommended)
23. Test acceptability criterion:	90% or greater survival in controls (required)

SUMMARY OF TEST METHODOLOGY FOR WHOLE-EFFLUENT TOXICITY TESTS

Whole-effluent-toxicity test required in NPDES permits shall use the following test conditions when performing single or multiple dilution methods. Any future changes in methodology will be supplied to the permittee by the Missouri Department of Natural Resources (MDNR). Unless more stringent methods are specified by the DNR, the procedures shall be consistent with the most current edition of Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.

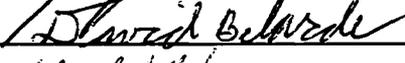
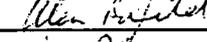
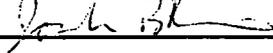
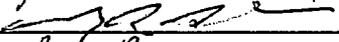
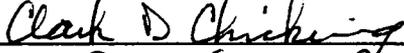
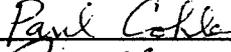
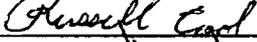
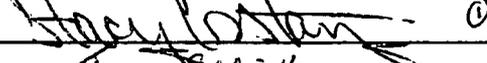
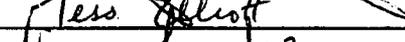
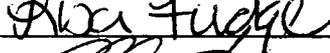
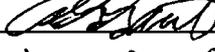
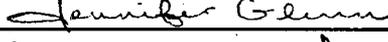
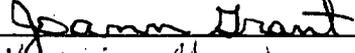
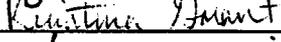
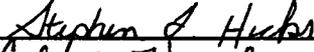
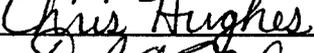
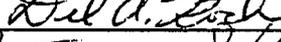
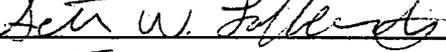
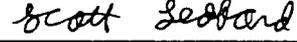
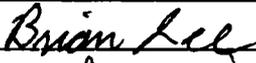
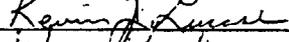
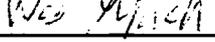
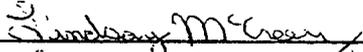
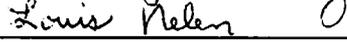
Test conditions for Ceriodaphnia dubia:

Test duration:	48 h
Temperature:	25 ± 1°C Temperatures shall not deviate by more than 3°C during the test.
Light Quality:	Ambient laboratory illumination
Photoperiod:	16 h light, 8 h dark
Size of test vessel:	30 mL (minimum)
Volume of test solution:	15 mL (minimum)
Age of test organisms:	<24 h old
No. of animals/test vessel:	5
No. of replicates/concentration:	4
No. of organisms/concentration:	20 (minimum)
Feeding regime:	None (feed prior to test)
Aeration:	None
Dilution water:	Upstream receiving water; if no upstream flow, synthetic water modified to reflect effluent hardness.
Endpoint:	Pass/Fail (Statistically significant Mortality when compared to upstream receiving water control or synthetic control if upstream water was not available at $p \leq 0.05$)
Test acceptability criterion:	90% or greater survival in controls

Test conditions for (Pimephales promelas):

Test duration:	48 h
Temperature:	25 ± 1°C Temperatures shall not deviate by more than 3°C during the test.
Light Quality:	Ambient laboratory illumination
Photoperiod:	16 h light/ 8 h dark
Size of test vessel:	250 mL (minimum)
Volume of test solution:	200 mL (minimum)
Age of test organisms:	1-14 days (all same age)
No. of animals/test vessel:	10
No. of replicates/concentration:	4 (minimum) single dilution method 2 (minimum) multiple dilution method
No. of organisms/concentration:	40 (minimum) single dilution method 20 (minimum) multiple dilution method
Feeding regime:	None (feed prior to test)
Aeration:	None, unless DO concentration falls below 4.0 mg/L; rate should not exceed 100 bubbles/min.
Dilution water:	Upstream receiving water; if no upstream flow, synthetic water modified to reflect effluent hardness.
Endpoint:	Pass/Fail (Statistically significant Mortality when compared to upstream receiving water control or synthetic control if upstream water was not available at $p \leq 0.05$)
Test Acceptability criterion:	90% or greater survival in controls

This list includes all personnel of the Chemical Services Group and is not study-specific.
Primary project personnel will be identified separately for each project.

Name	Signature	Initials	Date
John Aufderheide		JAA	15 Jan 07
David Belarde		DB	1/15/07
Alan Bergfield		WAF	15 Jan 07
Jordan Blinne		JB	16 Jan 2007
Max Brinkman		MAB	16 Jan 07
Sara Bunker		SB	15 Jan 07
Kris Burkey		KB	18 Jan 07
Clark Chickering		CC	15 Jan 07
Paul Cohle		PC	15 Jan 07
Russell Cool		RC	16 Jan 07
Stacy Costanza		SC	16 Jan 07
Tess Elliott		TE	15 Jan 07
Lisa Fudge		LF	16 Jan 07
A.G. Gant		AGG	16 Jan 07
Jennifer Glenn		JG	16 JAN 07
Joann Grant		JG	1-15-07
Kristina Grant		KRG	16 Jan 07
Steve Hicks		SH	15 JAN 07
Chris Hughes		CH	15 Jan. 07
Del A. Koch		DAK	17 Jan 2007
Seth Lafferty		SWL	15 Jan 07
A. Tom Leak		ATL	JAN 15, 07
Scott Ledford		SL	1-15-07
K. Brian Lee		KBL	15 Jan 07
Carolyn Lucas		CAL	16 Jan 07
Kevin Lucash		KL	15 Jan - 07
Wesley March		WM	15 Jan - 07
Lindsay McCreery		LM	18 Jan - 07
Louis Nelen		LMN	23 Jan 07

① Recent name change see page 3 29 July 07 SS

This list includes all personnel of the Chemical Services Group and is not study-specific.
Primary project personnel will be identified separately for each project.

Name	Signature	Initials	Date
Gerald Nothdurft	<i>Gerald A. Nothdurft</i>	GAN	Jan 16, 2007
Martha Pezold	<i>Martha Pezold</i>	MAP	16 Jan 07
Susan Powell	<i>Susan Powell</i>	SRP	16 Jan 07
Darrick Pritchett	<i>Darrick Pritchett</i>	DP	16 Jan 07
Xiaoyan "Jane" Qin	<i>Xiaoyan Qin</i>	XYQ	16 Jan 07
Michael Raub	<i>Michael Raub</i>	MR	23 Jan 07
Jon E. Rhodes	<i>Jon E. Rhodes</i>	JR	23 Jan 07
C. Fred Rice	<i>C. Fred Rice</i>	FR	16 Jan 07
Carol Rodgers	<i>Carol A. Rodgers</i>	CR	16 Jan 07
Philip Sarff	<i>Philip Sarff</i>	PS	16 Jan 07
Richard Schierhoff	<i>Richard Schierhoff</i>	RS	16 Jan 07
Nancy Schwartz	<i>Nancy L. Schwartz</i>	NLS	17 Jan 07
Kelda Serak	<i>Kelda Serak</i>	KRS	18 Jan 07
Stan Shaffer	<i>Stan Shaffer</i>	SS	16 Jan 07
Emily Shepard	<i>Emily Shepard</i>	ESS	15 Jan 07
Candice Sutton	<i>Candice Sutton</i>	CS	15 Jan 07
Chris Talken	<i>Chris Talken</i>	CT	1/15/2007
Elen Tesfai	<i>Elen Tesfai</i>	ETB	16 Jan 07
Ruth Tesfai	<i>Ruth Tesfai</i>	R.T	16 JAN 07
Andrew Thiel	<i>Andrew Thiel</i>	AT	16 Jan 07
Amanda Tunink	<i>Amanda Tunink</i>	ALT	15 Jan 07
Mark Tunink	<i>Mark Tunink</i>	MT	18 Jan 07
John Walkup	<i>John Walkup</i>	JW	16 Jan 07
Ryan Warbritton	<i>Ryan Warbritton</i>	RW	Jan 17, 07
Warren Ward	<i>Warren E. Ward</i>	WEW	1-16-07
Winfried Wedekind	<i>Winfried Wedekind</i>	WW	1-15-07
Christina Wilson	<i>Christina Wilson</i>	CW	16 JAN 07
Elana Wilson	<i>Elana Wilson</i>	EW	16 Jan 07
Richard Wilson	<i>Richard Wilson</i>	RW	15 Jan 07

DATA CORRECTION CODES AND FACILITY RECORDS

Data Correction Codes

The following correction codes may have been used to correct errors in the raw data:

- | | |
|-----------------------|-------------------------|
| A - Addition | I - Illegible |
| C - Calculation error | R - Recording error |
| D - Dating error | S - Spelling error |
| F - Form change | T - Transcription error |
| G - Grammatical error | W - Write over |

Other - _____ Date: _____ Initials: _____

Other - _____ Date: _____ Initials: _____

Facility Record Statement

Some of the records that appear in the raw data may have been provided as photocopies of the original records maintained on file at ABC Laboratories as facility records. This was done by necessity for data that are common to several studies.

EQUIPMENT IDENTIFICATION LIST

Balances

B-1: Sartorius R300S #1621-43 (940)
 B-2: Mettler PM460-#1905-1020 (956)
 B-3: Mettler PM200 #1905-320 (934)
 B-4: Mettler BP3260 #163-1120 (934)
 B-5: Mettler AG245 #1630-981346 (934)
 B-6: Mettler PM480 #1626-141 (940)
 B-7: Mettler PM200 #1714-280 (940)
 B-8: Mettler AJ100 #1626-4030 (940)
(Retired)
 B-9: Mettler PM480 #1626-107 (940)
 B-10: Mettler PM480 #1626-94 (940)
 B-11: Mettler AT261 #1626-2040 (928)
 B-12: Mettler PM480 #1624-28C (GH)
 B-13: Mettler PM400 #1630-200101 (GH)
(Retired)
 B-15: Mettler PM11-K #1622-172 (719)
 B-16: Sartorius 1702MPB #1714-145A (722)
 B-17: Mettler BB2440 #1716-295 (721)
 B-18: Mettler BB2440 #1625-540 (721)
 B-19: Mettler PM-400 #1227-3570 (721)
 B-20: Mettler PM-400 #1625-530 (721)
 B-21: Fisher XD-8K #163-320 (919)
 B-22: Mettler PM 400 #4570-23 (GH)
 B-23: Mettler UMX5 (SN 1125141099)

Centrifuges

CE-1: IEC Clinical #1905-290
 CE-2: IEC CR 6000 #163-309
 CE-3: IEC Clinical #1713-430
 CE-4: IEC-2K #1715-765
 CE-5: IEC Centra-HN #1626-191
 CE-6: IEC Centra-HN #1626-190
 CE-7: IEC B-22 #1626-580
 CE-8: Beckman Model J2-21 #1704-200

Waterbath

W-1: Fisher Model 9510 #1626-4055
 W-2: Fisher Model 9110 #1626-360A
 W-3: Fisher Model 9101 #1626-4040
 W-4: Neslab RTE 100 #1626-990048
 W-5: Fisher #1626-133
 W-6: Labline Imperial III
 W-7: VWR Scientific Model 1203
 W-8: Fisher #516717

Sonicators

S-1: Branson 5200 #1905-465
 S-3: Fisher FS110 #129-3020
 S-4: Baxter S/P Brand #163-343
 S-5: Baxter Brand C6450-11 #163-347A
 S-6: Baxter #163-347B
 S-7: Fisher Model FS110H #RVB0600607088
 S-8: Branson Model 5200 #B520U R-4

Environmental Chamber

EC-2: BioCold #163-313
 EC-3: Norlake Scientific #1626-1070
 EC-4: Norlake Scientific #175-277

pH Meters

pH-1: Beckman Φ 34 #163-640 *(Retired)*
 pH-2: Accumet Model 25 #1630-96-1282
 pH-4: Accumet Model 50 #1626-95-4590 *(Retired)*
 pH-5: Denver Instruments #1630-000000 *(Retired)*
 pH-6: Denver Instruments #1630-010050
 pH-7: Corning 240 #1625-115
 pH-8: Accumet Model AR50 #AR93314000
 pH-9: WTW Model pH 330i #03300091
 pH-10: WTW Model pH 330i #03310029

Incubators

INC-1: Percival Scientific #163-1122
 INC-2: Lab-Line 3597-3 #1900-000 *(Retired)*
 INC-3: Bevco #163-370 *(Retired)*
 INC-4: True Manufacturing #055-1030
 INC-5: Percival Scientific #163-1123
 INC-6: Fisher Isotemp Model 5160 #1626-820
 INC-7: Percival Scientific Model I-36NL
 #1626-974738
 INC-8: VWR 1910 #1713-915
 INC-9: VWR 1910 #1713-860
 INC-10: True Manufacturing #054-1030
 INC-11: Percival Scientific Model I-37LLVLX
 #1626-96-4656
 INC-12: Percival Scientific Model I-37LLVLX
 #1626-4488
 INC-13: Manitowoc AV3A #163-910A
 INC-14: Fisher Scientific 146E #1630-0100006
 INC-15: Fisher Scientific 146E #1630-0100008

Product Chemistry

PC-2: Koehler Model K-16200 Flashpoint Apparatus
 #1626-4190
 PC-3: Brookfield Model DV-I+ Viscometer
 #1626-4492
 PC-4: Mettler FP-90 Central Processor #1626-410
 Mettler FP81HT MBC Cell #1626-411
 PC-5: AccuPyc 1330 Gas Pycnometer #1626-4135A
 PC-6: Fisher Scientific Surface Tensiomat Model 21
 #1626-95-4560
 PC-7: Mel-Temp II Melting Point Apparatus
 #1626-974748
 PC-8: Princo Mercury Barometer #046-3020
 PC-9: Fisher U-tube Manometer #084-3020
 PC-10: Brookfield R/S Rheometer #1630-010024A
 Brookfield PTR Thermoregulator
 #1630-010024B
 PC-11: Mel-Temp II Apparatus Model 1001D
 #1187040915168

EQUIPMENT IDENTIFICATION LIST

Pipets

PI-1: Oxford Macroset 5-10 mL (D) *(Retired)*
 PI-2: Gilson 100-1000 µL (E 8415486)
 PI-3: Eppendorf 100-1000 µL (09450P)
 PI-4: Gilson 10-100 µL (H84 11398)
 PI-5: Gilson 1-10 mL (N05409D)
 PI-7: Gilson P1000 (H137514)
 PI-8: Oxford Benchmate 100-1000 µL (498753)
 PI-10: Oxford Benchmate 100-1000 µL (498701)
 PI-12: Rainin EDP Plus (D41111)
 PI-14: Gilson P200 (L8415256)
 PI-15: Rainin EDP Plus (D40453)
 PI-20: Rainin EDP Plus (E42105)
 PI-22: Gilson 100-1000 µL (S682810)
 PI-23: Gilson 10-100 µL (S691520)
 PI-24: Gilson 1-10 mL (S559756)
 PI-25: Gilson 1000 µL (447507)
 PI-26: Eppendorf 10-100 µL (2147081)
 PI-27: Finnpiquette 0.5-10 µL (G03479)
 PI-28: Eppendorf 500 µL
 PI-29: Eppendorf 50 µL
 PI-30: Eppendorf 100 µL (43977-N) *(Retired)*
 PI-31: Eppendorf 1000 µL (51984-N) *(Retired)*
 PI-32: Eppendorf Pipetman 100-1000 µL (J215300)
 PI-33: Eppendorf Pipetman 100-1000 µL (J215191)
 PI-34: Oxford Sampler 1 mL
 PI-35: Wheaton 20-200 µL *(Retired)*
 PI-36: Wheaton 50-200 µL *(Retired)*
 PI-52: Finnpiquette II, 100-1000µL (GXP:1786)

Ovens/Furnaces

Oven-1: Fisher Isotemp 500 Series #1621-100
 Oven-2: Fisher Isotemp #163-96-1806
 Oven-3: Fisher Vacuum Oven 285 #1626-96-4644
 Oven-4: VWR 1310 Drying Oven #1628-970008
 Oven-5: Napco Model 430 #1704-900
 Oven-6: American Scientific Products DK 62 #3570-1045
 Oven-7: Scientific Products DK 63 #3570-1047
 Oven-8: Hotpack #1905-280
 Oven-9: Thermolyne B2700 Furnace #1628-970010
 Oven-10: Blue M Muffle Furnace #1704-400
 Oven-11: VWR 1390 FM #1628-980126
 Oven-12: VWR 1390 fm #1628-980052
 Oven-13: Fisher Isotemp 500 series Mat ID#031-3510
 Oven-14: Fisher Isotemp 500 series #1622-10
 Oven-15: Blue M Drying Oven #1709-500

Refrigerators/Freezers

A: Walk-In Freezer #1715-740
 B: Walk-In Freezer #1650-0046

Refrigerators/Freezers (cont.)

E: Walk-In Freezer #1650-140B
 F-1: Mr. Winter Freezer #166-13
 F-2: Masterbilt Freezer # 1630-99-0010
 I: Walk-In Refrigerator #1713-625
 R-1: Mr. Winter Refrigerator #166-12
 R-1A: True Refrigerator #1715-840
 R-2: Labline Refrigerator/Freezer 3551 #1715-100
 R-2A: Sample Prep Refrigerator #1625-635
 R-3: True Refrigerator GDM-40 #1626-4010
 R-3A: Sample Prep Refrigerator #1622-100
 R-4: Jordan Refrigerator #1716-480 *(Retired)*
 R-5: True Refrigerator #1905-625
 RF-1: Estate Refrigerator/Freezer TT18EKR00 #1626-350
 RF-2: Fisher Scientific Refrigerator/Freezer ET18NK #1630-010010
 U-1: Upright True Freezer #1715-845
 U-2: Upright Freezer #1905-895
 U-3: Upright Freezer #ABC 201520
 U-4: Upright Freezer #1805-810
 U-5: Freezer Model T-49F, Mat ID#06-0031, (SN 3930805)

Miscellaneous

DFM-1: Fisher Model 650 Digital Flowmeter #1626-2030
 DFM-2: Fisher Model 520 Digital Flowmeter (SN #291146)
 DFM-3: Agilent ADM 1000 Digital Flowmeter (SN #220737458)
 DFM-4: Agilent ADM 1000 Digital Flowmeter (#1630-030004)
 MM-1: Mitutoyo Digital Micrometer (SN #911083)
 MX-1: Thermolyne Speci-Mix #1715-727
 NE-1: Meyer N-EVAP 112 #192-4070
 PT-1: Kinematica AG Ploytron #1626-990050
 PT-2: Brinkman Polytron
 RT-1: Pierce Reacti-Therm Heating Module Model 18870/Evaporating unit 18780 (S/N 548911237883)
 RT-2: Pierce Reacti-Therm Heating Module Model 18800/Evaporating unit 18780 (S/N 5421)
 RT-3: Pierce Reacti-Therm Heating Module Model 18835/Evaporating unit 18785 #160-010040
 SM-1: Shearmill, Divtech #163-95-1162
 SP-1: Sonicator Probe #163-1065
 UV-1: Perkin Elmer Lambda 3B #1905-715 *(Retired)*
 V-1: Vortex-Genie #1715-730
 V-2: Vortex Genie 2, Fisher Scientific Model G-560 (S/N 2-189839)
 V-3: Vortex Labline Supermixer (No. 1290)
 VS-1: Virtis Virtishear #1625-750
 VS-2: Virtis Virtishear #1715-455

EQUIPMENT IDENTIFICATION LIST

Oxidizer

O-1: Harvey Oxidizer OX 500 #1626-88
(Retired)
O-2: Harvey Oxidizer OX 500 #1626-4035
O-3: Harvey Oxidizer OX-500 #D5-0037

Total Organic Carbon Analyzer

TOC-3: OI Analytical TOC 1020 #1630-000002
Autosampler #1630-000004 (Retired)

Scintillation Counter

FD: Beckman (LS 6000 IC) #1626-74A
FE: Beckman (LS 6000 IC) #1626-91A
FF: Beckman (LS 6000 IC) #1626-000006

Thin Layer Chromatography

TLC 1: Ambis Scanner 4000 CA4570-14 (Retired)
TLC 2: AIS Multispotter #1716-965
TLC 3: AIS Multispotter #1715-545

Environmental Fate

EF-1: Mettler Toledo HR73 Halogen Moisture
Analyzer #1630-010032
EF-2: Strathkelvin ASR System Oxygen Interface
928 #1630-010034A Stirplate #1630-
010034B
EF-3: Columbus Instruments Respirometer System
Pump #1630-010036A
Carbon Dioxide Sensor #1630-010036B
Oxygen Sensor #1635-020004
Expansion Unit #1630-010036C Condenser
Power Supply #1630-010036D Condenser
#1630-010036E
EF-4: Bioscience COD Reactor
Model 163-446 #1626-96-4684

Shaker Tables

ST-1: Innova 2100 #163-1110
ST-2: Innova 2100 #163-1111
ST-3: Innova 2100 #163-1114
ST-4: Lab-Line #163-95-1224B
ST-5: Lab-Line #1630-981328
ST-7: Lab-Line #163-95-1224A
ST-8: VWR Scientific #1905-480
ST-9: Eberbach 6010 #1713-810
ST-10: Eberbach 6010 #1626-4060A
ST-11: Lab-Line Model 3590 #1905-1045
ST-12: Eberbach #1626-106
ST-13: Lab-Line Model 3590 # 1626-4050
ST-14: Burrell Wrist Action Model 75 #1626-000
ST-15: Eberbach #6010

Light Meters

LM-1: LI-COR Model LI-189 #163-341 with
Photometric Sensor
LM-2: LI-COR Model LI-189 #1630-199501
w/Quantum Sensor

Microscopes

M-1: Olympus BH-2 #163-384
M-2: Olympus CH #1900-800
M-3: Olympus VM #1903-700
M-4: Fisher Micromaster II 12-561-4B
#1625-980060

Conductivity Meters

CM-1: Orion Model 140 #150-4070 (Retired)
CM-2: Corning Checkmate 90 #1905-895 (Retired)
CM-3: WTW Cond 330i #04250007
CM-4: WTW Cond 3300i #07291237

Dissolved Oxygen Meters

DO-1: YSI Model 54A #1905-730
DO-4: YSI Model 58 #1627-13
DO-5: Corning Checkmate 90 #109-3020
DO-6: YSI Model 95 #1630-991318 (Retired)
DO-7: YSI Model 95 #1626-990090 (Retired)
DO-8: WTW OXi 330 #1630-010004
DO-9: WTW OXi 330i # 1635-020006
DO-10: WTW OXi 330i # 05070021

Micro/Fate Miscellaneous

AU-1: Market Forge Sterilmatic Autoclave #1626-
79
AU-2: Market Forge Sterilmatic Autoclave
#1626-4474A
AZR-1: Fisher-Lilly Antibiotic Zone Reader
#185 98602
BSC-1: Labconco Purifier Class II Biosafety Cabinet
#1630-010014
CR-1: Cole Parmer Chart Recorder 2D20-0000
#1626-984762
DBI-1: Fisher Scientific Dry Bath Incubator #1630-
010012
LFH-1: Labconco Purifier Clean Bench #1627-24
LFH-2: Labconco Purifier Clean Bench #1626-4476
OS-1: Lab-line 3540 Orbital Shaker Waterbath
#1626-105
TR-1: Biolog Turbidity Reader
#1630-010047A
UV-2: Genesys 20 Spectrophotometer,
Model 4001/4 #1635-040000

Memorandum

To: Ron Boutelle
William Hinchie

cc: Shipment file 07-0091, R200-0001.

From: Jim Nurrenbern

Date: 9/13/2007

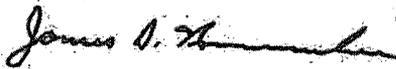
Re: Shipment of W.E.T. Water Sample

The water sample obtained in support of the W.E.T. test identified by gamma spectroscopy report 07-3227-H is not radioactive per 49CFR173.436.

The sample may be packaged and shipped without regard to radioactivity. No special marking or labeling with respect to quantity or concentration of radioactivity is required.

The concentration and total activity of the identified radioactivity is below the level requiring licensing in accordance with 10CFR30.

Notwithstanding the above, it is understood that the sample will be shipped to the ABC Laboratories for analysis which possesses a Radioactive Materials License from the State of Missouri. The ABC Laboratories Radioactive Materials License 24-13365-01 has an expiration date of 7/31/2017.

 4269

James D. Nurrenbern

Callaway RAM Shipper

 ***** 13-SEP-2007 07:31:27.15 *****

T TEST COMPOSITE SAMPLE

Sample Collection Start Date: 13-SEP-2007 05:00:00.00
 Sample Collection Stop Date: 13-SEP-2007 05:00:00.00

*Scale to OAW
 Z26199.*

Sample Identification: 07-3227-H Operator: GLS

Sample Quantity: 1.16600E+03 Units: GM
 Sample Geometry: LM1K0 Shelf: 0

Storage File: APPLDISK:[GSP.ARCHV]CRN07-3227-H.CNF;1

Acquire Date: 13-SEP-2007 06:00:04.89 *
 Preset Live Time: 0 01:00:00.00 * Sensitivity :4.00000
 Elapsed Live Time: 0 01:00:00.00 * Shape Parameter:10.00000
 Elapsed Real Time: 0 01:00:03.67 * Iterations :10
 Percent Deadtime : 0.1% *

Detector : GSS-4242-HP * Library File : NPDES
 Calib Date: 12-SEP-2007 06:41:26.47 * Energy Tolerance: 1.25000
 Slope : 5.00766E-01 * Half Life Ratio : 8.00000
 Offset : 3.83473E-02 Kev * Abundance Limit : 80.00000

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	92.73	34	67	0.80	185.12	181	7	9.33E-03	44.2	
2	2	238.25	24	27	1.31	475.79	470	17	6.58E-03	45.3	9.64E-01
3	2	241.09	19	30	1.31	481.45	470	17	5.14E-03	56.1	
4	0	295.62	36	22	0.90	590.38	586	10	9.95E-03	29.8	
5	1	351.61	19	14	1.32	702.24	697	11	5.18E-03	48.6	4.58E+00
6	1	352.49	31	12	1.20	704.00	697	11	8.73E-03	27.4	
7	0	511.43	55	30	1.82	1021.59	1013	18	1.54E-02	27.2	
8	0	583.41	21	2	0.62	1165.46	1161	9	5.75E-03	25.6	
9	0	609.46	31	4	1.08	1217.52	1213	8	8.56E-03	21.3	
10	0	1461.35	29	0	1.97	2921.28	2915	13	8.06E-03	18.6	

Nuclide Line Activity Report

Nuclide Type: NAT. PRODUCT

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected Decay Corr		1-Sigma
					uCi/GM	uCi/GM	%Error
K-40	1460.81	29	10.67*	6.624E-01	2.642E-07	2.642E-07	18.57
PB-212	74.82	-----	10.70	2.179E+00	-----	Line Not Found	-----
	77.11	-----	18.00	2.318E+00	-----	Line Not Found	-----
	238.63	24	44.60*	2.922E+00	1.170E-08	1.290E-08	45.30
BI-214	300.09	-----	3.41	2.472E+00	-----	Line Not Found	-----
	609.31	31	46.30*	1.391E+00	3.080E-08	5.959E-07	21.29
	665.45	-----	1.57	1.291E+00	-----	Line Not Found	-----
	768.35	-----	5.04	1.143E+00	-----	Line Not Found	-----
	806.17	-----	1.23	1.097E+00	-----	Line Not Found	-----
	934.06	-----	3.21	9.665E-01	-----	Line Not Found	-----
	1120.29	-----	15.10	8.266E-01	-----	Line Not Found	-----
	1155.19	-----	1.70	8.052E-01	-----	Line Not Found	-----
	1238.11	-----	5.94	7.593E-01	-----	Line Not Found	-----
	1280.96	-----	1.48	7.379E-01	-----	Line Not Found	-----
	1377.67	-----	4.11	6.948E-01	-----	Line Not Found	-----
	1401.50	-----	1.39	6.851E-01	-----	Line Not Found	-----
	1407.98	-----	2.49	6.826E-01	-----	Line Not Found	-----
	1509.23	-----	2.22	6.458E-01	-----	Line Not Found	-----
	1661.28	-----	1.15	6.002E-01	-----	Line Not Found	-----
	1729.60	-----	2.97	5.829E-01	-----	Line Not Found	-----
	1764.49	-----	15.80	5.748E-01	-----	Line Not Found	-----
	1847.42	-----	2.09	5.571E-01	-----	Line Not Found	-----
	-214	77.11	-----	10.50	2.318E+00	-----	Line Not Found
87.30		-----	4.67	2.848E+00	-----	Line Not Found	-----
89.80		-----	1.03	2.955E+00	-----	Line Not Found	-----
241.98		19	7.49	2.899E+00	5.492E-08	5.118E-07	56.12
295.21		36	19.20	2.500E+00	4.805E-08	4.478E-07	29.83
RA-224	351.92	19	37.20*	2.184E+00	1.476E-08	1.376E-07	48.60
	785.91	-----	1.10	1.121E+00	-----	Line Not Found	-----
	240.98	19	3.95*	2.899E+00	1.041E-07	1.054E-07	56.12
TH-228	84.37	-----	1.21	2.711E+00	-----	Line Not Found	-----
	238.63	24	44.60*	2.922E+00	1.170E-08	1.170E-08	45.30
	240.98	19	3.95	2.899E+00	1.041E-07	1.041E-07	56.12
	300.08	-----	3.41	2.472E+00	-----	Line Not Found	-----

Nuclide Type: OTHER

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected Decay Corr		1-Sigma
					uCi/GM	uCi/GM	%Error
ANNIL	511.00	55	0.00*	1.610E+00	0.000E+00	0.000E+00	0.00

Flag: "*" = Keyline

Unidentified Energy Lines
Sample ID : 07-3227-H

Page : 2
Acquisition date : 13-SEP-2007 06:00:04

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	92.73 <i>NAT.</i>	34	67	0.80	185.12	181	7	9.33E-03	44.2	3.07E+00	T
1	352.49 <i>NAT.</i>	31	12	1.20	704.00	697	11	8.73E-03	27.4	2.18E+00	
0	583.41 <i>NAT.</i>	21	2	0.62	1165.46	1161	9	5.75E-03	25.6	1.44E+00	T

Flags: "T" = Tentatively associated

M.S.R. 9-13-07
3123

Slide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/GM)	1-Sigma %Error	Rejected by
BR-82	35.30H	0.04	92.18	0.72	1.008E-06	44.22	Abun.
			221.45	2.26	---	Not Found	---
			554.32	70.60	---	Not Found	---
			606.30	1.17	---	Not Found	---
			619.07	43.10	---	Not Found	---
			698.33	28.20	---	Not Found	---
			776.49*	83.31	---	Not Found	---
			827.81	24.20	---	Not Found	---
			1007.57	1.27	---	Not Found	---
			1043.97	27.30	---	Not Found	---
			1317.47	26.90	---	Not Found	---
			1474.82	16.58	---	Not Found	---
		% Abundances Found =		0.22	(Abn. Limit = 70.00%)		
KR-90	32.32S	167.29	120.92	2.70	---	Not Found	Decay, Abun.
			121.82	32.00	---	Not Found	---
			234.44	2.50	---	Not Found	---
			242.19	9.60	1.248E+28	56.12	
			249.32	1.28	---	Not Found	---
			433.47	1.25	---	Not Found	---
			492.63	1.16	---	Not Found	---
			539.49	29.00	---	Not Found	---
			554.37	4.80	---	Not Found	---
			619.08	1.04	---	Not Found	---
			731.33	1.42	---	Not Found	---
			941.86	1.28	---	Not Found	---
			1118.69*	37.00	---	Not Found	---
			1423.77	2.80	---	Not Found	---
			1537.85	9.30	---	Not Found	---
			1552.18	2.10	---	Not Found	---
			1658.18	1.27	---	Not Found	---
			1780.04	6.40	---	Not Found	---
		% Abundances Found =		6.54			
SR-92	2.71H	0.55	241.52	3.00	2.008E-07	56.12	Abun.
			430.56	3.30	---	Not Found	---
			953.32	3.60	---	Not Found	---
			1142.30	2.90	---	Not Found	---
			1383.94*	90.00	---	Not Found	---
		% Abundances Found =		2.92			
NB-96	23.35H	0.06	219.10	3.78	---	Not Found	Abun.
			241.40	3.87	1.111E-07	56.12	
			350.32	1.11	---	Not Found	---
			371.81	2.81	---	Not Found	---
			460.03	28.20	---	Not Found	---
			480.68	6.30	---	Not Found	---
			568.86	55.70	---	Not Found	---
			719.55	7.30	---	Not Found	---
			778.22*	96.80	---	Not Found	---
			810.25	9.90	---	Not Found	---
			812.54	3.40	---	Not Found	---

Slide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/GM)	1-Sigma %Error	Rejected by	
NB-96	23.35H	0.06	847.67	1.60	---	Not Found	---	Abun.
			849.86	20.70	---	Not Found	---	
			1091.30	49.40	---	Not Found	---	
			1200.19	20.00	---	Not Found	---	
			% Abundances Found =			1.24		
RU-103	39.35D	0.00	497.08*	89.00	---	Not Found	---	Abun.
			610.33	5.60	2.549E-07	21.29		
			% Abundances Found =			5.92		
CE-143	33.00H	0.05	231.56	2.00	---	Not Found	---	Abun.
			293.26*	42.00	---	Not Found	---	
			350.59	3.40	1.667E-07	48.60		
			490.36	2.00	---	Not Found	---	
			664.55	5.20	---	Not Found	---	
			721.96	5.10	---	Not Found	---	
% Abundances Found =			5.70					
TL-208	3.05M	29.54	277.35	6.80	---	Not Found	---	Decay
			583.14*	84.20	1.276E-01	25.57		
			763.13	1.64	---	Not Found	---	
			860.37	12.46	---	Not Found	---	
% Abundances Found =			80.11					
231	4.20D	0.01	84.21	7.00	---	Not Found	---	Abun.
			92.29	17.30	4.114E-08	44.22		
			95.87*	28.00	---	Not Found	---	
% Abundances Found =			33.08	(Abn. Limit = 50.00%)				
TH-232	1.41E+10Y	0.00	209.28	4.40	---	Not Found	---	Abun.
			238.63	44.60	1.170E-08	45.30		
			240.98	3.95	1.041E-07	56.12		
			270.23	3.60	---	Not Found	---	
			300.09	3.41	---	Not Found	---	
			327.64	3.20	---	Not Found	---	
			338.32	11.40	---	Not Found	---	
			463.00	4.40	---	Not Found	---	
			583.14*	30.25	3.057E-08	25.57		
			794.70	4.60	---	Not Found	---	
			860.37	4.48	---	Not Found	---	
			911.07	27.70	---	Not Found	---	
			964.60	5.20	---	Not Found	---	
969.11	16.60	---	Not Found	---				
1588.00	3.50	---	Not Found	---				
% Abundances Found =			46.00					
TH-234	24.10D	0.00	92.38*	2.72	2.595E-07	44.22	Abun.	
			92.80	2.69	2.624E-07	44.22		
			99.86	4.90	---	Not Found		---
			131.20	20.40	---	Not Found		---
			152.70	6.80	---	Not Found		---
			226.40	6.00	---	Not Found		---

Rejected Report (continued)
Sample ID : 07-3227-H

Page : 5
Acquisition date : 13-SEP-2007 06:00:04

Slide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/GM)	1-Sigma %Error	Rejected by	
TH-234	24.10D	0.00	569.50	11.00	---	Not Found	---	Abun.
			880.51	12.24	---	Not Found	---	
			883.24	12.00	---	Not Found	---	
			926.00	11.20	---	Not Found	---	
			946.00	12.00	---	Not Found	---	
			949.00	8.16	---	Not Found	---	
% Abundances Found =				4.91				

Flag: "*" = Keyline

Summary of Nuclide Activity
 Sample ID : 07-3227-H

Page : 6
 Acquisition date : 13-SEP-2007 06:00:04

Total number of lines in spectrum 10
 Number of unidentified lines 1
 Number of lines tentatively identified by NID 9 90.00%

Nuclide Type : NAT. PRODUCT

Nuclide	Hlife	Decay	Uncorrected uCi/GM	Decay Corr uCi/GM	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.28E+09Y	1.00	2.642E-07	2.642E-07	0.491E-07	18.57	
PB-212	10.64H	1.10	1.170E-08	1.290E-08	0.584E-08	45.30	A
BI-214	19.90M	19.3	3.080E-08	5.959E-07	1.269E-07	21.29	A
PB-214	26.80M	9.32	1.476E-08	1.376E-07	0.669E-07	48.60	A
RA-224	3.62D	1.01	1.041E-07	1.054E-07	0.591E-07	56.12	
TH-228	1.91Y	1.00	1.170E-08	1.170E-08	0.530E-08	45.30	
Total Activity :			4.373E-07	1.128E-06			

Nuclide Type : OTHER

Nuclide	Hlife	Decay	Uncorrected uCi/GM	Decay Corr uCi/GM	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
ANNIL	100.00D	1.00	0.000E+00	0.000E+00	0.000E+00	0.00	
Total Activity :			0.000E+00	0.000E+00			

Grand Total Activity : 4.373E-07 1.128E-06

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

- H-3, 1.19E-04 uCi/cc^x

- No activation or fission product radionuclides identified for this gamma spectroscopy analysis.

 ***** 13-SEP-2007 07:31:28.58 *****

T TEST COMPOSITE SAMPLE

Sample Identification: 07-3227-H Operator: GLS
 Sample Quantity: 1.16600E+03 Units: GM
 Sample Geometry: LM1K0 Shelf: 0
 Detector : GSS-4242-HP

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/GM)
BE-7	10.	477.59	5.3257E-08
NA-24	3.	1368.53	7.9560E-09
CL-38	1.	1642.42	7.7446E-08
AR-41	4.	1293.64	1.3892E-08
SC-46	5.	889.25	6.9119E-09
CR-51	14.	320.08	4.9191E-08
MN-54	4.	834.83	5.6096E-09
MN-56	2.	846.75	6.0779E-09
NI-56	25.	158.38	4.2223E-09
CO-57	25.	122.06	4.7944E-09
NI-57	6.	1377.59	1.3620E-08
CO-58	4.	810.76	5.1961E-09
58 SUM	4.	1321.76	0.0000E+00
-59	3.	1099.22	1.0956E-08
CO-60	11.	1173.22	1.2592E-08
CU-64	3.	1345.90	1.6217E-06
NI-65	3.	1481.84	4.8671E-08
ZN-65	2.	1115.52	1.0477E-08
ZN-69	14.	318.40	7.2523E-04
SE-75	14.	264.65	6.8595E-09
BR-82	5.	776.49	7.1776E-09
BR-83	4.	529.64	4.6702E-07
KR-83M	0.	9.39	0.0000E+00
RB-83	8.	520.41	1.1608E-08
BR-84	4.	881.50	9.5344E-08
BR-85	0.	802.41	Half-Life too short
KR-85	12.	513.99	1.5042E-06
KR-85M	28.	151.18	7.2482E-09
SR-85	12.	513.99	6.5806E-09
RB-86	5.	1076.63	8.9363E-08
KR-87	8.	402.58	2.0084E-08
KR-88	27.	196.32	2.6078E-08
RB-88	1.	1836.01	6.7179E-07
RB-88ESC	3.	1325.00	0.0000E+00
Y-88	1.	1836.01	5.3876E-09
KR-89	0.	220.90	Half-Life too short
RB-89	2.	1031.88	3.5310E-07
ZR-89	2.	909.10	4.3793E-09
-90	0.	1118.69	Half-Life too short
MO-90	16.	257.34	6.6505E-09
Y-90	1.	1760.70	5.2862E-05

Minimum Detectable Activity Report (continued)

Page : 2

Sample ID : 07-3227-H

Acquisition date : 13-SEP-2007 06:00:04

Slide	Bckgnd Sum	Energy (keV)	MDA (uCi/GM)
Y-90M	23.	202.51	6.3720E-09
SR-91	2.	1024.30	1.6281E-08
Y-91	2.	1204.90	1.8180E-06
Y-91M	5.	557.57	1.5585E-08
SR-92	4.	1383.94	1.4075E-08
Y-92	9.	934.46	8.8931E-08
Y-93	29.	266.90	9.6759E-08
NB-94	5.	871.10	6.5234E-09
NB-95	4.	765.79	5.2412E-09
NB-95M	17.	235.69	1.6739E-08
ZR-95	4.	756.72	9.4128E-09
NB-96	3.	778.22	4.8331E-09
TC-96	3.	778.22	4.5311E-09
NB-97	7.	657.90	1.4355E-08
NB-97M	0.	743.36	Half-Life too short
ZR-97	8.	743.36	7.7934E-09
MO-99	31.	140.51	5.1666E-09
TC-99M	31.	140.51	5.1666E-09
TC-101	19.	306.81	3.5540E-07
RU-103	10.	497.08	6.4463E-09
RU-105	8.	724.50	1.8165E-08
RH-106	3.	621.84	4.1666E-08
RU-106	3.	621.84	4.1666E-08
-109	31.	88.03	1.5491E-07
-110M	7.	657.75	6.5355E-09
IN-113M	3.	391.69	4.1063E-09
SN-113	3.	391.69	4.1089E-09
IN-114M	27.	190.27	2.9002E-08
SN-117M	27.	158.56	4.9863E-09
SB-122	11.	563.93	9.5896E-09
I-124	11.	602.71	1.2344E-08
SB-124	1.	1691.02	1.1815E-08
SB-125	8.	427.89	1.5000E-08
XE-125	22.	188.43	8.1339E-09
I-126	13.	388.63	1.8292E-08
TE-127	10.	417.90	5.6207E-07
TE-127M	29.	88.30	6.1784E-06
XE-127	21.	202.84	6.2390E-09
TE-129	2.	459.60	8.0759E-08
TE-129M	32.	105.50	3.3645E-06
I-130	8.	536.09	5.9987E-09
I-131	12.	364.48	6.0631E-09
TE-131	26.	149.72	6.5363E-08
TE-131M	22.	182.25	4.9830E-07
XE-131M	26.	163.93	2.1960E-07
I-132	11.	667.69	1.2292E-08
TE-132	18.	228.16	4.9172E-09
BA-133	10.	356.01	7.4605E-09
BA-133M	13.	276.09	2.3640E-08
133	4.	529.87	4.5332E-09
TE-133M	14.	334.14	2.7589E-07

Slide	Bckgnd Sum	Energy (keV)	MDA (uCi/GM)
XE-133	25.	81.00	1.6437E-08
XE-133M	19.	233.22	4.3626E-08
CS-134	4.	795.85	6.5757E-09
CS134ESC	1.	1400.00	0.0000E+00
I-134	4.	884.09	2.8911E-08
TE-134	5.	767.20	7.9727E-08
I-135	1.	1260.41	1.6375E-08
XE-135	21.	249.79	6.0647E-09
XE-135M	6.	526.56	2.5293E-07
CS-136	6.	818.50	6.5447E-09
CS-137	9.	661.65	7.5793E-09
XE-137	0.	455.49	Half-Life too short
CS-138	2.	1435.86	5.1637E-08
XE-138	11.	258.31	6.8866E-07
BA-139	26.	165.85	5.3260E-08
CE-139	26.	165.85	5.3681E-09
BA-140	7.	537.32	2.0928E-08
LA-140	2.	1596.49	6.4157E-09
BA-141	27.	190.22	2.3538E-07
CE-141	22.	145.44	7.9175E-09
BA-142	22.	255.12	5.4184E-06
LA-142	6.	641.17	2.0016E-08
CE-143	15.	293.26	1.1441E-08
-143	8.	741.98	6.1934E-01
-144	30.	133.54	4.1038E-08
PR-144	30.	133.54	4.1038E-08
ND-147	34.	91.11	2.0850E-08
PM-148	5.	1465.12	4.4158E-08
PM-148M	7.	550.27	5.6004E-09
EU-152	5.	1407.95	4.7381E-08
EU-154	2.	1274.45	1.6095E-08
EU-155	31.	105.31	2.3309E-08
EU-156	5.	646.29	7.1297E-08
HF-181	7.	482.03	5.7907E-09
W-187	10.	479.53	2.4885E-08
HG-203	18.	279.19	6.2571E-09
TL-208	0.	583.14	Half-Life too short
BI-212	5.	727.17	1.3242E-07
RA-226	38.	186.21	1.6577E-07
AC-228	6.	911.07	3.1759E-08
RA-228	6.	911.07	2.6814E-08
U-231	23.	95.87	1.6184E-08
TH-232	19.	583.14	3.0252E-08
TH-234	67.	92.38	2.9463E-07
U-235	16.	183.72	6.4965E-09
NP-237	29.	86.50	4.5408E-08
U-237	25.	114.00	3.4529E-08
NP-238	5.	984.45	3.0733E-08
NP-239	33.	106.13	2.2230E-08

VMS Efficiency Comparison Report V1.3 Generated 13-SEP-2007 07:32:26

Configuration 1 : APPLDISK:[GSP.ARCHV]CRN07-3227-H.CNF;1
Configuration 2 : APPLDISK:[GSP.D4242.EFF]LM1K0.CNF;2
Detector Name : GSS-4242-HP
Detector Geometry :

Efficiency Comparison Report

Energy (keV)	5-SEP-2005 01:47		5-SEP-2005 01:47		% Diff
	Efficiency	Error	Efficiency	Error	
88.03	2.881E-02	1.171E-04	2.881E-02	1.171E-04	0.00
122.06	3.648E-02	1.636E-04	3.648E-02	1.636E-04	0.00
165.85	3.563E-02	2.013E-04	3.563E-02	2.013E-04	0.00
279.19	2.602E-02	2.892E-04	2.602E-02	2.892E-04	0.00
391.69	1.988E-02	1.288E-04	1.988E-02	1.288E-04	0.00
661.65	1.326E-02	8.186E-05	1.326E-02	8.186E-05	0.00
898.02	9.763E-03	5.493E-05	9.763E-03	5.493E-05	0.00
1173.22	8.035E-03	4.176E-05	8.035E-03	4.176E-05	0.00
1332.49	7.132E-03	3.687E-05	7.132E-03	3.687E-05	0.00
1836.01	5.588E-03	3.440E-05	5.588E-03	3.440E-05	0.00

ALPHA/BETA/TRITIUM CONCENTRATION WORKSHEET

CRN 0

"WELL KNOWN" BLANK ----->
 PAIRED OBSERVATIONS ----->

GM BETA SCALERS with >5000 cpm ---->
 DPM = Rs/E
 MDA = (Rs+Lc)*FCF / [E*V*F*2.22E6]

uCi/unit(liq) = Rs / [E*V*F*D*2.22E6]
 uCi/unit(air) = Rs * FCF / [E*V*D*2.22E6]

MDA = Minimum Detectable Activity
 Ro = Initial Sample Count Rate(cpm)
 DPM = Disintegrations per minute
 D = Nuclide Decay Correction
 Tb = Blank Count Time(min)
 FCF = 4 (only used for 4 inch filters)
 F = Transmission Factor(evap. samples)

$Lc = 1.64 * \text{SQRT}(Rb/Ts)$
 $Lc = 1.64 * \text{SQRT}((Rb/Tb) * [1+(Tb/Ts)])$

$Rs = (Ro-Rb) / [1-(Ro*T/60)]$
 $D = e^{(-0.693/\text{halflife}) * \text{decay time}}$

Lc = Critical Level
 Rs = NET CPM
 Rb = Blank CPM
 Ts = Sample Count time(min)
 T = Resolving time(sec)
 V = sample volume(cc or ml)
 E = Efficiency(decimal value)

Inst. Code	Inst I.D.	Rb	Lc	Sample Type
1	LSC-4002-HP	N/A	N/A	Tritium
2				
3				
4				
5				

Shaded areas are not required to be filled out if instrument provides DPM printout and printout is attached.
 * Not required to be filled out if not used; Assumed to be 1.0
 ** For instruments out-of-control; indicate B for blank, E for efficiency.

** Inst. Code	Sample I.D.	Gross Counts	Count Time (min)	Resolving Time (sec)*	Rs	E	DPM	D*	V	F*	uCi/ unit Vol.	%Diff (stds)
1	WET TEST		10				792.60		3		1.19E-04	

Milton E. Kenny 3/23 13-Sep-2007 06:44
 Completed by Time

Reviewed by _____

ENVIRONMENTAL SAMPLE RECEIPT

Data by: hw Date: Sept 13, 07 Study No.: 63115

Sponsor: Ameren UE Contact: Ron Donta

Sample Type/ID
 Effluent ID(s) Composite Sample Receiving Water ID RAW water
 Sediment ID(s) _____ Soil ID _____
 Other ID _____

Number of containers 1 each Mass/Volume each ~3gals

Comments/Sample Description — Composite sample hereafter referred to as Effluent =
Slightly cloudy yellow brown
- Raw water = Cloudy Brown Raw Sept 13, 07

STORAGE

Used immediately upon receipt
 Stored at -4°C Cooler ID R-1 R-2 Other _____

CHEMISTRY ON RECEIPT

Sample ID	Temp ^a (°C)	DO (mg/L)	pH	Cond. (µS/cm)	Hard ^{b,c} (mg/L)	Alk ^{b,c} (mg/L)	NH ₃ ^d (mg/L)	Cl ₂ ^d (mg/L)
Effluent <u>Composite</u>	<u>10.8</u>	<u>9.98</u>	<u>8.51</u>	<u>2590</u>	<u>49.6</u> <u>992</u>	<u>11.8</u> <u>236</u>	<u>1.8</u>	<u>0</u>
RAW	<u>11.1</u>	<u>10.19</u>	<u>8.24</u>	<u>657</u>	<u>12.1</u> <u>242</u>	<u>9.0</u> <u>180</u>	<u>0.4</u>	<u>0</u>
Device ID	<u>1546</u>	<u>DO-10</u>	<u>PH-10</u>	<u>CM-2</u>				

^a Correction factor 0.0 °C @ 12.6 °C
^b Colorimetric titration procedure adapted from APHA Standard Methods (mg/L as CaCO₃)
^c 1st number is mL of titrant second number is mg/L hardness
^d Colorimetric method by HACH Co. for total ammonia and total chlorine

PREPARATION OF EFFLUENT CONCENTRATIONS (Volume/Volume)

Effluent ID: Ameron NE Composite Study No.: 63115

Preparation/Transfer By: RW Time: 10:45am Date: Sept 13, 07

Effluent Sample ID	Aliquot Volume (mL)	Dilution water Volume (mL) ^a	Total Volume (mL)	Final Concentration (%) ^b
ABC control	2000	—	2000	100% ABC control
RAW water	2000	—	2000	100% RAW water
Composite	200	1800	2000	10% Composite
Composite	2000	—	2000	100% Composite

Controls: 100% ABC synthetic water
 100% receiving water

^aDilution water type: ABC synthetic water
 Effluent receiving water RAW water
 Other _____

^b These solutions used for: *Ceriodaphnia dubia* test
 Fathead minnow test
 Other _____

Remarks:

Ceriodaphnia dubia test:
 Test chamber: 30-mL Plastic _____ mL Glass beaker
 Number of replicates: 4 Solution volume per replicate: 25 mL

Fathead minnow test:
 Test chamber: 300-mL Plastic 1000 mL Glass beaker
 Number of replicates: _____ Solution volume per replicate: 400 mL

Other:
 Test chamber: _____
 Number of replicates: _____
 Solution volume per replicate: _____ mL

Prepared By: RW Date: Sept 13, 07

PREPARATION AND CHARACTERIZATION OF ABC SYNTHETIC WATER

PREPARATION

Water is generally prepared in 20, 60, or 120 liter increments. Calcium sulfate should be dissolved separately then added to the container. The water should be vigorously aerated for ~24 hours prior to conducting water chemistry. The water will expire four weeks from the date prepared. The following target weights, in grams, should be used except for sodium selenate where a 400 mg/L stock solution is prepared in a 100mL volumetric. Sodium selenate may only be utilized as required by the individual project requirements.

Balance used: B2 B5 Other

Chemical	20 liters	60 liters	120 liters	Actual weight (g)	Supplier	Lot Number
MgSO ₄	1.20	3.60	7.20	7.2068	ACROS	30119126
NaHCO ₃	1.92	5.76	11.52	11.5207	ACROS	A0222859
KCl	0.08	0.24	0.48	0.4806	ACROS	30113189
CaSO ₄	1.20	3.60	7.20	7.2023	ACROS	A0222960
Na ₂ SeO ₄	0.1 mL	0.3 mL	0.6 mL	0.0916	SIGMA	075KD689

Weighed By: JLK Date: 30 AUG 07
 Prepared By: JLK Date: 04 SEPT 07

CHARACTERIZATION

Hardness^a: 4.3 mL^b 86 mg/L^c

The acceptable range for hardness is 80-100 mg/L if out of this range see notes below.

Acceptable Unacceptable

Notes:

^a HACH buffer solution hardness 1 lot number: A16299 & HACH ManVer 2 hardness indicator lot number: A7016

^b Milliliters of titrant times twenty equals mg/L as CaSO₄

^c Total alkalinity and hardness measured using a titrimetric method adapted from standard methods (mg/L as CaCO₃)

Batch was discarded

Batch was adjusted by the addition of the following: K₂S DATE: 04/9/07

Analysis By: JLK Date: 05 SEPT 07
DD JLK 05 SEPT 07

THIS IS AN EXACT COPY OF THE ORIGINAL DOCUMENT

TEST SOLUTION OBSERVATIONS

Test Substance: *Ameren UE Effluent*

Study No.: *63115*

Definitive Preliminary Screen

Test Concentration (% Effluent)	REP	Observations ^a				
		Initiation:	Event: 29 N	Event: 48hr N	Event:	Event:
100% ABC Control	A-D	N	N	N		
100% RAW	A-D	cloudy brown	cloudy brown w/ PM	clear brown w/ PM		
10% composite	A-D	cloudy brown	cloudy brown w/ PM	clear brown w/ PM		
100% Composite	A-D	clear yellow/brown	clear yellow w/ PM	clear yellow w/ PM		

Observer	<i>RW</i>	<i>RW</i>	<i>RW</i>		
Date ^① Time	<i>11:30am</i>	<i>10:50am</i>	<i>10:45am</i>		
Time ^② Date	<i>Sept 13, 07</i>	<i>Sept 14, 07</i>	<i>Sept 15, 07</i>		

Notes: observations for Ceriodaphnia and fathead minnow tests
 ① correction for Sept 14, 07
 ② F for Sept 14, 07

^a see Form CDG 020 for code key

**KEY TO TEST SOLUTION OBSERVATIONS DURING
AQUATIC TOXICITY TESTS**Test Substance: *American UG Effluent*Study No.: *63115*

Clear (CC) – Test solution is clear but has a tint of color due to the presence of the test substance. Coloration observation should be noted.

Cloudy (C) – Test solution is murky in appearance.

Foam (F) – Foam on surface of test solution.

None (N) – Test solution is clear and colorless (i.e., no coloration associated with test substance) with no visible particulates, surface film, undissolved test substance, or precipitate.

Particulate Matter (PM) – Test solution which has solids present, either in suspension or on the bottom of the test chamber. The solids are not believed to be a component of the test substance.

Precipitate (PR) – Solid substance present either floating at the surface of the test solution or settled on the bottom of the test chamber. The substance is assumed to be a component of the test substance which has become separated from the test solution by the action of a chemical or physical change. Never used when observation is made immediately after addition of the test substance stock.

Surface Film (SF) – Test solution with a substance partially or entirely covering the surface of the solution. The substance may have an oily or scum-like appearance.

Undissolved Test Substance (UTS) – Used in two instances: 1) when the test substance falls out of solution immediately upon addition to the dilution water; 2) when the test substance is added directly into the dilution water and it does not completely dissolve.

PHOTOPERIOD AND LIGHT MEASUREMENTS

Test Substance: Ameron UE Effluent Study No.: 63115

Photoperiod: 16 Hours Light; 8 Hours Darkness; Transition Period: 2*30min

Location: Diluter # _____ Waterbath # 25
 Environmental Chamber # _____

Type of Lighting: Fluorescent Other: _____

Photoperiod Initiation Date/Time: already on

Prepared By: [Signature] Date: Sept 13, 07

LIGHT READINGS

Study Day	Date	Initials	LUX	Measurement Position
24hrs	Sept 13, 07	[Signature]	561.7	cerio cups
24hrs	Sept 14, 07	[Signature]	511.1	FHM 10% A

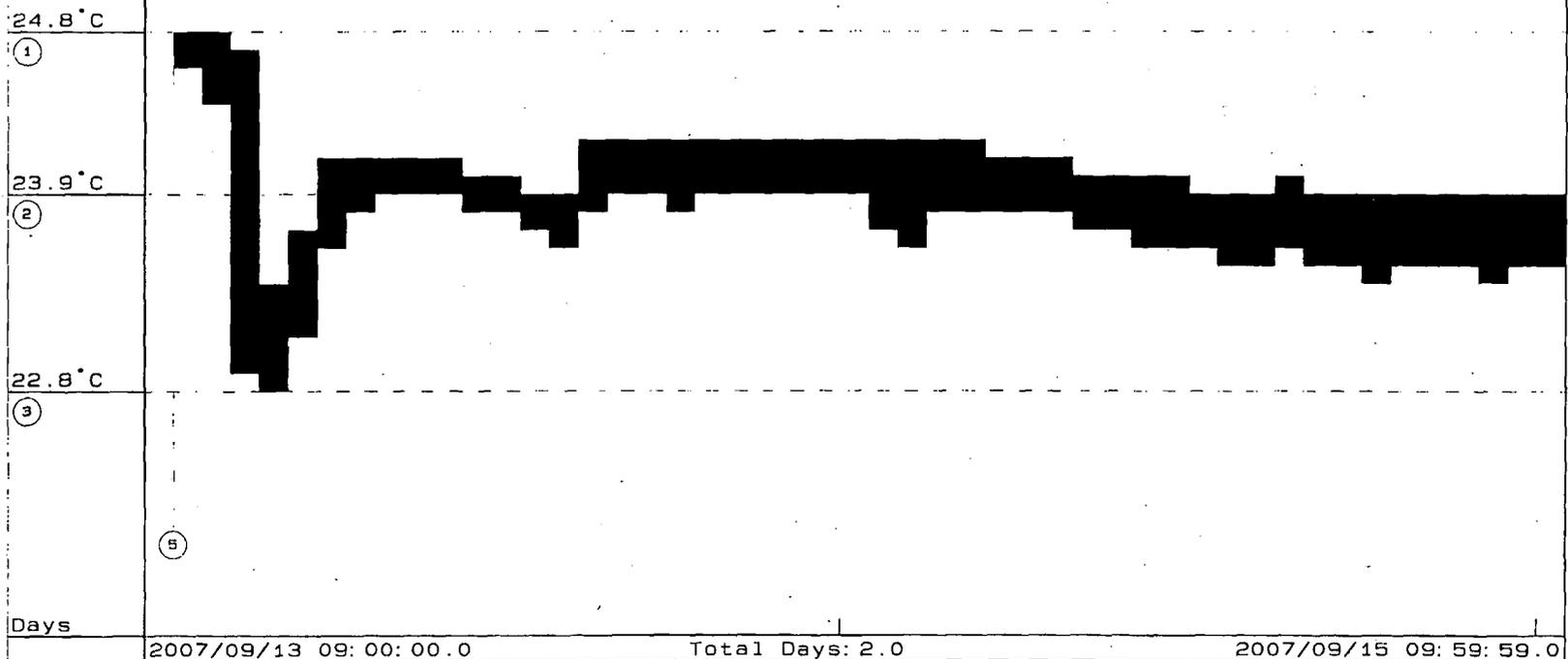
Location of Sensor: Level of Test Media
 Other: _____

Meter Used: LI-COR Model LI-189 ABC material control #163-341 used with photometric sensor Serial No. (PH 40027)
 Other: _____

Study 63115 Rev 2/15/07

ABC Laboratories, Inc.
Program: MultiScan_Root: [000000] MultiGraph.Com Version: 2.2g

Probe Location: EFE 037
Printout Date: 2007/9/15 12:09
Units: Temperature Celsius
Periodic Average: 23.9 ± 0.3 (4)
Total Days: 2.0



- (1) Highest Temperature line.
- (2) Periodic Current Temperature Average.
- (3) Lowest Temperature line.
- (4) Average ± SD of periodic (usually 1 per hr.) "Current Reading"
- (5) (20070913 09:59:23 -1.5°C) Initial NIST Value Adjustment

II. DAPHNID EXPOSURE

WATER QUALITY FOR EFFLUENT SAMPLES

Effluent Designation: Ameron UE

Species: Ceriodaphnia dubia/Fathead Minnow

Study #: 63115

Extra replicate prepared for water chemistry Measurements made in test beakers

Concentration (%)	Date/ID/REP <u>Sept 13, 07 / RW / -</u>				Date/ID/REP <u>Sept 14, 07 / RW / -</u>				Date/ID/REP <u>Sept 15, 07 / RW / -</u>				Date/ID/REP			
	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)
60% ABC Control	24.5	8.09	8.17 8.32 ^①	311	24.5	8.08	8.22	325	24.5	8.05	8.22	347				
100% Receiving water	24.5	8.05	8.18 8.32 ^①	659	24.6	7.87	8.51	676	24.6	8.17	8.57	708				
10% Effluent	24.5	7.99	8.22	882	24.7	7.85	8.50	908	24.6	8.13	8.55	954				
100% Effluent	24.6	8.13	8.40	2580	24.7	7.91	8.50	2640	24.6	8.17	8.54	2760				
Device ID	-0.1CF PH-10	D010	PH10	CM3	-0.1CF PH-10	D010	PH-10	CM-3	0.0CF PH10	D010	PH10	CM3				

Notes: * Correction Factor _____ @ _____ °C

① correction RW Sept 13, 07

Probe EFC 87 RW Sept 15, 07

MORTALITY AND BEHAVIORAL OBSERVATIONS							
Test Substance: <u>Ameron UE Effluent</u>				Study No.: <u>63/15</u>			
<input type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Screen							
Test Species: <u>Ceriodaphnia dubia</u>				Date Initiated: <u>Sept 13, 07</u>			
Time Test Organism Addition Started: <u>11am</u>				Completed: <u>11:15am</u>			
Prepared by: <u>RW</u>				Date: <u>Sept 13, 07</u>			
Test Concentration (% Effluent)	REP	Event: <u>24 hr</u>			Event: <u>48 hr</u>		
		# Alive	Cum. # D/D	Sublethal Obs. ^a	# Alive	Cum. # D/D	Sublethal Obs. ^a
^{100%} ABC Control	A	5	0	5N	5	0	5N
	B	5	0	5N	5	0	5N
	C	5	0	5N	5	0	5N
	D	5	0	5N	5	0	5N
^{100%} Receiving water	A	5	0	5N	5	0	5N
	B	5	0	5N	5	0	5N
	C	5	0	5N	5	0	5N
	D	5	0	5N	5	0	5N
Observer		<u>RW</u>			<u>RW</u>		
Date		<u>Sept 14, 07</u>			<u>Sept 15, 07</u>		
Time		<u>11:15am</u>			<u>10:35am</u>		
Note: Dead organisms removed and discarded after each observation period. Notes (initial & date all entries):							
^a See Form CDG 018/CDG 019 for Code Key.							

MORTALITY AND BEHAVIORAL OBSERVATIONS							
Test Substance: <u>Amgen UE Effluent</u>				Study No.: <u>63115</u>			
<input type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Screen							
Test Species: <u>Ceriodaphnia dubia</u>				Date Initiated: <u>Sept 13, 07</u>			
Time Test Organism Addition Started: <u>11am</u>				Completed: <u>11:15am</u>			
Prepared by: <u>PLW</u>				Date: <u>Sept 13, 07</u>			
Test Concentration (% Effluent)	REP	Event: <u>24hr</u>			Event: <u>48hr</u>		
		# Alive	Cum. # D/D	Sublethal Obs. ^a	# Alive	Cum. # D/D	Sublethal Obs. ^a
<u>10% Effluent</u>	<u>A</u>	<u>5</u>	<u>0</u>	<u>SN</u>	<u>5</u>	<u>0</u>	<u>SN</u>
	<u>B</u>	<u>5</u>	<u>0</u>	<u>SN</u>	<u>5</u>	<u>0</u>	<u>SN</u>
	<u>C</u>	<u>5</u>	<u>0</u>	<u>SN</u>	<u>5</u>	<u>0</u>	<u>SN</u>
	<u>D</u>	<u>5</u>	<u>0</u>	<u>SN</u>	<u>5</u>	<u>0</u>	<u>SN</u>
<u>100% Effluent</u>	<u>A</u>	<u>5</u>	<u>0</u>	<u>SN</u>	<u>5</u>	<u>0</u>	<u>SN</u>
	<u>B</u>	<u>5</u>	<u>0</u>	<u>SN</u>	<u>5</u>	<u>0</u>	<u>SN</u>
	<u>C</u>	<u>5</u>	<u>0</u>	<u>SN</u>	<u>5</u>	<u>0</u>	<u>SN</u>
	<u>D</u>	<u>5</u>	<u>0</u>	<u>SN</u>	<u>5</u>	<u>0</u>	<u>SN</u>
Observer		<u>PLW</u>			<u>PLW</u>		
Date		<u>Sept 14, 07</u>			<u>Sept 15, 07</u>		
Time		<u>11:15am</u>			<u>10:35am</u>		
Note: Dead organisms removed and discarded after each observation period. Notes (initial & date all entries):							
^a See Form CDG 018/CDG 019 for Code Key.							

Key to Morphological And Behavioral Observations For Invertebrate Toxicity TestsTest Substance: *Ameron UE Effluent*Study No.: *63115*UNIVERSAL

Dead (D) - Animals exhibiting no response to a physical stimulus (e.g., gentle prodding or stream of water/air from a pipet). **Not used in daphnid tests.**

Discoloration (DC) - Animals exhibiting abnormal color patterns when compared to the control(s). This may include complete or partial light or dark discoloration.

Normal (N) - Animals not exhibiting behavioral or morphological abnormalities.

Not Found (NF) - An animal not observed as dead. It may have died without being detected, was trapped or stuck on the side of a retention or test chamber and not found, or simply not observed. Animals not found may be treated as dead at the end of the test.

Erratic Movement (E) - Animals moving in a rapid disorderly fashion.

Lethargic (L) - Live animals display abnormal slow movement/reduced activity. Not used in daphnid tests.

AQUATIC INVERTEBRATES

Immobile (I) - No observed movement of appendages or postabdomen within 15 seconds after gentle agitation of the test chamber or gentle disturbance of the daphnid itself. **Used exclusively in daphnid tests.**

On Bottom (B) - Animals resting on the bottom of the test chamber. **Not used in daphnid tests.**

Quiescent (Q) - Movement of one or more appendages or postabdomen within 15 seconds after gentle agitation of the test chamber or gentle disturbance of the daphnid itself. **Used exclusively in daphnid tests.**

Trailing Extraneous Material (T) - Animal observed with extraneous material trailing from the body.

Floating on Surface (F) - Animals floating on the surface of the test solution.

SOIL INVERTEBRATES

Elongated (EL) - Animal is elongated in an abnormal fashion.

Flacid (FL) - Animal is observed to be abnormally soft, lacking normal turgidity.

Lesions on Body Surface (LE) - Animals observed with ulcers or lesions on the body surface.

Surfacing (S) - Animals are observed on the surface of the soil.

Swellings (SW) - Animal observed with abnormal midsegmented swellings.

BENEFICIAL ARTHROPODS

On Back (OB) - Live animals on their backs. **Used exclusively for honeybee tests.**

CLADOCERAN CULTURE RECORD

Species: Ceriodaphnia dubia Lot No.: 07-CD8
 Date Initiated: 03SEP07 No. Used to Initiate: 1 per vial; 24 per Lot
 Initiated from: 07CD6 Thermometer No.: CR-1 Water Type: Age Blended
 Food Type/Lot No.: SEL 082807 DS082807
 Note: Original source received from USGS-CERC on March 13, 2001
 Prepared By: JLK Date: 10SEP07

Date/ID	10SEP07 ^{JLK}	11SEP07 ^{JLK}	12SEP07 ^{JLK}	13SEP07 ^{RJ}	14SEP07 ^{JLK}		
Temp/Fed	25 ✓	25 ✓	24 ✓	25 ✓	—		
No. Young	—	—	0/4:00pm	—	—		
25	13		14	0	1		
26	12		3	4			
27	12		17	2			
28	18		11	12			
29	10		11	9			
30	13		23	3			
31	17		24	5			
32	11		17	2			
33	24		23	4			
34	21		21	0			
35	17		21	8			
36	24		18	12			
37	36		17	5			
38	36		13	12			
39	32		9	12			
40	14		15	3			
41	17		6	6			
42	28		24	0			
43	26		16	0			
44	26		12	10			
45	32		14	8			
46	18		17	12			
47	27		15	10			
48	18		23	12			
				used for study 63115 by 5/12/07	TERMINATED		

Notes: DS = Daphnia Supplement SEL = Selenastrum sp. (aka pseudokirchneriella sp.)
 © R. JLK 14SEP07

CLADOCERAN CULTURE RECORD

Species: Ceriodaphnia dubia Lot No.: 07-CD 8
 Date Initiated: 03SEP07 No. Used to Initiate: 1 per vial; 24 per Lot
 Initiated from: 07CD6 Thermometer No.: CR-1 Water Type: Age Blended
 Food Type/Lot No.: SEL02507 DS 082807
 Note: Original source received from USGS-CERC on March 13, 2001
 Prepared By: JLK Date: 03SEP07

Date/ID	^{JLK} 03SEP07	^{JLK} 07SEP07	^{JLK} 05SEP07	^{JLK} 06SEP07	^{JLK} 07SEP07	08 Sep 07 PC	09 Sep 07 PC
Temp/Fed	25 ✓	25 ✓	25 ✓	24 ✓	25 ✓	25 ✓	25 ✓
No. Young	—	—	—	—	—	—	—
25					4		
26					66		
27					12		
28					17		
29					14		
30					7		
31					2		
32					6		
33					13		
34					10		
35					5		
36					4		
37					4		
38					10		
39					1		
40					9		
41					9		
42					8		
43					7		
44					7		
45					8		
46					11		
47					31		
48					14		
"THIS IS AN EXACT COPY OF THE ORIGINAL DOCUMENT"					① JK 07SEP07		
BY	<u>JK</u>	DATE	<u>Sept 14, 07</u>				

Notes: DS = Daphnia Supplement SEL = *Selenastrum* sp. (aka *pseudokirchneriella* sp.)

III. FATHEAD MINNOW EXPOSURE

WATER QUALITY FOR EFFLUENT SAMPLES

Effluent Designation: Amorex UE Effluent Species: Ceriodaphnia dubia/Fathead Minnow Study #: 63115

Extra replicate prepared for water chemistry Measurements made in test beakers

Concentration (%)	Date/ID/REP <u>Sept 13, 07 / RW / A</u>				Date/ID/REP <u>Sept 14, 07 / RW / B</u>				Date/ID/REP <u>Sept 15, 07 / RW / C</u>				Date/ID/REP			
	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)	Temp* (°C)	DO (mg/L)	pH	Cond. (µS)
100% ABC Control	24.7	8.11	8.19	311	24.8	7.39	8.03	362	24.8	7.82	8.10	400				
100% Receiving water	24.5	8.17	8.21	659	24.9	7.33	8.40	736	24.8	7.80	8.45	758				
10% Effluent	24.5	8.08	8.23	840	24.9	7.23	8.40	952	24.8	7.76	8.45	989				
100% Effluent	24.7	8.09	8.40	2580	25.0	7.18	8.43	2650	24.9	7.73	8.48	2800				
Device ID	-0.1 CF PH-10	DO-10	PH-10	CM-3	-0.1 CF PH-10	DO-10	PH-10	CM-3	0.0 CF PH-10	DO-10	PH-10	CM-3				

Notes: * Correction Factor _____ @ _____ °C

Probe EPE37 RW Sept 15, 07

MORTALITY AND BEHAVIORAL OBSERVATIONS							
Test Substance: <u>Ameren UE Effluent</u>				Study No.: <u>63115</u>			
<input type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Screen							
Test Species: <u>Fathead Minnow</u>				Date Initiated: <u>Sept 13, 07</u>			
Time Test Organism Addition Started: <u>11:15am</u>				Completed: <u>11:30am</u>			
Prepared by: <u>RW</u>				Date: <u>Sept 13, 07</u>			
Test Concentration (% Effluent)	REP	Event: <u>24 hr</u>			Event: <u>48 hr</u>		
		# Alive	Cum. # D/I	Sublethal Obs. ^a	# Alive	Cum. # D/I	Sublethal Obs. ^a
<u>100% ABC Control</u>	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
	C	10	0	10N	10	0	10N
	D	10	0	10N	10	0	10N
<u>100% Receiving water</u>	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
	C	10	0	10N	10	0	10N
	D	10	0	10N	10	0	10N
Observer		<u>RW</u>			<u>RW Sept 15, 07</u>		
Date		<u>Sept 14, 07</u>			<u>Sept 15, 07</u>		
Time		<u>11:15am</u>			<u>10:45am</u>		
Note: Dead organisms removed and discarded after each observation period. Notes (initial & date all entries):							
^a See Form CDG 018/CDG 019 for Code Key.							

MORTALITY AND BEHAVIORAL OBSERVATIONS							
Test Substance: <u>American UE Effluent</u>				Study No.: <u>63115</u>			
<input type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Screen							
Test Species: <u>Fathead Minnow</u>				Date Initiated: <u>Sept 13, 07</u>			
Time Test Organism Addition Started: <u>11:15am</u>				Completed: <u>11:30am</u>			
Prepared by: <u>RW</u>				Date: <u>Sept 13, 07</u>			
Test Concentration (% Effluent)	REP	Event: <u>24 hr</u>			Event: <u>48 hr</u>		
		# Alive	Cum. # <u>DI</u>	Sublethal Obs. ^a	# Alive	Cum. # <u>DI</u>	Sublethal Obs. ^a
<u>10% Effluent</u>	<u>A</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>B</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>C</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>D</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
<u>100% Effluent</u>	<u>A</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>B</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>C</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
	<u>D</u>	<u>10</u>	<u>0</u>	<u>10N</u>	<u>10</u>	<u>0</u>	<u>10N</u>
Observer		<u>RW</u>			<u>RW</u>		
Date		<u>Sept 14, 07</u>			<u>Sept 15, 07</u>		
Time		<u>11:15am</u>			<u>10:45am</u>		
Note: Dead organisms removed and discarded after each observation period. Notes (initial & date all entries):							
^a See Form CDG 018/CDG 019 for Code Key.							

**KEY TO MORPHOLOGICAL AND BEHAVIORAL OBSERVATIONS FOR VERTEBRATE
TOXICITY TESTS**Test Substance: American Effluent Study No.: 63115

Dead (D) - Animals exhibiting no gill movement and no response to a physical stimulus (e.g., gentle prodding or stream of water from a pipet).

Discoloration (DC) - Animals exhibiting abnormal color patterns when compared to the control(s). This may include complete or partial light or dark discoloration.

Edema (ED) - Animals that appear to be retaining water and have a bloated appearance.

Erratic Swimming Pattern (E) - Animals moving in a rapid disorderly fashion.

Exophthalmia (EX) - Abnormal protrusion of the eyeball.

Floating on Surface (FL) - Animals floating on the surface of the test solution.

Fungus (FU) - Egg and/or animal exhibiting fungal infection.

Hemorrhagic (H) - Animals that are bleeding internally and/or subcutaneously.

Hypersensitivity (HP) - Animals that appear to be hypersensitive to physical stimuli.

Irregular Respiration (I) - Animals that exhibit rapid, slow, or irregular opercular movement.

Jaw Deformity (J) - Abnormal morphological development of the mouth and/or jaw usually observed in rainbow trout.

Loss of Equilibrium (LE) - Animals that have lost the ability to maintain normal orientation in the water column (e.g., nose up, nose down, listing to one side, etc.).

Normal (N) - Animals not exhibiting behavioral or morphological abnormalities. In tests where positive counts are not performed on a daily basis, an N indicates that **all remaining** animals in a test chamber are not exhibiting behavioral or morphological abnormalities.

Not Found (NF) - It is possible that an animal may die and never be observed as dead, get trapped on a drain screen or the side of the test chamber and not found, or simply not observed. Animals not found will be considered as dead unless later observed at a subsequent observation.

On Bottom (B) - Animals laying on the bottom of the test chamber.

Spinal Curvature (C) - An animal exhibiting lateral or dorsal curvature of the spine.

Surfacing (S) - Animals observed breaking the surface of the test solution. This condition can be associated with low dissolved oxygen concentrations or is the result of exposure to a test substance which interferes with oxygen uptake across the gills.

Swim-Up (U) - Animals swimming up into the water column from the bottom of the test chamber. Normal behavior exhibited by salmonids as they deplete their yolk-sac and begin to accept an external diet.

IV. DMRQA 27 COMMON DATA



**Instructions for Catalog # WET002
DMR-QA Test Code 13**

Revision 040307

Organism: Fathead minnow (*Pimephales promelas*)

Test Conditions: 48-Hour, Acute, Non-renewal, 25°C, Moderately-Hard Synthetic Freshwater (MHSF)

Description:

- This reference toxicant is designed for the Fathead minnow (*Pimephales promelas*), 48-Hour, Acute, Non-renewal, 25°C, Moderately-Hard Synthetic Freshwater (MHSF), Toxicity Test (i.e., USEPA Test Code 13, USEPA Method Code 2000.0).
- This reference toxicant is packaged in a 125 mL bottle containing approximately 125 mL of standard concentrate.
- The concentrate can be stored at room temperature.

Before you begin:

- This reference toxicant has been prepared as a concentrate and must be diluted prior to analysis to prepare a "simulated" effluent (hereafter referred to as the effluent).
- This reference toxicant must be diluted with moderately-hard synthetic freshwater (MHSF) prepared from Millipore Milli-Q® deionized water (or equivalent) and reagent grade chemicals, as specified in the current version of the USEPA methods manual.
- The diluted effluent should be utilized as soon as possible after preparation.

Instructions:

1. Add approximately 1.8 Liters of moderately-hard synthetic freshwater (MHSF) to a clean, dry, 2.0 Liter, class A volumetric flask.
2. Shake the reference toxicant concentrate bottle prior to opening.
3. Using a clean, dry, 50 mL, class A volumetric flask, carefully transfer 50 mL of the reference toxicant concentrate into the 2.0 L flask.
4. Rinse the 50 mL flask into the 2.0 L flask using MHSF.
5. Dilute the 2.0 L flask to final volume using MHSF.
6. Cap the flask and mix well.

The effluent prepared according to these instructions represents the 100% effluent. See below for secondary dilution instructions:

1. Split the 100% effluent sample into two 1.0 L aliquots. The first aliquot is your 100% effluent for testing.
2. Dilute the second aliquot with 1.0 L of MHSF and mix. This is your 50% effluent sample.
3. Continue diluting half of each sample with the same volume of MHSF to make your 25%, 12.5% and 6.25% effluent dilutions, which represent all five test dilutions.
4. You are now ready to proceed with the test following your normal procedures.
5. If necessary, additional effluent may be prepared using the same reference toxicant concentrate and following instructions 1-6 above.
6. Report your results (expressed as percent effluent) for the 48-Hour LC50 endpoint.

Safety:

ERA products may be hazardous and are intended for use by professional laboratory personnel trained in the competent handling of such materials. Responsibility for the safe use of these products rests entirely with the buyer and/or user. Material Safety Data Sheets (MSDS) for all ERA products are available by calling 1-800-372-0122.



**ENVIRONMENTAL
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**Instructions for Catalog # WET008
DMR-QA Test Code 19**

Revision 040307

Organism: *Ceriodaphnia dubia*

Test Conditions: 48-Hour, Acute, Daily Renewal, 25°C, Moderately-Hard Synthetic Freshwater (MHSF)

Description:

- This reference toxicant is designed for the *Ceriodaphnia dubia*, 48-Hour, Acute, Daily Renewal, 25°C, Moderately-Hard Synthetic Freshwater (MHSF), Toxicity Test (i.e., USEPA Test Code 19, USEPA Method Code 2002.0).
- This reference toxicant is packaged in a 125 mL bottle containing approximately 125 mL of standard concentrate.
- This concentrate can be stored at room temperature.

Before you begin:

- This reference toxicant has been prepared as a concentrate and must be diluted prior to analysis to prepare a "simulated" effluent (hereafter referred to as the effluent).
- This reference toxicant must be diluted with moderately-hard synthetic freshwater (MHSF) prepared from Millipore Milli-Q® deionized water (or equivalent) and reagent grade chemicals, as specified in the current version of the USEPA methods manual.
- The diluted effluent should be utilized as soon as possible after preparation.

Instructions:

1. Add approximately 800 mL of moderately-hard synthetic freshwater (MHSF) to a clean, dry, 1.0 Liter, class A volumetric flask.
2. Shake the reference toxicant concentrate bottle prior to opening.
3. Using a clean, dry, 50 mL, class A volumetric flask, carefully transfer 50 mL of the reference toxicant concentrate into the 1.0 L flask.
4. Rinse the 50 mL flask into the 1.0 L flask using MHSF.
5. Dilute the 1.0 L flask to final volume using MHSF.
6. Cap the flask and mix well.

The effluent prepared according to these instructions represents the 100% effluent. See below for secondary dilution instructions:

1. Split the 100% effluent sample into two 0.5 L aliquots. The first aliquot is your 100% effluent for testing.
2. Dilute the second aliquot with 0.5 L of MHSF and mix. This is your 50% effluent sample.
3. Continue diluting half of each sample with the same volume of MHSF to make your 25%, 12.5% and 6.25% effluent dilutions, which represent all five test dilutions.
4. You are now ready to proceed with the test following your normal procedures.
5. All five test dilutions must be freshly prepared each day of the testing period.
6. Report your results (expressed as percent effluent) for the 48-Hour LC50 endpoint.

Safety:

ERA products may be hazardous and are intended for use by professional laboratory personnel trained in the competent handling of such materials. Responsibility for the safe use of these products rests entirely with the buyer and/or user. Material Safety Data Sheets (MSDS) for all ERA products are available by calling 1-800-372-0122.

DATA CORRECTION CODES AND FACILITY RECORDSData Correction Codes

The following correction codes may have been used to correct errors in the raw data:

A - Addition	I - Illegible
C - Calculation error	R - Recording error
D - Dating error	S - Spelling error
F - Form change	T - Transcription error
G - Grammatical error	W - Write over

Other - _____ Date: _____ Initials: _____

Other - _____ Date: _____ Initials: _____

Facility Record Statement

Some of the records that appear in the raw data may have been provided as photocopies of the original records maintained on file at ABC Laboratories as facility records. This was done by necessity for data that are common to several studies.

EQUIPMENT IDENTIFICATION LIST

Balances

B-1: Sartorius R300S #1621-43 (940)
 B-2: Mettler PM460-#1905-1020 (956)
 B-3: Mettler PM200 #1905-320 (934)
 B-4: Mettler BP3260 #163-1120 (934)
 B-5: Mettler AG245 #1630-981346 (934)
 B-6: Mettler PM480 #1626-141 (940)
 B-7: Mettler PM200 #1714-280 (940)
 B-8: Mettler AJ100 #1626-4030 (940)
(Retired)
 B-9: Mettler PM480 #1626-107 (940)
 B-10: Mettler PM480 #1626-94 (940)
 B-11: Mettler AT261 #1626-2040 (928)
 B-12: Mettler PM480 #1624-28C (GH)
 B-13: Mettler PM400 #1630-200101 (GH)
(Retired)
 B-15: Mettler PM11-K #1622-172 (719)
 B-16: Sartorius 1702MPB #1714-145A (722)
 B-17: Mettler BB2440 #1716-295 (721)
 B-18: Mettler BB2440 #1625-540 (721)
 B-19: Mettler PM-400 #1227-3570 (721)
 B-20: Mettler PM-400 #1625-530 (721)
 B-21: Fisher XD-8K #163-320 (919)
 B-22: Mettler PM 400 #4570-23 (GH)
 B-23: Mettler UMX5 (SN 1125141099)

Centrifuges

CE-1: IEC Clinical #1905-290
 CE-2: IEC CR 6000 #163-309
 CE-3: IEC Clinical #1713-430
 CE-4: IEC-2K #1715-765
 CE-5: IEC Centra-HN #1626-191
 CE-6: IEC Centra-HN #1626-190
 CE-7: IEC B-22 #1626-580
 CE-8: Beckman Model J2-21 #1704-200

Waterbath

W-1: Fisher Model 9510 #1626-4055
 W-2: Fisher Model 9110 #1626-360A
 W-3: Fisher Model 9101 #1626-4040
 W-4: Neslab RTE 100 #1626-990048
 W-5: Fisher #1626-133
 W-6: Labline Imperial III
 W-7: VWR Scientific Model 1203
 W-8: Fisher #516717

Sonicators

S-1: Branson 5200 #1905-465
 S-3: Fisher FS110 #129-3020
 S-4: Baxter S/P Brand #163-343
 S-5: Baxter Brand C6450-11 #163-347A
 S-6: Baxter #163-347B
 S-7: Fisher Model FS110H #RVB0600607088
 S-8: Branson Model 5200 #B520U R-4

Environmental Chamber

EC-2: BioCold #163-313
 EC-3: Norlake Scientific #1626-1070
 EC-4: Norlake Scientific #175-277

pH Meters

pH-1: Beckman Φ 34 #163-640 *(Retired)*
 pH-2: Accumet Model 25 #1630-96-1282
 pH-4: Accumet Model 50 #1626-95-4590 *(Retired)*
 pH-5: Denver Instruments #1630-000000 *(Retired)*
 pH-6: Denver Instruments #1630-010050
 pH-7: Corning 240 #1625-115
 pH-8: Accumet Model AR50 #AR93314000
 pH-9: WTW Model pH 330i #03300091
 pH-10: WTW Model pH 330i #03310029

Incubators

INC-1: Percival Scientific #163-1122
 INC-2: Lab-Line 3597-3 #1900-000 *(Retired)*
 INC-3: Bevco #163-370 *(Retired)*
 INC-4: True Manufacturing #055-1030
 INC-5: Percival Scientific #163-1123
 INC-6: Fisher Isotemp Model 5160 #1626-820
 INC-7: Percival Scientific Model I-36NL
 #1626-974738
 INC-8: VWR 1910 #1713-915
 INC-9: VWR 1910 #1713-860
 INC-10: True Manufacturing #054-1030
 INC-11: Percival Scientific Model I-37LLVLX
 #1626-96-4656
 INC-12: Percival Scientific Model I-37LLVLX
 #1626-4488
 INC-13: Manitowoc AV3A #163-910A
 INC-14: Fisher Scientific 146E #1630-0100006
 INC-15: Fisher Scientific 146E #1630-0100008

Product Chemistry

PC-2: Koehler Model K-16200 Flashpoint Apparatus
 #1626-4190
 PC-3: Brookfield Model DV-I+ Viscometer
 #1626-4492
 PC-4: Mettler FP-90 Central Processor #1626-410
 Mettler FP81HT MBC Cell #1626-411
 PC-5: AccuPyc 1330 Gas Pycnometer #1626-4135A
 PC-6: Fisher Scientific Surface Tensiomat Model 21
 #1626-95-4560
 PC-7: Mel -Temp II Melting Point Apparatus
 #1626-974748
 PC-8: Princo Mercury Barometer #046-3020
 PC-9: Fisher U-tube Manometer #084-3020
 PC-10: Brookfield R/S Rheometer #1630-010024A
 Brookfield PTR Thermoregulator
 #1630-010024B
 PC-11: Mel-Temp II Apparatus Model 1001D
 #1187040915168

EQUIPMENT IDENTIFICATION LIST

Pipets

PI-1: Oxford Macroset 5-10 mL (D) *(Retired)*
 PI-2: Gilson 100-1000 µL (E 8415486)
 PI-3: Eppendorf 100-1000 µL (09450P)
 PI-4: Gilson 10-100 µL (H84 11398)
 PI-5: Gilson 1-10 mL (N05409D)
 PI-7: Gilson P1000 (H137514)
 PI-8: Oxford Benchmate 100-1000 µL (498753)
 PI-10: Oxford Benchmate 100-1000 µL (498701)
 PI-12: Rainin EDP Plus (D41111)
 PI-14: Gilson P200 (L8415256)
 PI-15: Rainin EDP Plus (D40453)
 PI-20: Rainin EDP Plus (E42105)
 PI-22: Gilson 100-1000 µL (S682810)
 PI-23: Gilson 10-100 µL (S691520)
 PI-24: Gilson 1-10 mL (S559756)
 PI-25: Gilson 1000 µL (447507)
 PI-26: Eppendorf 10-100 µL (2147081)
 PI-27: Finnpiptette 0.5-10 µL (G03479)
 PI-28: Eppendorf 500 µL
 PI-29: Eppendorf 50 µL
 PI-30: Eppendorf 100 µL (43977-N) *(Retired)*
 PI-31: Eppendorf 1000 µL (51984-N) *(Retired)*
 PI-32: Eppendorf Pipetman 100-1000 µL (J215300)
 PI-33: Eppendorf Pipetman 100-1000 µL (J215191)
 PI-34: Oxford Sampler 1 mL
 PI-35: Wheaton 20-200 µL *(Retired)*
 PI-36: Wheaton 50-200 µL *(Retired)*
 PI-52: Finnpiptette II, 100-1000µL (GXP:1786)

Ovens/Furnaces

Oven-1: Fisher Isotemp 500 Series #1621-100
 Oven-2: Fisher Isotemp #163-96-1806
 Oven-3: Fisher Vacuum Oven 285 #1626-96-4644
 Oven-4: VWR 1310 Drying Oven #1628-970008
 Oven-5: Napco Model 430 #1704-900
 Oven-6: American Scientific Products DK 62 #3570-1045
 Oven-7: Scientific Products DK 63 #3570-1047
 Oven-8: Hotpack #1905-280
 Oven-9: Thermolyne B2700 Furnace #1628-970010
 Oven-10: Blue M Muffle Furnace #1704-400
 Oven-11: VWR 1390 FM #1628-980126
 Oven-12: VWR 1390 fm #1628-980052
 Oven-13: Fisher Isotemp 500 series Mat ID#031-3510
 Oven-14: Fisher Isotemp 500 series #1622-10
 Oven-15: Blue M Drying Oven #1709-500

Refrigerators/Freezers

A: Walk-In Freezer #1715-740
 B: Walk-In Freezer #1650-0046

Refrigerators/Freezers (cont.)

E: Walk-In Freezer #1650-140B
 F-1: Mr. Winter Freezer #166-13
 F-2: Masterbilt Freezer # 1630-99-0010
 I: Walk-In Refrigerator #1713-625
 R-1: Mr. Winter Refrigerator #166-12
 R-1A: True Refrigerator #1715-840
 R-2: Labline Refrigerator/Freezer 3551 #1715-100
 R-2A: Sample Prep Refrigerator #1625-635
 R-3: True Refrigerator GDM-40 #1626-4010
 R-3A: Sample Prep Refrigerator #1622-100
 R-4: Jordan Refrigerator #1716-480 *(Retired)*
 R-5: True Refrigerator #1905-625
 RF-1: Estate Refrigerator/Freezer TT18EKR00 #1626-350
 RF-2: Fisher Scientific Refrigerator/Freezer ET18NK #1630-010010
 U-1: Upright True Freezer #1715-845
 U-2: Upright Freezer #1905-895
 U-3: Upright Freezer #ABC 201520
 U-4: Upright Freezer #1805-810
 U-5: Freezer Model T-49F, Mat ID#06-0031, (SN 3930805)

Miscellaneous

DFM-1: Fisher Model 650 Digital Flowmeter #1626-2030
 DFM-2: Fisher Model 520 Digital Flowmeter (SN #291146)
 DFM-3: Agilent ADM 1000 Digital Flowmeter (SN #220737458)
 DFM-4: Agilent ADM 1000 Digital Flowmeter (#1630-030004)
 MM-1: Mitutoyo Digital Micrometer (SN #911083)
 MX-1: Thermolyne Speci-Mix #1715-727
 NE-1: Meyer N-EVAP 112 #192-4070
 PT-1: Kinematica AG Ploytron #1626-990050
 PT-2: Brinkman Polytron
 RT-1: Pierce Reacti-Therm Heating Module Model 18870/Evaporating unit 18780 (S/N 548911237883)
 RT-2: Pierce Reacti-Therm Heating Module Model 18800/Evaporating unit 18780 (S/N 5421)
 RT-3: Pierce Reacti-Therm Heating Module Model 18835/Evaporating unit 18785 #160-010040
 SM-1: Shearmill, Divtech #163-95-1162
 SP-1: Sonicator Probe #163-1065
 UV-1: Perkin Elmer Lambda 3B #1905-715 *(Retired)*
 V-1: Vortex-Genie #1715-730
 V-2: Vortex Genie 2, Fisher Scientific Model G-560 (S/N 2-189839)
 V-3: Vortex Labline Supermixer (No. 1290)
 VS-1: Virtis Virtishear #1625-750
 VS-2: Virtis Virtishear #1715-455

EQUIPMENT IDENTIFICATION LIST

Oxidizer

- O-1: Harvey Oxidizer OX 500 #1626-88
(Retired)
O-2: Harvey Oxidizer OX 500 #1626-4035
O-3: Harvey Oxidizer OX-500 #D5-0037

Total Organic Carbon Analyzer

- TOC-3: OI Analytical TOC 1020 #1630-000002
Autosampler #1630-000004 (Retired)

Scintillation Counter

- FD: Beckman (LS 6000 IC) #1626-74A
FE: Beckman (LS 6000 IC) #1626-91A
FF: Beckman (LS 6000 IC) #1626-000006

Thin Layer Chromatography

- TLC 1: Ambis Scanner 4000 CA4570-14 (Retired)
TLC 2: AIS Multispotter #1716-965
TLC 3: AIS Multispotter #1715-545

Environmental Fate

- EF-1: Mettler Toledo HR73 Halogen Moisture
Analyzer #1630-010032
EF-2: Strathkelvin ASR System Oxygen
Interface 928 #1630-010034A Stirplate
#1630-010034B
EF-3: Columbus Instruments Respirometer
System Pump #1630-010036A
Carbon Dioxide Sensor #1630-010036B
Oxygen Sensor #1635-020004
Expansion Unit #1630-010036C
Condenser Power Supply #1630-010036D
Condenser #1630-010036E
EF-4: Bioscience COD Reactor
Model 163-446 #1626-96-4684

Shaker Tables

- ST-1: Innova 2100 #163-1110
ST-2: Innova 2100 #163-1111
ST-3: Innova 2100 #163-1114
ST-4: Lab-Line #163-95-1224B
ST-5: Lab-Line #1630-981328
ST-7: Lab-Line #163-95-1224A
ST-8: VWR Scientific #1905-480
ST-9: Eberbach 6010 #1713-810
ST-10: Eberbach 6010 #1626-4060A
ST-11: Lab-Line Model 3590 #1905-1045
ST-12: Eberbach #1626-106
ST-13: Lab-Line Model 3590 # 1626-4050
ST-14: Burrell Wrist Action Model 75 #1626-000
ST-15: Eberbach #6010

Light Meters

- LM-1: LI-COR Model LI-189 #163-341 with
Photometric Sensor
LM-2: LI-COR Model LI-189 #1630-199501
w/Quantum Sensor

Microscopes

- M-1: Olympus BH-2 #163-384
M-2: Olympus CH #1900-800
M-3: Olympus VM #1903-700
M-4: Fisher Micromaster II 12-561-4B
#1625-980060

Conductivity Meters

- CM-1: Orion Model 140 #150-4070 (Retired)
CM-2: Corning Checkmate 90 #1905-895
(Retired)
CM-3: WTW Cond 330i #04250007

Dissolved Oxygen Meters

- DO-1: YSI Model 54A #1905-730
DO-4: YSI Model 58 #1627-13
DO-5: Corning Checkmate 90 #109-3020
DO-6: YSI Model 95 #1630-991318 (Retired)
DO-7: YSI Model 95 #1626-990090 (Retired)
DO-8: WTW OXi 330 #1630-010004
DO-9: WTW OXi 330i # 1635-020006
DO-10: WTW OXi 330i # 05070021

Micro/Fate Miscellaneous

- AU-1: Market Forge Sterilmatic Autoclave
#1626-79
AU-2: Market Forge Sterilmatic Autoclave
#1626-4474A
AZR-1: Fisher-Lilly Antibiotic Zone Reader
#185 98602
BSC-1: Labconco Purifier Class II Biosafety
Cabinet #1630-010014
CR-1: Cole Parmer Chart Recorder 2D20-0000
#1626-984762
DBI-1: Fisher Scientific Dry Bath Incubator
#1630-010012
LFH-1: Labconco Purifier Clean Bench #1627-24
LFH-2: Labconco Purifier Clean Bench
#1626-4476
OS-1: Lab-line 3540 Orbital Shaker Waterbath
#1626-105
TR-1: Biolog Turbidity Reader
#1630-010047A
UV-2: Genesys 20 Spectrophotometer,
Model 4001/4 #1635-040000

EQUIPMENT IDENTIFICATION LIST

HPLC ComponentPump

P-1: Shimadzu LC-6A #1716-390B *(Retired)*
 P-2: Shimadzu LC-6A #1715-320B *(Retired)*
 P-3: Shimadzu LC-6A #1621-64A *(Retired)*
 P-4: Shimadzu LC-6A #1621-40D
 P-5: Shimadzu LC-10AS #163-1104A
 P-6: Shimadzu LC-10AS #163-1104B
 P-7: Shimadzu LC-6A #1623-78A
 P-9: Varian 9010 #1626-640
 P-11: Varian 9010 #1623-102C2
 P-12: Varian 9010 #1626-2060A
 P-15: Shimadzu LC-6A #1626-72C
 P-16: Varian 9010 #1626-700A
 P-17: Shimadzu LC-6A #1716-115A
 P-18: Shimadzu LC-6A #1716-180A
 P-19: Shimadzu LC-10AS #1626-4502B
 P-20: Shimadzu LC-10AS #16126-4502A
 P-21: Shimadzu LC-6A #1716-185A *(Retired)*
 P-23: Shimadzu LC-6A #1715-780B
 P-24: Shimadzu LC-6A #1716-315B *(Retired)*
 P-25: Shimadzu LC-6A #1625-128B *(Retired)*
 P-26: Shimadzu LC-6A #1625-136 *(Retired)*
 P-27: Shimadzu LC-6A #1622-83 *(Retired)*
 P-28: Shimadzu LC-6A #1622-77A *(Retired)*
 P-29: Shimadzu LC-10AT #1622-96-0196
 P-30: Shimadzu LC-10AT #1622-96-0206
 P-31: HP Series 1100 G1312A #1625-980046H
 P-32: Agilent G1311A #1635-020002A
 P-33: Shimadzu LC-10AT #1625-980024
 P-34: Shimadzu LC-10AT #1625-98022
 P-35: HP Series 1100 G1311A #1626-990026A
 P-36: Shimadzu LC-10AT #1622-96-0194
 P-37: Shimadzu LC-10AS #1625-812A
 P-38: Shimadzu LC-10AT #1623-96-0864
 P-39: Shimadzu LC-10AT #1623-96-0862
 P-40: Agilent G1311A #1629-010168B
 P-41: Agilent G1311A #1629-0100061
 P-42: Shimadzu LC-10AT VP #1625-980022
 P-43: Shimadzu LC-10AT VP #1625-980024
(Retired)
 P-44: KDS Syringe Pump #1630-010048
 P-45: Shimadzu LC-10AS (SN#40319A)
 P-46: Shimadzu LC-10AS (SN#40313A)
 P-47: Shimadzu LC-10AT #1623-97-4716
 P-48: Shimadzu LC-10AT #1623-97-4718
 P-49: KDS Syringe pump (SN# 104955)
 P-50: Agilent G1312A #07-00006B
 P-51: Agilent G1312A #07-00005B
 P-52: Agilent G1311A #07-00008B
 P-53: Agilent G1311A #07-00007B
 P-54: Agilent G1312A #DE 14909757

System Contoller

SC-1: Shimadzu SCL-6A #1715-650A
 SC-3: Shimadzu SCL-10A #163-1104C
 SC-4: Shimadzu SCL-6A #1715-920
 SC-6: Shimadzu SCL-6B #1626-72D *(Retired)*
 SC-7: Shimadzu SCL-6B #1716-185E

System Contoller (cont.)

SC-8: Shimadzu SCL-6B #1716-115E
 SC-9: Shimadzu SCL-10A #1626-4502D
 SC-11: Shimadzu SCL-6B #1625-128D *(Retired)*
 SC-12: Shimadzu SCL-10A vp #1625-980026
 SC-13: Shimadzu SCL-6B #1625-138 *(Retired)*
 SC-14: Shimadzu SCL-6A #1715-795B *(Retired)*
 SC-15: HP Series 1100 G1323 A #1626-990026F
 SC-16: Agilent Control Module G1323B
 #1635-020002F
 SC-17: Shimadzu SCL-10A #1622-96-0198
 SC-18: Shimadzu SCL-10A #1623-96-0866
 SC-19: Agilent G1323B #DE05014297
 SC-20: Shimadzu SCL-10A #1626-4732A
 SC-21: Shimadzu SCL-10A (SN#70024E)
 SC-22: Agilent G1323B # CN 40413281
 SC-23: Agilent G1323B # CN 40413252
 SC-24: Agilent G4208A #07-00006G
 SC-25: Agilent G4208A #07-00005G
 SC-26: Agilent G4208A #07-00008G
 SC-27: Agilent G4208A #07-00007H

Detectors

D-1: Shimadzu SPD-6A #1715-830
 D-2: Shimadzu SPD-6A #1621-40C *(Retired)*
 D-3: Shimadzu SPD-10AV #163-1104E
 D-4: Shimadzu SPD-6A #1623-78D *(Retired)*
 D-5: Shimadzu RID6A #1630-1118
 D-6: Shimadzu RF-551 #1625-0285
 D-7: Varian 9050 #1626-641
 D-8: Varian 9050 #1626-551
 D-9: Varian 9050 #1626-2050B
 D-11: Shimadzu SPD-6A #1716-390F *(Retired)*
 D-14: Shimadzu SPD-6A #1715-300D
 D-15: Shimadzu SPD-6A #1716-185F
 D-16: Shimadzu SPD-10A #1626-4502C
 D-17: Shimadzu SPD-6A #1625-128A *(Retired)*
 D-18: Shimadzu SPD-6A #1905-1015F *(Retired)*
 D-19: HP Series 1100 G1314A #1626-990026E
 D-20: Agilent G1315A #1635-020002E
 D-21: Shimadzu RID-6A #1626-72E
 D-22: Shimadzu RF-10A #1625-788E
 D-23: Shimadzu RF-551 #1625-140
 D-24: HP Series 1100 DAD G1315A #1625-980046E
 D-25: Shimadzu RF-10Ax1 #1625-980030
 D-26: Shimadzu SPD-10A #1625-812E
 D-27: Shimadzu SPD-10AV #100205
 D-28: Agilent G1314A #1629-010168E
 D-29: Agilent G1315A DAD #1629-010006D
 D-30: Shimadzu SPD-10A #1623-97-4724
 D-31: Shimadzu SPD-10AV #1626-97-4732C
 D-32: Shimadzu SPD-10A #1625-95-0865
 D-33: Agilent G1314A #1635-040002
 D-34: Agilent G1321A (fluorescence) #06-0011
 D-35: Agilent G1314B #07-00006F
 D-36: Agilent G1314B #07-00005F
 D-37: Agilent G1314B #07-00008F
 D-38: Agilent G1314B #07-00007F
 D-39: Agilent G1321A #07-0002G

EQUIPMENT IDENTIFICATION LIST

HPLC ComponentInjector

I-1: Varian 9100 #1626-4434 (*Retired*)
 I-2: Shimadzu SIL-6B #1621-40B (*Retired*)
 I-3: Shimadzu SIL-10A #163-1104F
 I-4: Shimadzu SIL-10A #1626-4502E
 I-14: Shimadzu SIL-6B #163-361B (*Retired*)
 I-15: HP Series 1100 G1313A #1626-990026C
 I-16: Shimadzu SIL-10A # 1622-96-0204
 I-19: HP Series 1100 ALS (G1313A)
 #1625-980046G
 I-22: Agilent G1313A ALS #1635-020002C
 I-23: Shimadzu SIL-10A #1625-980028 and
 Shimadzu Sample Cooler #1625-980034
 I-24: Shimadzu SIL-10A #1628-98-0112
 I-25: Agilent G1313A ALS #1629-010168C
 I-26A: Agilent G1329A ALS #1629-010006E
 I-26B: Agilent G1330A ALS Therm #1629-010006H
 I-27: Shimadzu SIL-10A #1623-720A
 I-28: Shimadzu SIL-10A (SN#40022F)
 I-29: Agilent G1329A #07-00006C
 I-30: Agilent G1329A #07-00005C
 I-31: Agilent G1329A #07-00008C
 I-32: Agilent G1329A #07-00007C

Column Heater/Controller

H-1: Eppendorf (CH-30/TC-50) #1621-270B/1623-698
 H-2: Eppendorf (CH-30/TC-50) #163-980A/980B
 H-3: Eppendorf (CH-30/TC-50) #163-1107/1106
 H-4: Eppendorf (CH-30/TC-50) #163-1084/1085
 H-5: Timberline #1623-580
 H-6: Timberline #1626-974746
 H-7: Timberline #1625-000006
 H-8: HP Series 1100 G1316A #1625-980046F
 H-9: Agilent G1316A #1635-020002D
 H-10: HP Series 1100 G1316A #1626-990026D
 H-11: Timberline #1625-000008
 H-12: Timberline #1625-132
 H-13: Agilent G1316A #1629-010168D
 H-14: Agilent G1316A 1629-010006C
 H-15: Eppendorf (CH-30/TC-50) #1623-97-0892
 H-16: Eppendorf (CH-30/TC-50) #1623-97-0900
 H-17: Agilent G1316A #07-00006E
 H-18: Agilent G1316A #07-00005E
 H-19: Agilent G1316A #07-00008E
 H-20: Agilent G1316A #07-00007E

Raytest

RA-1: Ramona #1626-95-4576A
 RA-2: Ramona 92 #1626-4000A
 RA-3: Ramona #1623-530A
 RA-4: Ramona #1626-4498
 RA-9: Ramona 90 #1626-570
 RA-10: Ramona 92 #1623-500

Degassers

DG-1: HP Series 1100 G1322A #1625-980046I
 DG-2: HP Series 1100 G1322A #1626-990026B
 DG-3: Agilent G1322A #1635-020002B
 DG-4: Agilent G1322A #1629-010168A
 DG-5: Agilent G1322A #1629-010006G
 DG-6: Shimadzu Degasser DGU-14A
 #1628-980182
 DG-7: Agilent G1379B #07-00006A
 DG-8: Agilent G1379B #07-00005A
 DG-9: Agilent G1322A #07-00008A
 DG-10: Agilent G1322A #07-00007A

Analog Convertors

AC-1: Raytest Steffi #1626-4486
 AC-2: Raytest Anna #1626-4499
 AC-3: Raytest Steffi (SN#975N39)
 AC-4: Raytest Anna #1623-95-0758
 AC-5: Raytest Anna #1626-95-4576B
 AC-7: Raytest Steffi (SN# 91SN17)

Fraction Collectors

FC-1: Gilson 202 #1626-600
 FC-2: Gilson 202 #1626-380
 FC-3: Gilson 202 #1626-2000
 FC-4: Gilson 202 #1626-76
 FC-5: Gilson 202 #1716-165
 FC-6: Gilson 202 #1626-116
 FC-7: Gilson 202 #1626-2070
 FC-8: Gilson 202 #1626-2080
 FC-9: Gilson 202 #1626-89
 FC-10: Gilson 202 #1626-370
 FC-11: Gilson 202 (SN#150L0247)

HPLC - Misc.

IC-1: Dionex DX500 #1630-990000
 M-1: Agilent G1330B #07-00006D
 M-2: Agilent G1330B #07-00005D
 M-3: Agilent G1330B #07-00008D
 M-4: Agilent G1330B #07-00007D

Shimadzu FCV-12AH Switching Valves

FCV-1: Valve Interface #1622-96-0192 &
 FCV-12AH
 Valves #1622-96-0208 and #1622-96-0210

EQUIPMENT IDENTIFICATION LIST

<u>GC Component</u>	<u>Controller (cont.)</u>
<u>Unit (Detectors)</u>	CO-14: HP 7673 S#3113A26295
GC-1: HP 5890 A (ECD, NPD) #1905-790A (Retired)	CO-15: HP 7673A S#2929A15282
GC-3: HP 5890 Series II (1990) (FID, FPD) #1621-67a	<u>Integrator</u>
GC-4: HP 5890 Series II (1989) (FID, ECD) #1621-47a	IN-1: HP 3392A #1714-575
GC-5: HP 5890 Series II # 1652-0120	IN-2: HP 3392A S#2736A12834 (Retired)
GC-6: HP 5890 Series II #1716-130A (Retired)	IN-3: HP 3396A #1630-981340
GC-7: HP 6890 Series (system) #1625-000014A, B & C	IN-4: HP 3392A #1905-785
GC-8: HP 5890 Series II #1212-3570	IN-5: HP 3392A #1626-530
GC-9: HP 5890 (ECD, NPD) #1715-860A	IN-6: HP 3392A # 1621-67C (Retired)
GC-10: HP 6980N (System) #05-0029	IN-7: HP 3392A #1714-030
GC-11: HP 5890 Series II SN#3310A49331	IN-8: HP 3392A #1715-855B
<u>Injector</u>	IN-9: HP 3392A #1715-275 (Retired)
AI-1: HP 7673A #1630-990006	IN-10: HP 3396A #1716-380
AI-2: HP 7673 #1621-47D	IN-11: HP 3396 S# 3112P26675
AI-3: HP 7673 #1621-67B	IN-12: HP 3396A S#3021P06221
AI-4: HP 7673 #1621-47B	IN-13: HP 3396 #1622-80
AI-5: HP 7373 #1212-3570B	IN-14: HP 3396 #1626-113
AI-6: HP 7673 #1630-CA 2000003	IN-15: HP 3392A #1714-182
AI-7: HP 7673 #1623-430	<u>GC/MSD</u>
AI-8: HP 7673 #1630-CA 2000002	GC/MSD1: HP 5890 Series II Unit #1625-382 HP 5971 MSD #1625-381 (Retired)
AI-9: HP 7673 #1625-380	GC/MSD2: HP 5890 Series II #1625-802B HP 5972 MSD #1625-802C
AI-10: HP 7673 #1625-970976	GC/MSD4: HP 5890 Series II #1625-970975 HP 5971 MSD #1625-970974
AI-11: HP 7673 #1625-106B	GC/MSD5: HP 5890 Series II 1217-3570 HP 5972 MSD Series 3329A00556
AI-12: HP 7673A #1716-130C	GC/MSD6: HP 6890N #05-0026A HP 5973 MSD #05-0026D
<u>Controller</u>	<u>GC - Misc.</u>
CO-1: HP 7673A #1905-790C (Retired)	PT-1: Tekmar Purge & Trap LSC 2000/ALS2016 #1621-72/1621-73
CO-2: HP 7673 #1630-981338	
CO-3: HP 7673 #1621-67D	
CO-4: HP 7673BG1512A #1630-990028	
CO-5: HP 7673BG1512A #1630-990026	
CO-6: HP 7673 #1218-3570F	
CO-7: HP 7673 #1652-0115B	
CO-8: HP7673 #1630-CA200001	
CO-9: HP 7673 #1625-970077	
CO-10: HP 7673 S#3207A28329	
CO-11: HP 7673 S#3435A36472	
CO-12: HP 7673 S#3113A25310	
CO-13: HP 7673 S#2730A08203	

EQUIPMENT IDENTIFICATION LIST

LC/MS ComponentLC-MS Detector

LC-MS1: HP Series 1100 G1946A MSD
#1625-98046A (*Retired*)

LC-MS/MS Detector

LC-MS/MS1: Sciex API 365 LC-MS/MS
#1623-970936 (*Retired*)

LC-MS/MS system C

LC-MS/MS: Sciex API 4000 LC-MS/MS
s/n V05930408

COLCOM: Agilent 1100 (G1316A)
s/n DE40540224

WPALS: Agilent 1100 (G1367A)
s/n DE43603694

ALSTherm: Agilent 1100 (G1330B)
s/n DE13209062

DEGASSER: Agilent 1100 (G1379A)
s/n JP40717836

BinPump: Agilent 1100 (G1312A)
s/n DE43616138

LC-MS/MS system D

LC-MS/MS: Sciex API 4000 LC-MS/MS
05-0007

COLCOM: Agilent 1100 (G1316A)
s/n DE43643483

WPALS: Agilent 1100 (G1367A)
s/n DE40503580

ALSTherm: Agilent 1100 (G1330B)
s/n DE13208593

DEGASSER: Agilent 1100 (G1379A)
s/n JP40716675

BinPump: Agilent 1100 (G1312A)
s/n DE40915993

Cont. Mod: Agilent 1100 (G1323B)
s/n CN40413252

Switch Valve: Valco s/n EM2MO2136
Switch Valve: Valco s/n 42607

LC-MS/MS system H

LC-MS/MS: Sciex API 5000 LC-MS/MS
s/n AG01174601

COLCOM: Agilent 1100 (G1316A)
s/n DE43651011

WPALS: Agilent 1100 (G1367A)
s/n DE60405011

ALSTherm: Agilent 1100 (G1330B)
s/n DE13213796

DEGASSER: Agilent 1100 (G1379A)
s/n JP54427608

BinPump: Agilent 1100 (G1312A)
s/n DE43619654

Cont. Mod: Agilent 1100 (G1323B)
s/n CN40414186

Switch Valve: Valco s/n E2P72035

Key to Morphological And Behavioral Observations For Invertebrate Toxicity Tests

Test Substance: unknown - Ceriodaphnia Study No.: DMRQA 27UNIVERSAL

Dead (D) - Animals exhibiting no response to a physical stimulus (e.g., gentle prodding or stream of water/air from a pipet). **Not used in daphnid tests.**

Discoloration (DC) - Animals exhibiting abnormal color patterns when compared to the control(s). This may include complete or partial light or dark discoloration.

Normal (N) - Animals not exhibiting behavioral or morphological abnormalities.

Not Found (NF) - An animal not observed as dead. It may have died without being detected, was trapped or stuck on the side of a retention or test chamber and not found, or simply not observed. Animals not found may be treated as dead at the end of the test.

Erratic Movement (E) - Animals moving in a rapid-disorderly fashion.

Lethargic (L) - Live animals display abnormal slow movement/reduced activity. **Not used in daphnid tests.**

AQUATIC INVERTEBRATES

Immobile (I) - No observed movement of appendages or postabdomen within 15 seconds after gentle agitation of the test chamber or gentle disturbance of the daphnid itself. **Used exclusively in daphnid tests.**

On Bottom (B) - Animals resting on the bottom of the test chamber. **Not used in daphnid tests.**

Quiescent (Q) - Movement of one or more appendages or postabdomen within 15 seconds after gentle agitation of the test chamber or gentle disturbance of the daphnid itself. **Used exclusively in daphnid tests.**

Trailing Extraneous Material (T) - Animal observed with extraneous material trailing from the body.

Floating on Surface (F) - Animals floating on the surface of the test solution.

SOIL INVERTEBRATES

Elongated (EL) - Animal is elongated in an abnormal fashion.

Flacid (FL) - Animal is observed to be abnormally soft, lacking normal turgidity.

Lesions on Body Surface (LE) - Animals observed with ulcers or lesions on the body surface.

Surfacing (S) - Animals are observed on the surface of the soil.

Swellings (SW) - Animal observed with abnormal midsegmented swellings.

BENEFICIAL ARTHROPODS

On Back (OB) - Live animals on their backs. **Used exclusively for honeybee tests.**

**KEY TO TEST SOLUTION OBSERVATIONS DURING
AQUATIC TOXICITY TESTS**

Test Substance:

unknown - Ceriodaphnia

Study No.:

DMR-27

Clear (CC) – Test solution is clear but has a tint of color due to the presence of the test substance. Coloration observation should be noted.

Cloudy (C) – Test solution is murky in appearance.

Foam (F) – Foam on surface of test solution.

None (N) – Test solution is clear and colorless (i.e., no coloration associated with test substance) with no visible particulates, surface film, undissolved test substance, or precipitate.

Particulate Matter (PM) – Test solution which has solids present, either in suspension or on the bottom of the test chamber. The solids are not believed to be a component of the test substance.

Precipitate (PR) – Solid substance present either floating at the surface of the test solution or settled on the bottom of the test chamber. The substance is assumed to be a component of the test substance which has become separated from the test solution by the action of a chemical or physical change. Never used when observation is made immediately after addition of the test substance stock.

Surface Film (SF) – Test solution with a substance partially or entirely covering the surface of the solution. The substance may have an oily or scum-like appearance.

Undissolved Test Substance (UTS) – Used in two instances: 1) when the test substance falls out of solution immediately upon addition to the dilution water; 2) when the test substance is added directly into the dilution water and it does not completely dissolve.

KEY TO MORPHOLOGICAL AND BEHAVIORAL OBSERVATIONS FOR VERTEBRATE TOXICITY TESTSTest Substance: unknown - Fathead minnow Study No.: DMRGA-27

Dead (D) - Animals exhibiting no gill movement and no response to a physical stimulus (e.g., gentle prodding or stream of water from a pipet).

Discoloration (DC) - Animals exhibiting abnormal color patterns when compared to the control(s). This may include complete or partial light or dark discoloration.

Edema (ED) - Animals that appear to be retaining water and have a bloated appearance.

Erratic Swimming Pattern (E) - Animals moving in a rapid disorderly fashion...

Exophthalmia (EX) - Abnormal protrusion of the eyeball.

Floating on Surface (FL) - Animals floating on the surface of the test solution.

Fungus (FU) - Egg and/or animal exhibiting fungal infection.

Hemorrhagic (H) - Animals that are bleeding internally and/or subcutaneously.

Hypersensitivity (HP) - Animals that appear to be hypersensitive to physical stimuli.

Irregular Respiration (I) - Animals that exhibit rapid, slow, or irregular opercular movement.

Jaw Deformity (J) - Abnormal morphological development of the mouth and/or jaw usually observed in rainbow trout.

Loss of Equilibrium (LE) - Animals that have lost the ability to maintain normal orientation in the water column (e.g., nose up, nose down, listing to one side, etc.).

Normal (N) - Animals not exhibiting behavioral or morphological abnormalities. In tests where positive counts are not performed on a daily basis, an N indicates that **all remaining** animals in a test chamber are not exhibiting behavioral or morphological abnormalities.

Not Found (NF) - It is possible that an animal may die and never be observed as dead, get trapped on a drain screen or the side of the test chamber and not found, or simply not observed. Animals not found will be considered as dead unless later observed at a subsequent observation.

On Bottom (B) - Animals laying on the bottom of the test chamber.

Spinal Curvature (C) - An animal exhibiting lateral or dorsal curvature of the spine.

Surfacing (S) - Animals observed breaking the surface of the test solution. This condition can be associated with low dissolved oxygen concentrations or is the result of exposure to a test substance which interferes with oxygen uptake across the gills.

Swim-Up (U) - Animals swimming up into the water column from the bottom of the test chamber. Normal behavior exhibited by salmonids as they deplete their yolk-sac and begin to accept an external diet.

**KEY TO TEST SOLUTION OBSERVATIONS DURING
AQUATIC TOXICITY TESTS**

Test Substance: *unknown - FIM*Study No.: *DMRQA-27*

Clear (CC) – Test solution is clear but has a tint of color due to the presence of the test substance. Coloration observation should be noted.

Cloudy (C) – Test solution is murky in appearance.

Foam (F) – Foam on surface of test solution.

None (N) – Test solution is clear and colorless (i.e., no coloration associated with test substance) with no visible particulates, surface film, undissolved test substance, or precipitate.

Particulate Matter (PM) – Test solution which has solids present, either in suspension or on the bottom of the test chamber. The solids are not believed to be a component of the test substance.

Precipitate (PR) – Solid substance present either floating at the surface of the test solution or settled on the bottom of the test chamber. The substance is assumed to be a component of the test substance which has become separated from the test solution by the action of a chemical or physical change. Never used when observation is made immediately after addition of the test substance stock.

Surface Film (SF) – Test solution with a substance partially or entirely covering the surface of the solution. The substance may have an oily or scum-like appearance.

Undissolved Test Substance (UTS) – Used in two instances: 1) when the test substance falls out of solution immediately upon addition to the dilution water; 2) when the test substance is added directly into the dilution water and it does not completely dissolve.

PHOTOPERIOD AND LIGHT MEASUREMENTS

Test Substance: _____ Study No.: _____

Photoperiod: 16 Hours Light; 8 Hours Darkness; Transition Period: 2 x 30 min

Location: Diluter # _____ Waterbath # _____
 Environmental Chamber # _____

Type of Lighting: Fluorescent Other: _____

Photoperiod Initiation Date/Time: already on

Prepared By: JLK Date: 23 JUL 07

LIGHT READINGS

Study Day	Date	Initials	LUX	Measurement Position
<u>0</u>	<u>23 JUL 07</u>	<u>JLK</u>	<u>680.3</u>	<u>Mid bath</u>

Location of Sensor: Level of Test Media
 Other: _____

Meter Used: LI-COR Model LI-189 ABC material control #163-341 used with
 photometric sensor Serial No. (PH 4447)
 Other: _____

CHEMICAL/PHYSICAL MEASUREMENTS OF DILUTION WATER

DILUTION WATER: FW (blended) FW (aged) NSW FW (well) Salt
 Other (describe): Synthetic

TEMPERATURE: °C

DO: mg/L

pH:

ALKALINITY^a: 32 mL^b 64 mg/L^c Station 1 / Station 2

HARDNESS^d: 4.3 mL^b 86 mg/L^c Station 1 / Station 2

CONDUCTIVITY: 298 μS or mS

OTHER:

INSTRUMENTS:

Thermometer ID: Correction factor: °C

Dissolved Oxygen Meter ID:

pH Meter ID:

Conductivity and/or Salinity Meter ID: CM-B3

COMMENTS:

① TLK 23JUL07

^aHach Bromcresol Green - Methyl Red Indicator Solution Lot # A6166

^bNumber mL of titrant (mL of titrant x 20 = mg/L as CaCO₃)

^cTotal alkalinity and hardness measured using a titrimetric method adapted from Standard Methods (mg/L as CaCO₃)

^dHach Buffer Solution Hardness 1 Lot # A6299 & Hach ManVer 2 Hardness Indicator Lot # A7016

Analysis by: TLK Date: 23JUL07

PREPARATION AND CHARACTERIZATION OF ABC SYNTHETIC WATER

PREPARATION

Water is generally prepared in 20, 60, or 120 liter increments. Calcium sulfate should be dissolved separately then added to the container. The water should be vigorously aerated for ~24 hours prior to conducting water chemistry. The water will expire four weeks from the date prepared. The following target weights, in grams, should be used except for sodium selenate where a 400 mg/L stock solution is prepared in a 100mL volumetric. Sodium selenate may only be utilized as required by the individual project requirements.

Balance used: B2 B5 Other _____

Chemical	20 liters	60 liters	120 liters	Actual weight (g)	Supplier	Lot Number
MgSO ₄	1.20	3.60	7.20	3.6650	ACROS	B0119120
NaHCO ₃	1.92	5.76	11.52	5.7608	ACROS	A0222959
KCl	0.08	0.24	0.48	0.2409	ACROS	B0113189
CaSO ₄	1.20	3.60	7.20	3.6008	ACROS	A0222961
Na ₂ SeO ₄	0.1 mL	0.3 mL	0.6 mL	0.0401	SIGMA	075K0689

Weighed By: JLK

Date: 06 JUL 07

Prepared By: JLK

Date: 09 JUL 07

CHARACTERIZATION

Hardness^d: 4.4 mL^b 88 mg/L^c

The acceptable range for hardness is 80-100 mg/L if out of this range see notes below.

Acceptable Unacceptable

Notes:

^a HACH buffer solution hardness 1 lot number: A6299 & HACH ManVer 2

hardness indicator lot number: A6279

^b Milliliters of titrant times twenty equals mg/L as CaSO₄

^c Total alkalinity and hardness measured using a titrimetric method adapted from standard methods (mg/L as CaCO₃)

Batch was discarded

Batch was adjusted by the addition of the following: _____

Analysis By: JLK / kw

Date: 10 JUL 07

"THIS IS AN EXACT COPY OF
THE ORIGINAL DOCUMENT"

BY JLK DATE 24 JUL 07

V. DMRQA 27 DAPHNID EXPOSURE

PREPARATION OF EFFLUENT CONCENTRATIONS (Volume/Volume)

Effluent ID: Unknown - Ceriodaphnia Study No.: DMRQA-27

Preparation/Transfer By: kw Time: 3:15p Date: July 23, 07

Effluent Sample ID	Aliquot Volume (mL)	Dilution water Volume (mL) ^a	Total Volume (mL)	Final Concentration (%) ^b
100%	5 1000	NA	1000	100%
100%	500	500	1000	50%
50%	500	500	1000	25%
25%	500	500	1000	12.5%
12.5%	500	500	1000	6.25%

Controls: 100% ABC synthetic water
 100% receiving water

*Solutions for study, intake
 0-40 PW July 23, 07*

^aDilution water type: ABC synthetic water
 Effluent receiving water
 Other

^b These solutions used for: *Ceriodaphnia dubia* test
 Fathead minnow test
 Other

Remarks: *100% effluent prepared with unknown Reference Toxicant (50 ml) into 1L of total volume synthetic water. Serial dilutions made from 100% effluent PW July 23, 07*

01 RRA 24, 23, 07

Ceriodaphnia dubia test:
 Test chamber: 30-mL Plastic _____ mL Glass beaker
 Number of replicates: 4 Solution volume per replicate: ~25 mL

Fathead minnow test:
 Test chamber: 300-mL Plastic _____ mL Glass beaker
 Number of replicates: _____ Solution volume per replicate: _____ mL

Other:
 Test chamber: _____
 Number of replicates: _____
 Solution volume per replicate: _____ mL

Prepared By: kw Date: July 29, 07

PREPARATION OF EFFLUENT CONCENTRATIONS (Volume/Volume)

Effluent ID: Unknown - Ceriodaphnia Study No.: DMRGA-27

Preparation/Transfer By: KEJ Time: 4 pm Date: July 24, 07

Effluent Sample ID	Aliquot Volume (mL)	Dilution water Volume (mL) ^a	Total Volume (mL)	Final Concentration (%) ^b
100%	1000	NA	1000	100%
100%	500	500	1000	50%
50%	500	500	1000	25%
25%	500	500	1000	12.5%
12.5%	500	500	1000	6.25%

Controls: 100% ABC synthetic water
 100% receiving water

*Solutions for 24hr renewal
 per July 24, 07*

^aDilution water type: ABC synthetic water
 Effluent receiving water _____
 Other _____

^b These solutions used for: *Ceriodaphnia dubia* test
 Fathead minnow test
 Other _____

Remarks: *Solutions prepared same as Day 0 per July 24, 07*

Ceriodaphnia dubia test:
 Test chamber: 30-mL Plastic _____ mL Glass beaker
 Number of replicates: 4 Solution volume per replicate: 25 mL

Fathead minnow test:
 Test chamber: 300-mL Plastic _____ mL Glass beaker
 Number of replicates: _____ Solution volume per replicate: _____ mL

Other:
 Test chamber: _____
 Number of replicates: _____
 Solution volume per replicate: _____ mL

Prepared By: KEJ Date: July 24, 07

TEST ORGANISM ADDITION

Test Substance: unknown - ceriodaphnia Study No.: DMRQA-27 Preliminary Screen DefinitiveSpecies Added: Ceriodaphnia dubia Lot No.: 07C02/07C03Number Added/Test Chamber: 5Total Number/Treatment: 20

Check appropriate method of addition:

- Added test organisms by ones and/or twos (no more than 10% at a time if <20 organisms per chamber or no more than 20% at a time if ≥20 organisms per chamber) proceeding from control(s), low to high test substance treatments, and repeating steps as necessary until the required number of individuals were added to each test chamber.
- One individual was added to each container containing only dilution water proceeding from containers labeled control(s), low to high test substance treatments and replicate I.D., if needed. The process was repeated until each container contained the required number of individuals. The test organisms within each container were then released from container/transferred via pipet (circle one) into the corresponding test chamber:
- Impartially added the required number of individuals to a set of labeled containers; each container representing one treatment or treatment replicate, if treatment replicated. Each container was randomly assigned to a treatment or treatment replicate by random number generator or lottery assignment. The individuals within each container were then released from container/transferred via pipet (circle one) into the corresponding test chamber.
- Other (Describe):

Comments:Prepared by: hvjDate: July 27, 07

07JLK 18JUL07
07JLK 18JUL07 **CLADOCERAN CULTURE RECORD** 07JLK 18JUL07

Species: Ceriodaphnia dubia Lot No.: 07CD3
 Date Initiated: 18JUL07 No. Used to Initiate: 1 per vial; 24 per Lot
 Initiated from: 07CD2 Thermometer No.: CR-1 Water Type: Age Blended
 Food Type/Lot No.: DS071707 SEL071707
 Note: Original source received from USGS-CERC on March 13, 2001
 Prepared By: JLK Date: 18JUL07

Date/ID	18JUL07JLK	19JUL07JLK	20JUL07JLK	21JUL07JLK	22JUL07JLK	23JUL07JLK
Temp/Fed	25 ✓	25 ✓	25 ✓	25 ✓	24 ✓	24 ✓
No. Young	—	—	—	—	—	—
1			3		7	11
2			4		7	11
3			3		8	9
4			2		10	12
5			2		7	13
6			4		4	6
7			7		15	12
8			5		6	8
9			4		8	10
10			1		12	11
11			1		10	1
12			5		8	9
13			2		7	13
14			4		10	8
15			7		12	10
16			8		8	13
17			1		6	12
18			5		10	9
19			7		10	9
20			5		9	11
21			5		4	7
22			1		7	8
23			5		15	1
24			9		4	7

used for
study
DMRQA-17
July 23, 2007

Notes: DS = Daphnia Supplement SEL = *Selenastrum* sp. (aka *pseudokirchneriella* sp.)

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BY JLK DATE 24JUL07

003LK 23JUL07

CLADOCERAN CULTURE RECORD

Species: Ceriodaphnia dubia Lot No.: 07CD2

Date Initiated: 16JUL07 No. Used to Initiate: 1 per vial: 24 per Lot

Initiated from: 07CD1 Thermometer No.: CR-1 Water Type: Age Blended

Food Type/Lot No.: SEL-0/6/707 DS-071707

Note: Original source received from USGS-CERC on March 13, 2001

Prepared By: JLK Date: 23JUL07

Date/ID	23JUL07 JLK					
Temp/Fed	24 ✓					
No. Young	—					
25	5					
26	9					
27	6					
28	dead					
29	11					
30	6					
31	9					
32	10					
33	0					
34	7					
35	9					
36	9					
37	9					
38	15					
39	10					
40	11					
41	11					
42	2					
43	5					
44	9					
45	6					
46	5					
47	10					
48	17					
	used for study DMRQA-27 Nov 24, 2003					

Notes: DS = Daphnia Supplement SEL = *Selenastrum* sp. (aka *pseudokirchneriella* sp.)

"THIS IS AN EXACT COPY OF THE ORIGINAL DOCUMENT"

BY JLK DATE 24JUL07

CLADOCERAN CULTURE RECORD

Species: Ceriodaphnia dubia Lot No.: 07CD2
 Date Initiated: 16 JUL 07 No. Used to Initiate: 1 per vial: 24 per Lot
 Initiated from: 07CD1 Thermometer No.: CR-1 Water Type: Age Blended
 Food Type/Lot No.: SEL062607 DS062607
 Note: Original source received from USGS-CERC on March 13, 2001
 Prepared By: JLK Date: 16 JUL 07

Date/ID	16 JUL 07 JLK	17 JUL 07 JLK	18 JUL 07 JLK	19 JUL 07 JLK	20 JUL 07 JLK	21 JUL 07 JLK	22 JUL 07 JLK
Temp/Fed	25 ✓	25 ✓	25 ✓	25 ✓	25 ✓	25 ✓	24 ✓
No. Young	-	-	-	-	-	-	-
25			5		5		7
26			6		7		6
27			5		4		5
28			5		7		7
29			4		5		6
30			5		2		4
31			5		8		16
32			4		6		8
33			5		2		7
34			6		3		12
35			8		2		10
36			4		4		6
37			5		3		4
38			5		7		3
39			10		6		3
40			5		2		2
41			5		3		9
42			6		4		8
43			12		5		9
44			15		2		4
45			7		3		4
46			9		5		13
47			5		7		10
48			6		10		7
			Young used to initiate CD3				

Notes: DS = Daphnia Supplement SEL = *Selenastrum* sp. (aka *pseudokirchneriella* sp.)

"THIS IS AN EXACT COPY OF THE ORIGINAL DOCUMENT"

BY JLK DATE 24 JUL 07

MORTALITY AND BEHAVIORAL OBSERVATIONS

Test Substance: Utkmaen - Ceriodaphnia Study No.: DMRQA-27

Definitive Preliminary Screen

Test Species: Ceriodaphnia dubia Date Initiated: July 23, 07
 Time Test Organism Addition Started: 3:15p Completed: 3:40p
 Prepared by: RW Date: July 23, 07

Test Concentration (%)	REP	Event: 24hr			Event: 48hr		
		# Alive	Cum. # D ¹	Sublethal Obs. ^a	# Alive	Cum. # D ¹	Sublethal Obs. ^a
Control (0)	A	5	0	5N	5	0	5N
	B	5	0	5N	5	0	5N
	C	5	0	5N	5	0	5N
	D	5	0	5N	5	0	5N
L-1 (6.25)	A	5	0	5N	5	0	5N
	B	5	0	5N	5	0	5N
	C	5	0	5N	5	0	5N
	D	5	0	5N	5	0	5N
L-2 (12.5)	A	5	0	5N	5	0	5N
	B	5	0	5N	5	0	5N
	C	5	0	5N	5	0	5N
	D	5	0	5N	5	0	5N

Observer	<u>RW</u>	<u>RW</u>
Date	<u>July 24, 07</u>	<u>3:55p July 25, 07</u>
Time	<u>4:20p</u>	<u>3:55p</u>

Note: Dead organisms removed and discarded after each observation period.
 Notes (initial & date all entries):

^a See Form CDG 018/CDG 019 for Code Key.

MORTALITY AND BEHAVIORAL OBSERVATIONS

Test Substance: unknown - ceriodaphnia Study No.: DMA0A-27

Definitive Preliminary Screen

Test Species: Ceriodaphnia dubia Date Initiated: July 23, 07
 Time Test Organism Addition Started: 3:15p Completed: 3:40p
 Prepared by: RJ Date: July 23, 07

Test Concentration (%)	REP	Event: 24hr			Event: 48hr		
		# Alive	Cum. # D/D	Sublethal Obs. ^a	# Alive	Cum. # D/D	Sublethal Obs. ^a
L-3 (25)	A	5	0	SN	5 ^⓪	0	SN
	B	5	0	SN	5	0	SN
	C	5	0	SN	5	0	SN
	D	5	0	SN	5	0	SN
L-4 (50)	A	5	0	SN	5	0	SN
	B	5	0	SN	5	0	SN
	C	5	0	SN	5	0	SN
	D	5	0	SN	5	0	SN
L-5 (100)	A	0	5	5Z	—	5	—
	B	0	5	5Z	—	5	—
	C	0	5	5Z	—	5	—
	D	0	5	5Z	—	5	—

Observer: RJ RJ
 Date: July 24, 07 July 25, 07
 Time: 4:20p 3:55p

Note: Dead organisms removed and discarded after each observation period.
 Notes (initial & date all entries): ⓪ RJ 25, 07

^a See Form CDG 018/CDG 019 for Code Key.

WATER QUALITY (Temperature, DO & pH)									
Test Substance: <u>Unknown - Ceriodaphnia</u>		Study No.: <u>DMRQA-27</u>							
Test Concentration (%)	R E P	Time Period: <u>24 hr new</u> Circle One: P C <input checked="" type="radio"/>			R E P	Time Period: <u>48 hr old</u> Circle One: P C <input checked="" type="radio"/>			
		Temp (°C)	DO (mg/L)	pH		Temp (°C)	DO (mg/L)	pH	
Control (0)	-	24.7	7.96	8.04	-	24.5	7.90	8.21	
L-1 (6.25)	-	24.6	8.09	8.02	-	24.5	7.82	8.10	
L-2 (12.5)	-	24.6	8.13	8.02	-	24.6	7.74	8.09	
L-3 (25)	-	24.5	8.17	8.02	-	24.6	7.71	8.07	
L-4 (50)	-	24.6	8.18	8.00	-	24.7	7.67	8.05	
L-5 (100)	-	24.8	8.15	8.01	-	-	-	8.0	
Verifying Device Temperature ^a	-	-	-	-	-	-	-	-	
Multiscan Probe Temperature ^b	-	-	-	-	-	-	-	-	
Device ID:		P110	0010	P110		P110	0010	P110	
Device correction factor (°C)		0.0				0.0			
Date:		July 24, 07				July 25, 07			
Time:		4P				4P			
By:		R1	R2	R		R1	R2	R	
^a Verifying Device ID: _____	Correction Factor: _____	°C Location: _____							
^b Multiscan Probe ID: <u>EEB56</u>	Correction Factor: _____	<u>DMRQA-27 July 25, 07</u>							

C = Composite solutions. P = Parent solutions prior to distribution to test vessels. R = Replicate solutions.

TEST SOLUTION OBSERVATIONS

Test Substance: *unknown - Ceriodaphnia* Study No.: *DMP01-27*

Definitive Preliminary Screen

Test Concentration (%)	REP	Observations ^a				
		Initiation:	Event: ^{new} 24	Event: ^{old} 24	Event: 48	Event:
Control (6)	A-D	N	^{new} N	N	N	
6.25%	A-D	N	N	N	N	
12.5%	A-D	N	N	N	N	
25%	A-D	N	N	N	N	
50%	A-D	N	N	N	N	
100%	A-D	N	N	N	N	
Observer		<i>RW</i>	<i>RW</i>	<i>RW</i>	<i>RW</i>	
Date		<i>July 23, 07</i>	<i>July 24, 07</i>	<i>July 24, 07</i>	<i>July 25, 07</i>	
Time		<i>3:15p</i>	<i>4p</i>	<i>4p</i>	<i>2:10p</i>	

Notes:

^a see Form CDG 020 for code key

ABC LABORATORIES, INC.
SAS PROGRAM LC_EC50 (VER 2.3) RUN ON 25JUL07
STUDY NUMBER: DMRQA-27 WITH TEST MATERIAL: Unknown Toxicant
REFTOX USING DATA FILE: U:\WARBRITTONR\STATS\QA27CDNOM.prn

PRINTOUT OF RAW DATA
BY EXPOSURE PERIOD

----- EXP_PERD=24-Hour -----

TREATMENT GROUP	CONCENTRATION	NUMBER EXPOSED	NUMBER RESPONDING
Control	0.00	20	0
6.25	6.25	20	0
12.5	12.50	20	0
25	25.00	20	0
50	50.00	20	0
100	100.00	20	20

----- EXP_PERD=48-Hour -----

TREATMENT GROUP	CONCENTRATION	NUMBER EXPOSED	NUMBER RESPONDING
Control	0.00	20	0
6.25	6.25	20	0
12.5	12.50	20	0
25	25.00	20	0
50	50.00	20	0
100	100.00	20	20

ABC LABORATORIES, INC.
SAS PROGRAM LC_EC50 (VER 2.3) RUN ON 25JUL07
STUDY NUMBER: DMRQA-27 WITH TEST MATERIAL: Unknown Toxicant
REFTOX USING DATA FILE: U:\WARBRITTONR\STATS\QA27CDNOM.prn

ANALYSIS FOR Ceriodaphnia dubia AT 24-Hour

NUMBER OF PROPORTIONS BETWEEN 0 AND 1 = 0

ESTIMATES BASED ON THE PROBIT MODEL CAN NOT BE CALCULATED.

ANALYSIS FOR Ceriodaphnia dubia AT 24-Hour

RESULTS CALCULATED USING THE SPEARMAN-KARBER METHOD

Conc. (percent)	Number Exposed	Number Resp.	Observed Proportion Responding	Smoothed/Adj. Proportion Responding
0.0000	20	0	0.0000	0.0000
6.2500	20	0	0.0000	0.0000
12.5000	20	0	0.0000	0.0000
25.0000	20	0	0.0000	0.0000
50.0000	20	0	0.0000	0.0000
100.0000	20	20	1.0000	1.0000

UNTRIMMED SPEARMAN-KARBER ESTIMATES:

LC50: 70.711 percent

95% CONFIDENCE LIMITS CANNOT BE CALCULATED.

THE BEST ESTIMATE FOR THE LOWER LIMIT IS THE
HIGHEST CONCENTRATION WHOSE SMOOTHED
PROPORTION IS ZERO= 50 percent

THE BEST ESTIMATE FOR THE UPPER LIMIT IS THE
LOWEST CONCENTRATION WHOSE SMOOTHED
PROPORTION IS ONE= 100 percent

THE AUTOMATIC TRIM IS EQUAL TO ZERO.
UNTRIMMED AND TRIMMED SPEARMAN-KARBER ESTIMATES ARE THE SAME.

ABC LABORATORIES, INC.
SAS PROGRAM LC EC50 (VER 2.3) RUN ON 25JUL07
STUDY NUMBER: DMRQA-27 WITH TEST MATERIAL: Unknown Toxicant
REFTOX USING DATA FILE: U:\WARBRITTONR\STATS\QA27CDNOM.prn

ANALYSIS FOR Ceriodaphnia dubia AT 48-Hour

NUMBER OF PROPORTIONS BETWEEN 0 AND 1 = 0

ESTIMATES BASED ON THE PROBIT MODEL CAN NOT BE CALCULATED.

ANALYSIS FOR Ceriodaphnia dubia AT 48-Hour

RESULTS CALCULATED USING THE SPEARMAN-KARBER METHOD

Conc. (percent)	Number Exposed	Number Resp.	Observed Proportion Responding	Smoothed/Adj. Proportion Responding
0.0000	20	0	0.0000	0.0000
6.2500	20	0	0.0000	0.0000
12.5000	20	0	0.0000	0.0000
25.0000	20	0	0.0000	0.0000
50.0000	20	0	0.0000	0.0000
100.0000	20	20	1.0000	1.0000

UNTRIMMED SPEARMAN-KARBER ESTIMATES:

LC50: 70.711 percent

95% CONFIDENCE LIMITS CANNOT BE CALCULATED.

THE BEST ESTIMATE FOR THE LOWER LIMIT IS THE
HIGHEST CONCENTRATION WHOSE SMOOTHED
PROPORTION IS ZERO= 50 percent

THE BEST ESTIMATE FOR THE UPPER LIMIT IS THE
LOWEST CONCENTRATION WHOSE SMOOTHED
PROPORTION IS ONE= 100 percent

THE AUTOMATIC TRIM IS EQUAL TO ZERO.
UNTRIMMED AND TRIMMED SPEARMAN-KARBER ESTIMATES ARE THE SAME.

THIS COMPLETE ANALYSIS WAS CONDUCTED

BY: Ryan Warbritton

ON: 25JUL07

THE ANALYSIS WAS REVIEWED

BY: *WJ*

ON: *17 Sep 07*

ABC LABORATORIES, INC.
SAS PROGRAM CH_TOX (VER 2.0) RUN ON 25JUL07
Ceriodaphnia dubia REFTOX OF Unknown Toxicant
STUDY NUMBER: DMRQA-27 --- DATA FILE: U:\WARBRITTONR\STATS\QA27CDNOEC.

ANALYSIS FOR NUMBER SURVIVING
PRINTOUT OF RAW DATA

TREATMENT	REPLICATE	INITIAL NUMBER	FINAL NUMBER	PERCENT SURVIVAL
CONTROL	A	5	5	100
CONTROL	B	5	5	100
CONTROL	C	5	5	100
CONTROL	D	5	5	100
100	A	5	0	0
100	B	5	0	0
100	C	5	0	0
100	D	5	0	0
12.5	A	5	5	100
12.5	B	5	5	100
12.5	C	5	5	100
12.5	D	5	5	100
25	A	5	5	100
25	B	5	5	100
25	C	5	5	100
25	D	5	5	100
50	A	5	5	100
50	B	5	5	100
50	C	5	5	100
50	D	5	5	100
6.25	A	5	5	100
6.25	B	5	5	100
6.25	C	5	5	100
6.25	D	5	5	100

N = 24

ABC LABORATORIES, INC.
SAS PROGRAM CH_TOX (VER 2.0) RUN ON 25JUL07
Ceriodaphnia dubia REFTOX OF Unknown Toxicant
STUDY NUMBER: DMRQA-27 --- DATA FILE: U:\WARBRITTONR\STATS\QA27CDNOEC.

ANALYSIS FOR NUMBER SURVIVING
ALL VALUES IN THE DATA FILE ARE BEING PROCESSED
DESCRIPTIVE STATISTICS (N, MIN, MAX, MEAN, STANDARD DEVIATION, CV
AND UPPER AND LOWER 95% CONFIDENCE LIMITS)
BY TREATMENT GROUP

TREATMNT	NO_REPS	MINIMUM	MAXIMUM	AVERAGE	STD_DEV	CV	LOWER_CI	UPPER_CI
CONTROL	4	100	100	100	0	0	100	100
100	4	0	0	0	0	.	0	0
12.5	4	100	100	100	0	0	100	100
25	4	100	100	100	0	0	100	100
50	4	100	100	100	0	0	100	100
6.25	4	100	100	100	0	0	100	100

ABC LABORATORIES, INC.
 SAS PROGRAM CH_TOX (VER 2.0) RUN ON 25JUL07
 Ceriodaphnia dubia REFTOX OF Unknown Toxicant
 STUDY NUMBER: DMRQA-27 --- DATA FILE: U:\WARBRITTONR\STATS\QA27CDNOEC.

ANALYSIS FOR NUMBER SURVIVING
 ALL VALUES IN THE DATA FILE ARE BEING PROCESSED
 COMPARING THE TREATMENT GROUPS TO THE CONTROL

RESULTS OF TESTS FOR NORMALITY & HOMOGENEITY OF VARIANCE

Results of Shapiro-Wilk Test for Normality Conducted
 on Rep Residuals for each Treatment.
 P value <0.01 indicates Nonnormality.
 P value >0.01 indicates Normality.

GROUP	NO. OF REPS	RAW DATA	TRANSFORMED
		p VALUE	p VALUE
CONTROL	4	<0.01	<0.01
100	4	<0.01	<0.01
12.5	4	<0.01	<0.01
25	4	<0.01	<0.01
50	4	<0.01	<0.01
6.25	4	<0.01	<0.01

Results of Levene's Test for Homogeneity of Variance
 Conducted on Residuals for each Treatment.
 P value less than 0.01 indicates Unequal Treatment Variances.
 P value greater than 0.01 indicates Equal Treatment Variances.

VARIABLE	DEGREES OF FREEDOM		F	p VALUE
	NUMERATOR	DENOMINATOR		
RAW DATA	5	18	.	.
TRANSFORMED	5	18	0.00	1.0000

Conclusion:

Assumptions of Normality and Homogeneity of Variance
 Are Not Met for the Raw or Transformed Values.
 A Nonparametric Analysis is Performed on the Ranks of the Data.

ABC LABORATORIES, INC.
SAS PROGRAM CH_TOX (VER 2.0) RUN ON 25JUL07
Ceriodaphnia dubia REFTOX OF Unknown Toxicant
STUDY NUMBER: DMRQA-27 --- DATA FILE: U:\WARBRITTONR\STATS\QA27CDNOEC.

ANALYSIS FOR NUMBER SURVIVING
ALL VALUES IN THE DATA FILE ARE BEING PROCESSED
COMPARING THE TREATMENT GROUPS TO THE CONTROL

DESCRIPTIVE STATISTICS AND RESULTS OF DUNNETT'S TEST

GROUP	MEAN	STD.DEV.	p	SIG.
CONTROL	100.00	0.000		
6.25	100.00	0.000	.	
12.5	100.00	0.000	.	
25	100.00	0.000	.	
50	100.00	0.000	.	
100	0.000	0.000	.	

Note: No variability. Statistical comparisons could not be made.

ABC LABORATORIES, INC.
SAS PROGRAM CH_TOX (VER 2.0) RUN ON 25JUL07
Ceriodaphnia dubia REFTOX OF Unknown Toxicant
STUDY NUMBER: DMROA-27 --- DATA FILE: U:\WARBRITTONR\STATS\QA27CDNOEC

ANALYSIS FOR NUMBER SURVIVING
ALL VALUES IN THE DATA FILE ARE BEING PROCESSED

RESULTS OF FISHER'S ONE-TAILED EXACT TEST

GROUP	PERCENT SURVIVAL	FISHER'S 1-TAILED P	HOCHBERG SIGNIFICANCE
CONTROL	100.0		
100	0.0	0.0000	*
12.5	100.0	1.0000	
25	100.0	1.0000	
50	100.0	1.0000	
6.25	100.0	1.0000	

Note: * indicates significant differences from control at the 0.05 level using a one-tailed Fisher's test with Hochberg's familywise adjustment for significance.

THIS COMPLETE ANALYSIS WAS CONDUCTED

BY: Ryan Warbritton ON: 25JUL07

fw 25.07

THE ANALYSIS WAS REVIEWED

BY: JKG ON: 17 Sep 07

VI. DMRQA 27 FATHEAD MINNOW EXPOSURE

PREPARATION OF EFFLUENT CONCENTRATIONS (Volume/Volume)

Effluent ID: UNKNOWN FHM Study No.: DMPBA-27

Preparation/Transfer By: RJ Time: 2:30 Date: July 23, 07

Effluent Sample ID	Aliquot Volume (mL)	Dilution water Volume (mL) ^a	Total Volume (mL)	Final Concentration (%) ^b
100%	2000	MA	2000	100%
100%	1000	1000	2000	50%
50%	1000	1000	2000	25%
25%	1000	1000	2000	12.5%
12.5%	1000	1000	2000	6.25%

- Controls: 100% ABC synthetic water
 100% receiving water
- ^aDilution water type: ABC synthetic water
 Effluent receiving water _____
 Other _____
- ^b These solutions used for: *Ceriodaphnia dubia* test
 Fathead minnow test
 Other _____

Remarks: 100% effluent prepared w/ some solution brought to 2L total volume w/ synthetic water
Serial dilutions prepared w/ synthetic water from the 100% effluent RJ July 23, 07

- Ceriodaphnia dubia* test:
 Test chamber: 30-mL Plastic _____ mL Glass beaker
 Number of replicates: _____ Solution volume per replicate: _____ mL
- Fathead minnow test:
 Test chamber: 300-mL Plastic 1000 mL Glass beaker
 Number of replicates: 2 Solution volume per replicate: 500 mL
- Other:
 Test chamber: _____
 Number of replicates: _____
 Solution volume per replicate: _____ mL

Prepared By: RJ Date: July 23, 07

TEST ORGANISM ADDITION

Test Substance: Unknown - FHA Study No.: DMR01 27

Preliminary Screen Definitive

Species Added: Fathead minnow Lot No.: 0807 FHM

Number Added/Test Chamber: 10

Total Number/Treatment: 20

Check appropriate method of addition:

Added test organisms by ones and/or twos (no more than 10% at a time if <20 organisms per chamber or no more than 20% at a time if ≥20 organisms per chamber) proceeding from control(s), low to high test substance treatments, and repeating steps as necessary until the required number of individuals were added to each test chamber.

One individual was added to each container containing only dilution water proceeding from containers labeled control(s), low to high test substance treatments and replicate I.D., if needed. The process was repeated until each container contained the required number of individuals. The test organisms within each container were then released from container/transferred via pipet (circle one) into the corresponding test chamber.

Impartially added the required number of individuals to a set of labeled containers; each container representing one treatment or treatment replicate, if treatment replicated. Each container was randomly assigned to a treatment or treatment replicate by random number generator or lottery assignment. The individuals within each container were then released from container/transferred via pipet (circle one) into the corresponding test chamber.

Other (Describe):

Comments:

Prepared by: PW Date: July 23, 08

FISH CULTURE RECORD

Species: Fathead Minnow Lot No: 0807 FHM
 Tank/Aquarium No.: 4M22 Source: ABC In House SPC No. 0607
 Water Type: Well/Blended Food Lot No.: SS070707 FF062907 BP072007
 Date Received: July 10, 07 No. Received: 1500
 Thermometer ID No.: CR-4, CR-5, CR-6, CR-7 Other: _____
 Photoperiod: 16 hours light; 8 hours darkness; 30 minute transition period
 Prepared by: [Signature] Date: July 10, 07

Date	ID	Mort.	Feeding		°C Temp.	Treatment and/or Comments
			AM	PM		
July 10, 07	[Signature]	-	-	-	25	OR No July 10, 07
11 JULY 07	WIEW	-	✓	✓	25	③ W 11 JULY 07 WIEW
12 JULY 07	WIEW	0	✓	✓	25	
13 JULY 07	WIEW	0	✓	✓	25	
14 JULY 07	KCS	0	✓	✓	25	
15 JULY 07	KCS	0	✓	✓	25	
16 JULY 07	WIEW	0	✓	✓	25	"THIS IS AN EXACT COPY OF THE ORIGINAL DOCUMENT." BY 24 JLR DATE 24 JUL 07
17 JULY 07	WIEW	0	✓	✓	25	
18 JULY 07	WIEW	0	✓	✓	25	
19 JULY 07	WIEW	0	✓	✓	25	
20 JULY 07	WIEW	0	✓	✓	25	
21 JULY 07	WIEW	0	✓	✓	25	
22 JUL 07	WIEW	0	✓	✓	25	③ R 22 JUL 07 WIEW
23 JUL 07	WIEW	0	✓	✓	25	used 20 for DMR 04-27 07 23 07

*SS = Salmon Starter FF = Flake Food BS = Brine Shrimp BP = Brachionus plicatilis

OR 22 JUL 07 WIEW CORRECTION 24 JUL 07 WIEW

MORTALITY AND BEHAVIORAL OBSERVATIONS

Test Substance: Unknown - FHM Study No.: DMRGA-27

Definitive Preliminary Screen

Test Species: Fathom Mussels Date Initiated: July 23, 07
 Time Test Organism Addition Started: 2:30 p Completed: 2:52 p
 Prepared by: RLD Date: 24, 23, 07

Test Concentration (%)	REP	Event: <u>246</u>			Event: <u>48W</u>		
		# Alive	Cum. # D/I	Sublethal Obs. ^a	# Alive	Cum. # D/I	Sublethal Obs. ^a
Control (0)	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
L-1 (6.25)	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
L-2 (12.5)	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
L-3 (25)	A	10	0	10N	10	0	10N
	B	10	0	10N	10	0	10N
L-4 (50)	A	2	8	8D 2N	2	8	2N
	B	1	9	1D 9D	1	9	1N
L-5 (100)	A	0	10	10D	—	10	—
	B	0	10	10D	—	10	—

Observer	<u>RLD</u>	<u>RLD</u>
Date	<u>July 24, 07</u>	<u>July 25, 07</u>
Time	<u>2:30p</u>	<u>2:10p</u>

Note: Dead organisms removed and discarded after each observation period.
 Notes (initial & date all entries):

^a See Form CDG 018/CDG 019 for Code Key.

WATER QUALITY (Temperature, DO & pH)								
Test Substance: _____					Study No.: _____			
Test Concentration (%)	R E P	Time Period: <u>Initiation</u> Circle One: P C <u>(R)</u>			R E P	Time Period: <u>24 hr</u> Circle One: P C <u>(R)</u>		
		Temp (°C)	DO (mg/L)	pH		Temp (°C)	DO (mg/L)	pH
Control (0%)	A	24.8	7.97	8.15	A	25.2	7.05	7.86
	B	24.7	8.01	8.15	B	25.2	7.16	7.86
L-1 (6.25%)	A	24.8	8.05	8.11	A	25.3	7.27	7.81
	B	24.8	8.07	8.13	B	25.3	7.16	7.82
L-2 (12.5%)	A	24.9	8.06	8.12	A	25.3	7.21	7.81
	B	24.9	8.02	8.13	B	25.3	7.21	7.83
L-3 (25%)	A	25.1	8.05	8.12	A	25.3	7.17	7.80
	B	25.0	8.06	8.13	B	25.3	7.10	7.82
L-4 (50%)	A	25.1	8.13	8.11	A	25.4 25.4	6.41	7.75
	B	25.1	8.14	8.12	B	25.3	6.68	7.75
L-5 (100%)	A	25.1	8.15	8.09	A	25.4	5.02	7.63
	B	25.1	8.04	8.09	B	25.3	5.32	7.61
Verifying Device Temperature ^a	—	—	—	—	—	—	—	—
Multiscan Probe Temperature ^b	—	—	—	—	—	—	—	—
Device ID:		PH-10	DO-10	PH-10		PH10	DO10	PH10
Device correction factor (°C)		0.0				0.0		
Date:		23 JUL 07				July 24, 07		
Time:		3:30 pm				4P		
By:		JLK	JLK	JLK		<i>R</i>	<i>R</i>	<i>R</i>
^a Verifying Device ID: _____		Correction Factor: _____						
^b Multiscan Probe ID: _____		Correction Factor: _____		°C Location: _____				
① R <i>R</i> July 24, 07								
C = Composite solutions. P = Parent solutions prior to distribution to test vessels. R = Replicate solutions.								

WATER QUALITY (Temperature, DO & pH)								
Test Substance: _____			Study No.: _____					
Test Concentration (%)	R E P	Time Period: <u>48hr</u> Circle One: P C <u>R</u>			R E P	Time Period: _____ Circle One: P C R		
		Temp (°C)	DO (mg/L)	pH		Temp (°C)	DO (mg/L)	pH
Control (6)	A	25.1	7.29	7.94				
	B	25.1	7.34	7.92				
L-1 (6.25)	A	25.1	7.48	7.87				
	B	25.2	7.35	7.91				
L-2 (12.5)	A	25.1	7.42	7.92				
	B	25.1	7.41	7.93				
L-3 (25)	A	25.2	7.36	7.91				
	B	25.1	7.36	7.92				
L-4 (50)	A	25.2	7.21	7.87				
	B	25.2	7.47	7.88				
L-5 (100)	A	-	-	-				
	B	-	-	-				
Verifying Device Temperature ^a	-	-	-	-	-	-	-	-
Multiscan Probe Temperature ^b	-	-	-	-	-	-	-	-
Device ID:		PH10	DD10	PH10				
Device correction factor (°C)		0.0						
Date:		July 25, 07						
Time:		4P						
By:		<i>HW</i>	<i>HW</i>	<i>HW</i>				
* Verifying Device ID: _____		Correction Factor: _____						
* Multiscan Probe ID: <u>EFE 58</u>		Correction Factor: _____		°C Location: _____				

C = Composite solutions. P = Parent solutions prior to distribution to test vessels. R = Replicate solutions.

TEST SOLUTION OBSERVATIONS						
Test Substance: <i>Unknown Flw</i>			Study No.: <i>DMRQA-27</i>			
<input checked="" type="checkbox"/> Definitive <input type="checkbox"/> Preliminary <input type="checkbox"/> Screen						
Test Concentration (%)	REP	Observations ^a				
		Initiation:	Event: <i>24h</i>	Event: <i>48h</i>	Event:	Event:
Control (0)	A-B	N	N	N		
L-1 (6.25)	A-B	N	N	N		
L-2 (12.5)	A-B	N	N	N		
L-3 (25)	A-B	N	N	N		
L-4 (50)	A-B	N	N	N		
L-5 (100)	A-B	N	N	N		
Observer		<i>AD</i>	<i>RC</i>	<i>RC</i>		
Date		<i>July 23, 07</i>	<i>July 24, 07</i>	<i>July 25, 07</i>		
Time		<i>3P</i>	<i>2:20P</i>	<i>2P</i>		
Notes:						

^a see Form CDG 020 for code key

ABC LABORATORIES, INC.
SAS PROGRAM LC_EC50 (VER 2.3) RUN ON 25JUL07
STUDY NUMBER: DMRQA-27 WITH TEST MATERIAL: Unknown Toxicant
REFTOX USING DATA FILE: U:\WARBRITTONR\STATS\QA27FHNOM.prn

PRINTOUT OF RAW DATA
BY EXPOSURE PERIOD

----- EXP_PERD=24-Hour -----

TREATMENT GROUP	CONCENTRATION	NUMBER EXPOSED	NUMBER RESPONDING
Control	0.00	20	0
6.25	6.25	20	0
12.5	12.50	20	0
25	25.00	20	0
50	50.00	20	17
100	100.00	20	20

----- EXP_PERD=48-Hour -----

TREATMENT GROUP	CONCENTRATION	NUMBER EXPOSED	NUMBER RESPONDING
Control	0.00	20	0
6.25	6.25	20	0
12.5	12.50	20	0
25	25.00	20	0
50	50.00	20	17
100	100.00	20	20

ABC LABORATORIES, INC.
SAS PROGRAM LC_EC50 (VER 2.3) RUN ON 25JUL07
STUDY NUMBER: DMRQA-27 WITH TEST MATERIAL: Unknown Toxicant
REFTOX USING DATA FILE: U:\WARBRITTONR\STATS\QA27FHNOM.prn

ANALYSIS FOR Fathead Minnow AT 24-Hour

NUMBER OF PROPORTIONS BETWEEN 0 AND 1 = 1

ESTIMATES BASED ON THE PROBIT MODEL CAN NOT BE CALCULATED.

ANALYSIS FOR Fathead Minnow AT 24-Hour

RESULTS CALCULATED USING THE SPEARMAN-KARBER METHOD

Conc. (Percent)	Number Exposed	Number Resp.	Observed Proportion Responding	Smoothed/Adj. Proportion Responding
0.0000	20	0	0.0000	0.0000
6.2500	20	0	0.0000	0.0000
12.5000	20	0	0.0000	0.0000
25.0000	20	0	0.0000	0.0000
50.0000	20	17	0.8500	0.8500
100.0000	20	20	1.0000	1.0000

UNTRIMMED SPEARMAN-KARBER ESTIMATES:

LC50: 39.229 Percent
95% LOWER CONFIDENCE LIMIT: 35.119 Percent
95% UPPER CONFIDENCE LIMIT: 43.821 Percent

THE AUTOMATIC TRIM IS EQUAL TO ZERO.
UNTRIMMED AND TRIMMED SPEARMAN-KARBER ESTIMATES ARE THE SAME.

ABC LABORATORIES, INC.
SAS PROGRAM LC_EC50 (VER 2.3) RUN ON 25JUL07
STUDY NUMBER: DMRQA-27 WITH TEST MATERIAL: Unknown Toxicant
REFTOX USING DATA FILE: U:\WARBRITTONR\STATS\QA27\FHNOM.prn

ANALYSIS FOR Fathead Minnow AT 48-Hour

NUMBER OF PROPORTIONS BETWEEN 0 AND 1 = 1

ESTIMATES BASED ON THE PROBIT MODEL CAN NOT BE CALCULATED.

ANALYSIS FOR Fathead Minnow AT 48-Hour

RESULTS CALCULATED USING THE SPEARMAN-KARBER METHOD

Conc. (Percent)	Number Exposed	Number Resp.	Observed Proportion Responding	Smoothed/Adj. Proportion Responding
0.0000	20	0	0.0000	0.0000
6.2500	20	0	0.0000	0.0000
12.5000	20	0	0.0000	0.0000
25.0000	20	0	0.0000	0.0000
50.0000	20	17	0.8500	0.8500
100.0000	20	20	1.0000	1.0000

UNTRIMMED SPEARMAN-KARBER ESTIMATES:

LC50: 39.229 Percent
95% LOWER CONFIDENCE LIMIT: 35.119 Percent
95% UPPER CONFIDENCE LIMIT: 43.821 Percent

THE AUTOMATIC TRIM IS EQUAL TO ZERO.
UNTRIMMED AND TRIMMED SPEARMAN-KARBER ESTIMATES ARE THE SAME.

THIS COMPLETE ANALYSIS WAS CONDUCTED

BY: Ryan Warbritton

ON: 25JUL07

for July 25, 07

THE ANALYSIS WAS REVIEWED

BY: *JKJ*

ON: *17 Sep 07*

ABC LABORATORIES, INC.
SAS PROGRAM CH_TOX (VER 2.0) RUN ON 25JUL07
Fathead minnow REFTOX OF Unknown Toxicant
STUDY NUMBER: DMRQA-27 --- DATA FILE: U:\WARBRITTONR\STATS\QA27FHNOEC.

ANALYSIS FOR NUMBER SURVIVING
PRINTOUT OF RAW DATA

TREATMENT	REPLICATE	INITIAL NUMBER	FINAL NUMBER	PERCENT SURVIVAL
CONTROL	A	10	10	100
CONTROL	B	10	10	100
100	A	10	0	0
100	B	10	0	0
12.5	A	10	10	100
12.5	B	10	10	100
25	A	10	10	100
25	B	10	10	100
50	A	10	2	20
50	B	10	1	10
6.25	A	10	10	100
6.25	B	10	10	100

N = 12

ABC LABORATORIES, INC.
 SAS PROGRAM CH_TOX (VER 2.0) RUN ON 25JUL07
 Fathead minnow REFTOX OF Unknown Toxicant
 STUDY NUMBER: DMRQA-27 --- DATA FILE: U:\WARBRITTONR\STATS\QA27FHNOEC.

ANALYSIS FOR NUMBER SURVIVING
 ALL VALUES IN THE DATA FILE ARE BEING PROCESSED
 DESCRIPTIVE STATISTICS (N, MIN, MAX, MEAN, STANDARD DEVIATION, CV
 AND UPPER AND LOWER 95% CONFIDENCE LIMITS)
 BY TREATMENT GROUP

TREATMENT	N	MIN	MAX	MEAN	STANDARD DEVIATION	CV	LOWER 95% CI	UPPER 95% CI
CONTROL	2	100	100	100	0.00000	0.0000	100.000	100.000
100	2	0	0	0	0.00000	.	0.000	0.000
12.5	2	100	100	100	0.00000	0.0000	100.000	100.000
25	2	100	100	100	0.00000	0.0000	100.000	100.000
50	2	10	20	15	7.07107	47.1405	-48.531	78.531
6.25	2	100	100	100	0.00000	0.0000	100.000	100.000

ABC LABORATORIES, INC.
SAS PROGRAM CH_TOX (VER 2.0) RUN ON 25JUL07
Fathead minnow REFTOX OF Unknown Toxicant
STUDY NUMBER: DMRQA-27 --- DATA FILE: U:\WARBRITTONR\STATS\QA27FHNOEC.

ANALYSIS FOR NUMBER SURVIVING
ALL VALUES IN THE DATA FILE ARE BEING PROCESSED
COMPARING THE TREATMENT GROUPS TO THE CONTROL

RESULTS OF TESTS FOR NORMALITY & HOMOGENEITY OF VARIANCE

Shapiro-Wilk Test for Normality cannot be Conducted
When there are only 2 Reps for each Treatment.

Results of Bartlett's Test for Homogeneity of Variance
Conducted on Residuals for each Treatment.
P value less than 0.01 indicates Unequal Treatment Variances.
P value greater than 0.01 indicates Equal Treatment Variances.

VARIABLE	DEGREES OF FREEDOM	U	p VALUE
SURVIVAL	5	6.34	0.2743
TRANSFORM	5	-24.29	.

Conclusion:

Assumptions of Normality and Homogeneity of Variance
Are Met for the Raw Data Values.
A Parametric Analysis is Performed on the Raw Data.

ABC LABORATORIES, INC.
SAS PROGRAM CH_TOX (VER 2.0) RUN ON 25JUL07
Fathead minnow REFTOX OF Unknown Toxicant
STUDY NUMBER: DMRQA-27 --- DATA FILE: U:\WARBRITTONR\STATS\QA27FHNOEC.

ANALYSIS FOR NUMBER SURVIVING
ALL VALUES IN THE DATA FILE ARE BEING PROCESSED
COMPARING THE TREATMENT GROUPS TO THE CONTROL

DESCRIPTIVE STATISTICS AND RESULTS OF DUNNETT'S TEST

GROUP	MEAN	STD.DEV.	p	SIG.
CONTROL	100.00	0.000		
6.25	100.00	0.000	0.8333	
12.5	100.00	0.000	0.8333	
25	100.00	0.000	0.8333	
50	15.000	7.071	0.0000	*
100	0.000	0.000	0.0000	*

Note: * indicates significant differences from control at the 0.05 level using a one-tailed Dunnett's test.
Results based on 2 reps, 6 error degrees of freedom, and error root mean square= 2.8868.
Assumptions of normality and homogeneity met.
Parametric analysis performed on raw data values.
A treatment mean of about 91.839 or smaller may be declared significantly less than the control.

ABC LABORATORIES, INC.
SAS PROGRAM CH_TOX (VER 2.0) RUN ON 25JUL07
Fathead minnow REETOX OF Unknown Toxicant
STUDY NUMBER: DMRQA-27 --- DATA FILE: U:\WARBRITTONR\STATS\QA27EHNOEC.

ANALYSIS FOR NUMBER SURVIVING
ALL VALUES IN THE DATA FILE ARE BEING PROCESSED

RESULTS OF FISHER'S ONE-TAILED EXACT TEST

GROUP	PERCENT SURVIVAL	FISHER'S 1-TAILED P	HOCHBERG SIGNIFICANCE
CONTROL	100.0		
100	0.0	0.0000	*
12.5	100.0	1.0000	
25	100.0	1.0000	
50	15.0	0.0000	*
6.25	100.0	1.0000	

Note: * indicates significant differences from control at the 0.05 level using a one-tailed Fisher's test with Hochberg's familywise adjustment for significance.

THIS COMPLETE ANALYSIS WAS CONDUCTED

BY: Ryan Warbritton ON: 25JUL07

RW 25 Jul 07

THE ANALYSIS WAS REVIEWED

BY: *WJ* ON: 17 Sep 07

Ameren Services

Environmental Services
314.554.2824 (Phone)
314.554.4182 (Facsimile)
ggary@ameren.com

One Ameren Plaza
1901 Chouteau Avenue
PO Box 66149
St. Louis, MO 63166-6149

March 12, 2009

Dept of Natural Resources
Water Pollution Control Program
Planning Section
P.O. Box 176
Jefferson City, MO 65102



RE: AmerenUE Callaway Power Plant
NPDES Permit No. MO-0098001
2008 Whole Effluent Toxicity (WET) Test Report

Dear Sir or Madam:

Per Special Condition No. 9 of the Union Electric Company, d/b/a AmerenUE Callaway Power Plant, NPDES Permit MO-0098001, please find enclosed the 2008 Whole Effluent Toxicity (WET) Test Report. The WET test was completed in August of 2008. However, it was recently discovered that the 2008 report had not been submitted. Please except our apology for this late submittal as we inadvertently misplaced this report and failed to submit the test results last fall at the time they were received from ABC Laboratories Inc.

As indicated in the attached report, the mortality did not result in a statistically significant difference as compared to the control and was less than 10%; therefore the effluent passes for both the *Ceriodaphnia dubia* and the flathead minnow.

Please call me at 314-554-2824 if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Gail P. Gary".

Gail P. Gary, Consulting Chemist
Environmental Services Water Quality

Attachment

SPONSOR

Ameren UE, Callaway Power Plant
P.O. Box 620
Fulton, Missouri 65251

STUDY TITLE

Acute Toxicity of Ameren UE Composite Sample
To *Ceriodaphnia dubia* and Fathead Minnows (*Pimephales promelas*)

NPDES PERMIT NO.

MO-0098001

AUTHOR

John Aufderheide

REPORT COMPLETED ON

August 25, 2008

PERFORMING LABORATORY

ABC Laboratories, Inc.
Chemical Services
7200 E. ABC Lane
Columbia, Missouri 65202

PROJECT ID

Final Report No. 64061

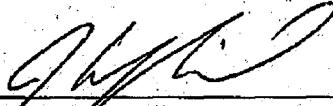
Page 1 of 6

SIGNATURE PAGE

Submitted by:

ABC Laboratories, Inc.
7200 E. ABC Lane
Columbia, Missouri 65202

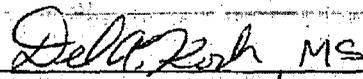
Prepared by:



John Aufderheide
Senior Toxicologist/Study Director
ABC Laboratories, Inc.

25 Aug 08
Date

Approved by:



Jon E. Rhodes, M.S.
Director, ABC Chemical Services
ABC Laboratories, Inc.

25 Aug 2008
Date

ACUTE TOXICITY COMPENDIUM

Subject: Acute Toxicity of Ameren UE Composite Sample To *Ceriodaphnia dubia* and Fathead Minnows (*Pimephales promelas*)

Sponsor: Ameren UE, Callaway Power Plant
Junction Hwy CC & Route O
P.O. Box 620
Fulton, Missouri 65251

Effluent: Composite Sample

Concentrations: Synthetic water control, raw water control (Receiving water), 10%, and 100% Composite Sample (Effluent – Outfall 001)

Dilution Water: Receiving water (Raw Water)

Test Dates: Initiated August 7, 2008 Terminated August 9, 2008

Length of Test: 48 Hours

Test Organisms: *Ceriodaphnia dubia* and Fathead Minnows

Organism Source: In-house cultures

Age at Initiation: *Ceriodaphnia dubia*: <24-hour old neonates
Fathead Minnows: 8 days post hatch

Test Procedures and Conditions:

I. *Ceriodaphnia dubia*

Duration:	48 hours
Temperature:	25±1°C
Lighting:	Ambient Laboratory lighting, 16:8-hour light:dark
Observations:	48 hours
Test chambers:	50 mL
Volume per chamber:	25 mL
Replicates per treatment:	4
Organisms per chamber:	5
Organisms per treatment:	20
Control water:	ABC Synthetic water
Dilution water:	Raw water (Receiving water)
Effluents:	10% and 100% Ameren UE Composite Sample

II. Fathead Minnow

Duration: 48 hours
Temperature: 25±1°C
Lighting: Ambient Laboratory lighting, 16-8 hr. light-dark
Observations: 24 and 48 hours
Test chambers: 1,000-mL glass jars
Volume per chamber: 400 mL
Replicates per treatment: 4
Organisms per chamber: 10
Organisms per treatment: 40
Control water: ABC Synthetic water
Dilution water: Raw water (Receiving water)
Effluents: 10% and 100% Ameren UE Composite Sample

III. Methods

The methodology used for this effluent test was that described by the U.S. EPA and Ameren UE NPDES Permit referenced below:

Weber, C.I. 2002. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 5th ed. U.S. Environmental Protection Agency, EPA/821/R-02/012.

The Ameren UE NPDES permit Number: MO-0098001

Receipt Water Quality

WATER QUALITY ON RECEIPT								
Sample ID	Temp (°C)	DO (mg/L)	pH	Conductivity (µS/cm)	Hardness (mg/L)	Alkalinity (mg/L)	Total Ammonia (mg/L)	Total Chlorine (mg/L)
RAW Water	16.4	8.95	7.96	449	184	150	0	0
Composite Sample	20.9	8.96	8.32	1,210	518	162	1.0	0

Results:

I. Mortality

PERCENT MORTALITY		
Sample ID	<i>Ceriodaphnia dubia</i>	<i>Pimephales promelas</i>
ABC Synthetic Water Control	0	0
Raw Water (Receiving Water Control)	0	8 ^a
10% Outfall Composite	5 ^a	0
100% Outfall Composite	5 ^a	0

^a Animals were not found. One *Ceriodaphnia dubia* out of 20 total and three fathead minnows out of 40 total were not found at test termination and assumed had died during the exposure. These mortality values did not result in a statistically significant difference as compared to the control (Dunnett's test; $p < 0.05$).

III. *Ceriodaphnia dubia* water quality Ranges

Treatment	Temperature (°C)	Dissolved Oxygen (mg/L) ^a	pH	Conductivity (µS)
ABC Control	24.5 – 24.7	7.5 – 8.6	7.8 – 8.2	297 – 425
Receiving Water	24.5 – 24.8	8.0 – 8.6	8.0 – 8.5	453 – 610
10% Effluent	24.4 – 24.9	8.1 – 8.6	8.1 – 8.5	536 – 730
100% Effluent	24.4 – 24.9	7.9 – 8.5	8.1 – 8.6	1,211 – 1,674

^a 100% oxygen saturation at 24 and 25°C is 8.1 and 7.9 mg/L respectively

IV. Fathead minnow water quality Ranges

Treatment	Temperature (°C)	Dissolved Oxygen (mg/L) ^a	pH	Conductivity (µS)
ABC Control	24.4 – 24.7	8.0 – 8.2	7.8 – 8.1	298 – 342
Receiving Water	24.5 – 24.7	7.9 – 8.2	8.0 – 8.4	450 – 511
10% Effluent	24.6 – 24.8	7.9 – 8.0	8.1 – 8.4	530 – 602
100% Effluent	24.6 – 24.8	8.1 – 8.3	8.3 – 8.5	1,192 – 1,348

^a 100% oxygen saturation at 24 and 25°C is 8.1 and 7.9 mg/L respectively

Discussion:

There was one *Ceriodaphnia dubia* out of a total of 20 daphnids in the 10% and 100% effluent treatments that were not found at test termination. It was assumed that these animals died during the exposure. There were three fathead minnows out of a total of 40 fish in the 100% receiving water (i.e., Raw Water) treatment that were not found at test termination. It was assumed that these animals died during the exposure. A statistical analysis (Dunnett's test; $p < 0.05$) of the percent survival data was performed to determine if the mortality observed in the 10% and 100% effluent for the *Ceriodaphnia dubia* test and in the 100% receiving water treatment for the fathead minnow test resulted in a statistically significant difference as compared to the control survival. Since there was no mortality in the receiving water or effluent treatments that exceeded 50%, statistical analysis to determine a median effect/lethal concentration (EC_{50}/LC_{50}) was not necessary. The mortality did not result in a statistically significant difference as compared to the control and was also less than 10%, therefore, the effluent passes the requirements for an acceptable study for both the *Ceriodaphnia dubia* and the fathead minnow tests by meeting the criterion for survival at the Acceptable Effluent Concentration (AEC).

bcc: D. Schultz
GPG
SCW/JCP/FLP
File: WQ 3.1.2.4