Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37384-2000

December 13, 2006

State of Tennessee
Department of Environment and Conservation
Division of Water Pollution Control
Enforcement & Compliance Section
6th Floor, L & C Annex
401 Church Street
Nashville, Tennessee 37243-1534

Attention: Mr. Chip Hannah

Dear Mr. Hannah:

SEQUOYAH NUCLEAR PLANT - DISCHARGE MONITORING REPORT FOR NOVEMBER 2006

Enclosed is the November 2006 Discharge Monitoring Report for Sequoyah Nuclear Plant. Please contact me at (423) 843-6700 if you have any questions or comments.

Sincerely,

Stephanie A. Howard

Stephanie A. Howard
Principal Environmental Engineer
Signatory Authority for
J. Randy Douet
Site Vice President
Sequoyah Nuclear Plant

Enclosure
cc (Enclosure):

Chattanooga Environmental Assistance Center
Division of Water Pollution Control
State Office Building, Suite 550
540 McCallie Avenue
Chattanooga, Tennessee 37402-2013

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Printed on recycled paper

IE25

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE SB-2A)
SODDY - DAISY TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY

ATTN: Stephanie A. Howard

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

TN0026450	101 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From	06	11	01	To	06	11	30

MAJOR
(SUBR 01)
F - FINAL
DIFFUSER DISCHARGE
EFFLUENT

*** NO DISCHARGE [ ] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING AVERAGE	QUANTITY OR LOADING MAXIMUM	QUANTITY OR LOADING UNITS	QUALITY OR CONCENTRATION MINIMUM	QUALITY OR CONCENTRATION AVERAGE	QUALITY OR CONCENTRATION MAXIMUM	QUALITY OR CONCENTRATION UNITS	NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********	18.4	04	0	30 / 30	MODELD
00010 Z 0 0 INSTREAM MONITORING	PERMIT REQUIREMENT	********	********	****	********	********	30.5 DAILY MX	DEG. C.		SEE PERMIT	CK REQ
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********	31.5	04	0	30 / 30	RCORDR
00010 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	REPORT DAILY MX	DEG. C.		SEE PERMIT	CK REQ
TEMP. DIFF. BETWEEN SAMP. & UPSTRM DEG.C	SAMPLE MEASUREMENT	********	********	**	********	********	2.0	04	0	30 / 30	CALCTD
00016 1 W 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	5.0 DAILY MX	DEG. C.		CONTIN UOUS	CALCTD
PH	SAMPLE MEASUREMENT	********	********	**	7.5	********	7.8	12	0	6 / 30	GRAB
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	6.0 MINIMUM	********	9.0 MAXIMUM	SU		WEEKLY	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	********	********	**	********	3	3	19	0	1 / 30	GRAB
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	30 MO AVG	100 DAILY MX	MG/L		MONTHLY	GRAB
OIL AND GREASE	SAMPLE MEASUREMENT	********	********	**	********	<5	<5	19	0	1 / 30	GRAB
00556 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	15 MO AVG	20 DAILY MX	MG/L		MONTHLY	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	********	1581	03	********	********	********	**	0	30 / 30	RCORDR
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	REPORT DAILY MX	MGD	********	********	********	****		CONTIN UOUS	RCORDR

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
J. Randy Douet Site Vice President TYPED OR PRINTED	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Stephanie A Howard Principal Environmental Engineer SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423 AREA CODE	843-6700 NUMBER	06 YEAR	12 MO	13 DAY

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

No closed mode operation. The following information is included in an attachment: 1. thermal compliance information 2. CCW data 3. veliger monitoring data

November 2006 DMR Attachment

November 2006 Thermal Compliance Information

November 1-30: The downstream temperature and temperature rate-of-change are based on measurements from Station 8, the "backup temperature monitor" located at the end of the mixing zone (TRM 483.4). The temperature rise is based on the increase in temperature from measurements at Station 14, located upstream of the plant (TRM 490.5), and measurements at Station 8 (TRM 483.4). Consistent with the permit, measurements reported for the downstream temperature and the temperature rise represent daily maximum 24-hour rolling averages; and, measurements reported of the temperature rate-of-change represent 1-hour averages. Measurements were used rather than the numerical modeling system because of relatively low river flows. TVA has learned as a result of the continuing studies performed under Part III.G. of the permit that under low flow conditions, adjustments may be needed in the formulation of numerical model to improve its accuracy. Until river flows increase or appropriate model adjustments can be made, the modeling system is considered "out of service".

November 2006 CCW Data

CCW TRENCH				
Date/Time Collected	**Extractable Petroleum Hydrocarbons**	**Analysis Date/Time**	**Analyst**	**Method**
11/01/2006 @ 0825	0.55 mg/L	11/06/2006 @ 2320	TLW	EPA 8015
CCW CHANNEL				
Date/Time Collected	**Extractable Petroleum Hydrocarbons**	**Analysis Date/Time**	**Analyst**	**Method**
11/01/2006 @ 0820	<0.10 mg/L	11/06/2006 @ 2309	TLW	EPA 8015

November 2006 Veliger Monitoring Information

Sample Date	Mean # of ZM/m^3	% Settlers	Water Temp. (°C)	Sample Date	Mean# of Asiatic Clams/m^3	Water Temp. (°C)	LOCATION	SUB LOCATION	NOTES: % Gravid Asiatic Clam	COLLECTED BY
11/16/2006	15	100	13	11/16/2006	30	13	Inplant			Dickie Adcock
11/24/2006	0	0	12	11/24/2006	28	12	Inplant			Dickie Adcock
11/27/2006	0	0	12	11/27/2006	0	12	Inplant			Dickie Adcock

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Location HAMILTON COUNTY

ATTN: Stephanie A. Howard

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

TN0026450	101 G
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From	06	11	01	To	06	11	30

MAJOR
(SUBR 01)
F - FINAL
DIFFUSER DISCHARGE
EFFLUENT

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

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PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	********	********	**	********	0.014	0.038	19	0	30 / 30	GRAB
50060 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	0.10 MO AVG	0.10 INST MAX	MG/L		WEEK-DAYS	CALCTD
TEMPERATURE - C, RATE OF CHANGE	SAMPLE MEASUREMENT	********	0.5	62	********	********		**	0	30 / 30	CALCTD
82234 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	2.0 DAILY MX	DEG C/HR	********	********	********	****		CONTIN-UOUS	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
J. Randy Douet Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Stephanie A. Howard Principal Environmental Engineer	423	843-6700	06	12	13
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

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

The following injections occured: 1. Biodetergent 73551 (max. calc. conc. was 0.015mg/L--limit 2.0mg/L) 2. H-150M (max. calc. conc. was 0.037mg/L--limit 0.050mg/L) 3. H-150M (low detection level analytical method was <0.020mg/L--limit 0.050mg/L)

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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

TN0026450	101 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From	06	11	01	To	06	11	30

MAJOR
(SUBR 01)
F - FINAL
BIOMONITORING FOR OUTFALL 101
EFFLUENT

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	>100.0	********	********	23	0	2 / 180	COMPOS
TRP3B 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	45.2 MINIMUM	********	********	PERCENT		SEE PERMIT	COMPOS
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	>100.0	********	********	23	0	2 / 180	COMPOS
TRP6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	45.2 MIMINUM	********	********	PERCENT		SEE PERMIT	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
J. Randy Douet Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Stephanie A. Howard Principal Environmental Engineer SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-6700	06	12	13
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

Toxicity was sampled 11/12/06 - 11/17/06 and 11/26/06 - 12/1/06. The report for 11/12/06 - 11/17/06 is attached. The report for 11/26/06 - 12/1/06 will be included with the December DMR.

December 11, 2006

Ruth Ann Hurt, SB 2A-SQN

SEQUOYAH NUCLEAR PLANT (SQN) TOXICITY BIOMONITORING, NPDES PERMIT NO. TN0026450, OUTFALL 101, NOVEMBER, 2006

Attached are two copies of the subject report for submission to the state of Tennessee and a copy of the report for your records. The report provides results of compliance testing using fathead minnows and daphnids. Outfall 101 samples collected November 12-17, showed no toxic effects to fathead minnows or daphnids. The resulting IC_{25} values for both species were > 100 percent. Fathead minnows exposed to intake samples were significantly different (less than) from the control based on growth analyses using Homoscedastic t-Tests. Daphnids were not significantly different from control for either intake or upstream based on reproduction analyses using Homoscedastic t-Tests.

In addition to the routine compliance test, fathead minnows were also tested in Outfall 101 and intake samples which were treated using UV exposure for pathogen removal prior to introduction of test organisms. Fish pathogens present in intake water have been the suspected cause of anomalous dose responses and high variability among replicates in previous toxicity testing at Sequoyah.

Call me at (256) 386-2755 if you have any questions or comments following your review of the report.

Cynthia L. Russell

Cynthia L. Russell
Biologist
Environmental Engineering Services- West
CTR 2L-M

Attachment
cc (Attachment):
Files, RSO&E-EDMS-Muscle Shoals

SQN November 2006M

TENNESSEE VALLEY AUTHORITY
TOXICITY TEST REPORT

INTRODUCTION / EXECUTIVE SUMMARY

Report Date: December 11, 2006

1. Facility / Discharger: Sequoyah Nuclear Plant / TVA

2. County / State: Hamilton / Tennessee

3. NPDES Permit #: TN0026450

4. Type of Facility: Nuclear-Fueled Electric Generating Plant

5. Type of Facility: Nuclear-Fueled Electric Generating Plant

6. Design Flow (MGD): 1579

7. Receiving Stream: Tennessee River (TRM 483.6)

8. 1Q10: 3491

9. Outfall Tested: 101

10. Dates Sampled: November 12-17, 2006

11. Average Flow on Days Sampled (MGD): 1569, 1565, 1564, 1567, 1557, 1563

12. Pertinent Site Conditions:

H-150M was injected from November 13-16, 2006. The dates and times for the H-150M injection are in the following table. H-150M was shut down on 11/14/2006 from 0812-0914 due to backwashing of the ERCW traveling screens and/or H-150M tote change-out.

Injection Location	Date/Start Time (ET)	Date/Ending Time (ET)
Essential Raw Cooling Water (ERCW) Train B	11/13/2006 1155 11/14/2006 0914	11/14/2006 0812 11/16/2006 1300

13. Test Dates: November 14-21, 2006

14. Test Type: Short-term Chronic Definitive

15. Test Species: Fathead Minnows (*Pimephales promelas*)
Daphnids (*Ceriodaphnia dubia*)

16. Concentrations Tested (%): Outfall 101: 11.3, 22.6, 45.2, 72.6, 100
Intake: 100.0

Pimephales promelas: UV treated Outfall 101: 11.3, 22.6, 45.2, 72.6, 100
UV treated Intake: 100.0

17. Permit Limit Endpoint (%): Outfall 101: IC_{25} = 45.2%

18. Test Results: Outfall 101: *Pimephales promelas:* IC_{25} > 100%
Ceriodaphnia dubia: IC_{25} > 100%

UV treated Outfall 101: *Pimephales promelas:* IC_{25} > 100%

19. Facility Contact: Stephanie Howard Phone #: (423) 843-6700

20. Consulting / Testing Lab: Environmental Testing Solutions, Inc.

21. Lab Contact: Jim Sumner Phone #: (828) 350-9364

22. TVA Contact: Cynthia L. Russell Phone #: (256) 386-2755

23. Notes: Outfall 101 samples collected November 12 - 17, 2006, showed no toxic effects to fathead minnows or daphnids. The resulting IC_{25} values, for both species, were > 100 percent. Fathead minnows exposed to intake samples were significantly different (less than) from the control based on growth analyses using Homoscedastic t-Tests. Daphnids were not significantly different from control for either intake or upstream based on reproduction analyses using Homoscedastic t-Tests.

Fathead minnows were also exposed to UV treated Outfall 101 and intake samples since fish pathogens present in intake water have been the suspected cause of interference (anomalous dose response and high variability among replicates) in previous toxicity testing at Sequoyah.

METHODS SUMMARY

Samples:

1. Sampling Point: Outfall 101, Intake

2. Sample Type: Composite

3. Sample Information:

Sample ID	Date (MM/DD/YY)/ Time (ET) Collected	Date (MM/DD/YY)/ Time (ET) Received	Arrival Temp. (°C)	Initial TRC* (mg/L)	Date (MM/DD/YY)/ Time (ET) Last Used By
101	11/12/06 0805 to 11/13/06 0705	11/13/06 1450	2.3/2.0†	<0.10	11/14/06 1425 11/15/06 1430
Intake	11/12/06 0840 to 11/13/06 0740	11/13/06 1450	1.5	<0.10	11/14/06 1425 11/15/06 1430
101	11/14/06 0824 to 11/15/06 0724	11/15/06 1425	4.5/5.0†	<0.10	11/16/06 1409 11/17/06 1355
Intake	11/14/06 0843 to 11/15/06 0743	11/15/06 1425	2.4	<0.10	11/16/06 1409 11/17/06 1355
101	11/16/06 0753 to 11/17/06 0653	11/17/06 1405	3.3/3.7†	<0.10	11/18/06 1345 11/19/06 1330 11/20/06 1336
Intake	11/16/06 0814 to 11/17/06 0714	11/17/06 1405	0.7	<0.10	11/18/06 1345 11/19/06 1330 11/20/06 1336

*TRC = Total Residual Chlorine
†Samples were collected in two 2.5 gallon cubitainers. Temperature was measured in each cubitainer upon arrival.

4. Sample Manipulation: Samples from Outfall 101 and intake were warmed to test temperature (25.0 ± 1.0°C) in a warm water bath.

   Aliquots of Outfall 101 and Intake samples were UV-treated through a 40-watt Smart®-UV Sterilizer (manufactured by Emperor Aquatics, Inc.) for 2 minutes.

	Pimephales promelas	*Ceriodaphnia dubia*
Test Organisms:		
1. Source:	Aquatic BioSystems, Inc.	In-house Cultures
2. Age:	22.5 - 24.5 hours old	<24-hours old
Test Method Summary:		
1. Test Conditions:	Static, Renewal	Static, Renewal
2. Test Duration:	7 days	Until at least 60% of control females have 3 broods
3. Control / Dilution Water:	Moderately Hard Synthetic	Moderately Hard Synthetic
4. Number of Replicates:	4	10
5. Organisms per Replicate:	10	1
6. Test Initiation: (Date/Time)		
Outfall 101	11/14/06 - 1425 ET	11/14/06 - 1218 ET
UV Treated Outfall 101	11/14/06 - 1407 ET	
7. Test Termination: (Date/Time)		
Outfall 101	11/21/06 - 1328 ET	11/21/06 - 1132 ET
UV Treated Outfall 101	11/21/06 - 1309 ET	
8. Test Temperature: Outfall 101:	Mean = 24.6°C (24.1 - 25.1°C)	Mean = 24.9°C (24.6 - 25.3°C)
Test Temperature: UV-Treated Outfall 101:	Mean = 24.7°C (24.1 - 25.1°C)	

9. Physical / Chemical Measurements: Alkalinity, hardness, total residual chlorine, and conductivity were measured at the laboratory in each 100% sample. Daily temperatures were measured in one replicate for each test concentration. Pre- and post-exposure test solutions were analyzed daily for pH and dissolved oxygen.

10. Statistics: Statistics were performed according to methods prescribed by EPA using ToxCalc version 5.0 statistical software (Tidepool Scientific Software, McKinneyville, CA).

TOXICITY TEST RESULTS (see Appendix C for Bench Sheets)

1. Results of a *Pimephales promelas* Chronic/ 7-day Toxicity Test.
(Genus species) (Type / Duration)

Conducted November 14 - 21, 2006 using effluent from Outfall 101.

Test Solutions (% Effluent)	Percent Surviving (time interval used – days)						
	1	2	3	4	5	6	7
Control	100	100	100	100	100	100	100
11.3%	100	100	100	100	100	100	100
22.6%	100	100	100	100	100	100	100
45.2%	100	100	100	100	100	100	100
72.6%	100	100	100	100	100	98	98
100.0%	100	100	100	100	100	100	100
Intake	100	100	98	98	98	98	98

Test Solutions (% Effluent)	Mean Dry Weight (mg) (replicate number)				
	1	2	3	4	Mean
Control	0.815	0.732	0.735	0.778	0.765
11.3%	0.662	0.656	0.684	0.744	0.687
22.6%	0.725	0.703	0.725	0.687	0.710
45.2%	0.679	0.657	0.650	0.563	0.637
72.6%	0.662	0.622	0.684	0.660	0.657
100.0%	0.671	0.745	0.683	0.669	0.692
Intake	0.674	0.604	0.742	0.628	0.662

IC_{25} Value: > 100% Permit Limit: 45.2% 95% Confidence Limits: Upper Limit: NA Lower Limit: NA	Calculated TU Estimates: < 1.0 TUc* Permit Limit: 2.2 TUc

*TUa = 100/LC_{50}: TUc = 100/ IC_{25}

TOXICITY TEST RESULTS (see Appendix C for Bench Sheets)

2. Results of a *Ceriodaphnia dubia* Chronic/ 7-day Toxicity Test.
(Genus species) (Type / Duration)

Conducted November 14 - 21, 2006 using effluent from Outfall 101.

Test Solutions (% Effluent)	Percent Surviving (time interval used – days)						
	1	2	3	4	5	6	7
Control	100	100	100	100	100	100	100
11.3%	100	100	100	100	100	100	100
22.6%	100	100	100	100	100	100	100
45.2%	100	100	100	100	100	100	100
72.6%	100	100	100	100	100	100	100
100.0%	100	100	100	100	100	100	100

Test Solutions (% Effluent)	Reproduction (#young/female/7 days) Data (replicate number)										
	1	2	3	4	5	6	7	8	9	10	Mean
Control	29	27	27	30	27	30	30	27	32	30	28.9
11.3%	28	29	31	31	31	33	31	29	30	34	30.7
22.6%	33	34	32	28	31	31	35	36	35	30	32.5
45.2%	38	33	33	31	34	32	34	31	30	34	33.0
72.6%	31	37	31	36	34	32	35	33	35	34	33.8
100.0%	32	33	33	36	33	36	34	33	38	34	34.2

IC_{25} Value: > 100% Permit Limit: 45.2% 95% Confidence Limits: Upper Limit: NA Lower Limit: NA	Calculated TU Estimates: < 1.0 TUc* Permit Limit: 2.2 TUc

*TUa = $100/LC_{50}$: TUc = $100/ IC_{25}$

TOXICITY TEST RESULTS (see Appendix C for Bench Sheets)

2. Results of a *Ceriodaphnia dubia* Chronic/ 7-day Toxicity Test.
(Genus species) (Type / Duration)

Conducted November 14 - 21, 2006 using water from Intake

Test Solutions (% Effluent)	Percent Surviving (time interval used – days)						
	1	2	3	4	5	6	7
Control	100	100	100	100	100	100	100
Intake	100	100	100	100	100	100	100

Test Solutions (% Effluent)	Reproduction (#young/female/7 days) Data (replicate number)										
	1	2	3	4	5	6	7	8	9	10	Mean
Control	29	26	30	29	30	29	28	31	27	32	29.1
Intake	38	30	34	34	31	33	33	36	33	34	33.6

IC_{25} Value: > 100% Permit Limit: N/A 95% Confidence Limits: Upper Limit: NA Lower Limit: NA	Calculated TU Estimates: < 1.0 TUc* Permit Limit: N/A

*TUa = $100/LC_{50}$: TUc = $100/ IC_{25}$

TOXICITY TEST RESULTS, UV-TREATED (see Appendix C for Bench Sheets)

3. Results of a *Pimephales promelas* Chronic/ 7-day Toxicity Test.
(Genus species) (Type / Duration)

Conducted November 14 – 21, 2006 using effluent from UV Treated Outfall 101.

Test Solutions (% Effluent)	Percent Surviving (time interval used – days)						
	1	2	3	4	5	6	7
Control	100	100	100	100	100	100	100
11.3%	100	100	100	100	100	100	98
22.6%	100	100	100	100	100	100	98
45.2%	100	100	100	100	100	100	100
72.6%	100	100	100	100	100	100	98
100.0%	100	100	100	100	100	100	100
Intake	100	100	100	100	100	100	100

Test Solutions (% Effluent)	Mean Dry Weight (mg) (replicate number)				
	1	2	3	4	Mean
Control	0.809	0.735	0.789	0.766	0.775
11.3%	0.816	0.780	0.721	0.829	0.787
22.6%	0.726	0.939	0.804	0.739	0.802
45.2%	0.610	0.814	0.712	0.836	0.743
72.6%	0.787	0.776	0.762	0.754	0.770
100.0%	0.705	0.737	0.710	0.772	0.731
Intake	0.646	0.768	0.717	0.772	0.726

IC_{25} Value: > 100% 95% Confidence Limits: Upper Limit: NA Lower Limit: NA	Calculated TU Estimates: < 1.0 TUc*

*TUa = 100/LC_{50}: TUc = 100/ IC_{25}

REFERENCE TOXICANT TEST RESULTS (see Appendix A and D)

Species	Date	Time	Duration	Toxicant	Results (IC_{25})
Pimephales promelas	November 14 - 21, 2006	1440	7-days	KCl	0.54 g/L
Ceriodaphnia dubia	November 7 - 14, 2006	1127	7-days	NaCl	1.06 g/L

PHYSICAL/CHEMICAL SUMMARY

Water Chemistry Mean Values and Ranges for *Pimephales promelas* and *Ceriodaphnia dubia* Tests, Sequoyah Nuclear Plant Effluent (SQN), Outfall 101, November 14-21, 2006.

Test	Sample ID	Temperature (°C)		Dissolved Oxygen (mg/L)		pH (S.U.)		Conductance	Alkalinity	Hardness	Total Residual
		Initial	Final	Initial	Final	Initial	Final	(µmhos/cm)	(mg/L $CaCO_3$)	(mg/L $CaCO_3$)	Chlorine (mg/L)
Pimephales promelas	Control	24.7 24.6 - 24.8	24.4 24.2 - 24.6	7.9 7.7 - 8.2	7.5 7.0 - 7.9	7.71 7.52 - 7.81	7.29 7.08 - 7.58	313 308 - 320	59 57 - 60	93 91 - 93	- - -
	11.3%	24.7 24.6 - 24.8	24.4 24.2 - 24.8	8.0 7.9 - 8.1	7.3 6.7 - 7.9	7.55 7.26 - 7.77	7.27 7.06 - 7.53	295 289 - 306	- - -	- - -	- - -
	22.6%	24.8 24.7 - 24.9	24.3 24.1 - 24.6	8.0 7.9 - 8.1	7.2 6.5 - 7.9	7.55 7.27 - 7.77	7.25 7.01 - 7.53	282 273 - 296	- - -	- - -	- - -
	45.2%	24.8 24.7 - 24.9	24.4 24.2 - 24.5	8.0 7.9 - 8.1	7.2 6.5 - 7.9	7.54 7.26 - 7.75	7.27 7.04 - 7.56	254 246 - 265	- - -	- - -	- - -
	72.6%	24.8 24.8 - 24.9	24.4 24.1 - 24.8	8.1 8.0 - 8.2	7.3 6.7 - 8.0	7.52 7.24 - 7.73	7.26 7.08 - 7.56	219 211 - 231	- - -	- - -	- - -
	100.0%	25.0 24.8 - 25.1	24.4 24.2 - 24.7	8.1 7.9 - 8.3	7.2 6.6 - 8.0	7.51 7.22 - 7.71	7.27 7.06 - 7.54	185 178 - 198	66 65 - 67	79 77 - 81	< 0.10 < 0.10 - < 0.10
	Intake	24.8 24.7 - 24.9	24.4 24.1 - 24.6	8.2 7.8 - 8.4	7.4 6.6 - 8.0	7.50 7.20 - 7.71	7.27 7.09 - 7.55	185 179 - 198	65 64 - 66	78 77 - 79	< 0.10 < 0.10 - < 0.10
Ceriodaphnia dubia	Control	24.7 24.6 - 24.9	24.9 24.6 - 25.2	7.9 7.7 - 8.2	8.0 7.6 - 8.3	7.71 7.52 - 7.81	7.49 7.27 - 7.71	313 308 - 320	59 57 - 60	93 91 - 93	- - -
	11.3%	24.8 24.7 - 24.9	24.9 24.7 - 25.1	7.9 7.9 - 8.0	7.9 7.6 - 8.3	7.55 7.26 - 7.77	7.49 7.27 - 7.69	295 289 - 306	- - -	- - -	- - -
	22.6%	24.8 24.7 - 24.9	24.9 24.6 - 25.3	8.0 7.9 - 8.1	7.9 7.6 - 8.3	7.55 7.27 - 7.77	7.50 7.27 - 7.68	282 273 - 296	- - -	- - -	- - -
	45.2%	24.8 24.7 - 25.0	25.0 24.9 - 25.2	8.0 7.9 - 8.1	7.9 7.6 - 8.3	7.54 7.26 - 7.75	7.50 7.28 - 7.68	254 246 - 265	- - -	- - -	- - -
	72.6%	24.9 24.8 - 25.2	25.0 24.8 - 25.2	8.1 8.0 - 8.2	7.9 7.6 - 8.3	7.52 7.24 - 7.73	7.50 7.31 - 7.69	219 211 - 231	- - -	- - -	- - -
	100.0%	25.0 24.7 - 25.3	24.9 24.7 - 25.2	8.1 7.9 - 8.3	7.9 7.7 - 8.3	7.51 7.22 - 7.71	7.51 7.30 - 7.70	185 178 - 198	66 65 - 67	79 77 - 81	< 0.10 < 0.10 - < 0.10
	Intake	24.9 24.8 - 25.1	24.9 24.8 - 25.1	8.2 7.8 - 8.4	8.0 7.7 - 8.3	7.50 7.20 - 7.71	7.50 7.29 - 7.70	185 179 - 198	65 64 - 66	78 77 - 79	< 0.10 < 0.10 - < 0.10

Overall temperature (°C)	Average	Minimum	Maximum
Pimephales promelas	24.6	24.1	25.1
Ceriodaphnia dubia	24.9	24.6	25.3

PHYSICAL/CHEMICAL SUMMARY

Water Chemistry Mean Values and Ranges for the *Pimephales promelas* Test, Sequoyah Nuclear Plant Effluent (SQN), UV-Treated Outfall 101, November 14-21, 2006.

Test	Sample ID	Temperature (°C)		Dissolved Oxygen (mg/L)		pH (S.U.)		Conductance (µmhos/cm)
		Initial	Final	Initial	Final	Initial	Final	
Pimephales promelas	Control	24.8 24.7 - 24.9	24.5 24.3 - 24.6	7.9 7.8 - 8.2	7.5 7.1 - 7.8	7.62 7.49 - 7.83	7.34 7.11 - 7.59	302 296 - 308
	11.3%	24.8 24.7 - 24.9	24.5 24.1 - 24.8	7.9 7.8 - 8.2	7.4 7.0 - 7.8	7.62 7.48 - 7.83	7.33 7.11 - 7.53	298 288 - 304
	22.6%	24.8 24.7 - 24.9	24.5 24.2 - 24.7	8.0 7.8 - 8.2	7.4 6.8 - 7.7	7.62 7.47 - 7.82	7.32 7.10 - 7.55	283 276 - 293
	45.2%	24.9 24.8 - 24.9	24.4 24.2 - 24.7	8.0 7.9 - 8.2	7.4 6.8 - 7.8	7.62 7.44 - 7.79	7.31 7.11 - 7.55	257 248 - 267
	72.6%	24.9 24.9 - 25.0	24.4 24.2 - 24.5	8.1 7.9 - 8.2	7.4 6.8 - 7.8	7.60 7.43 - 7.77	7.33 7.11 - 7.55	221 216 - 230
	100.0%	25.0 24.6 - 25.1	24.5 24.2 - 24.7	8.0 7.9 - 8.1	7.3 6.8 - 7.9	7.58 7.39 - 7.74	7.33 7.13 - 7.57	191 188 - 202
	Intake	24.9 24.8 - 25.0	24.4 24.2 - 24.8	8.1 8.0 - 8.2	7.3 6.9 - 7.9	7.55 7.29 - 7.72	7.33 7.07 - 7.58	189 184 - 195

Overall temperature (°C)	Average	Minimum	Maximum
Pimephales promelas	24.7	24.1	25.1

SUMMARY / CONCLUSIONS

Outfall 101 samples collected November 12-17, 2006, showed no toxic effects to fathead minnows or daphnids. The resulting IC_{25} values, for both species, were > 100 percent. Fathead minnows exposed to intake samples were significantly different (less than) from the control based on growth analyses using Homoscedastic t-Tests. Daphnids were not significantly different from control for either intake or upstream based on reproduction analyses using Homoscedastic t-Tests.

Fathead minnows were also exposed to UV treated Outfall 101 and intake samples since fish pathogens present in intake water have been the suspected cause of interference (anomalous dose response and high variability among replicates) in previous toxicity testing at Sequoyah.

Appendix A

ADDITIONAL TOXICITY TEST INFORMATION

SUMMARY OF METHODS

1. *Pimephales promelas*

   Tests were conducted according to EPA-821-R-02-013 using four replicates, each containing ten test organisms, per treatment. Test vessels consisted of 500-mL plastic disposable cups, each containing 250-mL of test solution.

2. *Ceriodaphnia dubia*

   Tests were conducted according to EPA-821-R-02-013 using ten replicates, each containing one test organism, per treatment. Test vessels consisted of 30-mL polypropylene cups, each containing 15-mL of test solution.

DEVIATIONS / MODIFICATIONS TO TEST PROTOCOL

1. *Pimephales promelas*

   None

2. *Ceriodaphnia dubia*

   None

DEVIATIONS / MODIFICATIONS TO PRETEST CULTURE OR HOLDING OF TEST ORGANISMS

1. *Pimephales promelas*

   None

2. *Ceriodaphnia dubia*

   None

PHYSICAL AND CHEMICAL METHODS

1. Reagents, Titrants, Buffers, etc.: All chemicals were certified products used before expiration dates (where applicable).

2. Instruments: All identification, service, and calibration information pertaining to laboratory instruments is recorded in calibration and maintenance logbooks.

3. Temperature was measured by EPA Method 170.1.

4. Dissolved oxygen was measured by EPA Method 360.1.

5. The pH was measured by EPA Method 150.1.

6. Conductance was measured by EPA Method 120.1.

7. Alkalinity was measured by EPA Method 310.1.

8. Total Hardness was measured by EPA Method 130.2.

9. Total residual chlorine was measured by ORION 97-70.

QUALITY ASSURANCE

Toxicity Test Methods: All phases of the study including, but not limited to, sample collection, handling and storage, glassware preparation, test organism culturing/acquisition and acclimation, test organism handling during test, and maintaining appropriate test conditions were conducted according to the protocol as described in this report and EPA-821-R-02-013. Any known deviations were noted during the study and are reported herein.

REFERENCE TOXICANT TESTS (See Appendix D for control chart information)

1. Test Type: 7-day chronic tests with results expressed as IC_{25} values in g/L KCl or NaCl.

2. Standard Toxicant: Potassium Chloride (KCl crystalline) for *Pimephales promelas*.
   Sodium Chloride (NaCl crystalline) for *Ceriodaphnia dubia*.

3. Dilution Water Used: Moderately hard synthetic water.

4. Statistics: ToxCalc software Version 5.0 was used for statistical analyses.

REFERENCES

1. NPDES Permit No. TN0026450.

2. USEPA. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, EPA-821-R-02-013 (October 2002).

3. Methods for Chemical Analysis of Water and Wastes, EPA-600-4-79-020 (March 1983).

4. Quality Assurance Program: Standard Operating Procedures, Environmental Testing Solutions, Inc (most current version).

Sequoyah Nuclear Plant Biomonitoring
November 14-21, 2006

Appendix B

Diffuser Discharge Concentrations of Chemicals Used to Control
Microbiologically Induced Corrosion and Mollusks,
During Toxicity Test Sampling,

Table B-1. Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Growth of Microbiologically Induced Bacteria and Mollusks, During Toxicity Test Sampling, March 12, 1998 – December 1, 2006

Date	Sodium Hypochlorite mg/L TRC	Towerbrom mg/L TRC	PCL-222 mg/L Phosphate	PCL-401 mg/L Copolymer	CL-363 mg/L DMAD	Cuprostat-PF mg/L Azole	H-130M mg/L Quat
03/12/1998	0.016	-	-	-	-	-	-
03/13/1998	0.015	-	-	-	-	-	-
03/14/1998	0.013	-	-	-	-	-	-
03/15/1998	0.030	-	-	-	-	-	-
03/16/1998	0.013	-	-	-	-	-	-
03/17/1998	0.020	-	-	-	-	-	-
03/18/1998	0.018	-	-	-	-	-	-
09/08/1998	0.015	-	0.014	0.005	-	-	0.021
09/09/1998	0.003	-	0.031	0.011	-	-	-
09/10/1998	0.014	-	0.060	0.021	-	-	-
09/11/1998	0.013	-	0.055	0.019	-	-	-
09/12/1998	< 0.001	-	0.044	0.015	-	-	-
09/13/1998	< 0.001	-	0.044	0.015	-	-	-
09/14/1998	0.008	-	0.044	0.015	-	-	-
02/22/1999	< 0.001	-	-	-	-	-	-
02/23/1999	0.005	-	-	-	-	-	-
02/24/1999	0.009	-	-	-	-	-	-
02/25/1999	0.012	-	-	-	-	-	-
02/26/1999	0.008	-	-	-	-	-	-
02/27/1999	< 0.001	-	-	-	-	-	-
02/28/1999	< 0.001	-	-	-	-	-	-
08/18/1999	-	0.015	0.069	0.024	0.006	-	-
08/19/1999	-	0.012	0.068	0.024	-	-	-
08/20/1999	-	0.023	0.070	0.024	-	0.120	-
08/21/1999	-	0.022	0.068	0.024	-	-	-
08/22/1999	-	0.022	0.068	0.024	-	-	-
08/23/1999	-	0.025	0.068	0.024	0.006	-	-
08/24/1999	-	0.016	0.067	0.023	0.020	-	-

Table B-1 (continued). Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Growth of Microbiologically Induced Bacteria and Mollusks, During Toxicity Test Sampling, March 12, 1998 – December 1, 2006

Date	Sodium Hypochlorite mg/L TRC	Towerbrom mg/L TRC	PCL-222 mg/L Phosphate	PCL-401 mg/L Copolymer	CL-363 mg/L DMAD	Cuprostat-PF mg/L Azole	H-130M mg/L Quat
01/31/2000	-	< 0.002	0.026	0.009	-	-	-
02/01/2000	-	0.011	0.026	0.028	-	-	-
02/02/2000	-	0.028	0.026	0.009	0.006	-	-
02/03/2000	-	0.008	0.027	0.009	-	-	-
02/04/2000	-	0.006	0.027	0.009	0.005	0.109	-
02/05/2000	-	< 0.002	0.027	0.009	-	-	-
02/06/2000	-	< 0.002	0.027	0.009	-	-	-
07/26/2000	-	< 0.0057	0.055	0.019	-	-	-
07/27/2000	-	0.019	0.055	0.019	-	-	-
07/28/2000	-	0.0088	0.053	0.018	0.004	0.108	-
07/29/2000	-	< 0.0088	0.055	0.019	-	-	-
07/30/2000	-	< 0.0076	0.055	0.019	-	-	-
07/31/2000	-	< 0.0152	0.055	0.019	0.006	-	-
08/01/2000	-	< 0.0141	0.055	0.019	0.005	-	-
12/11/2000	-	0.0143	0.025	0.020	0.005	-	-
12/12/2000	-	0.0092	0.025	0.020	0.005	-	-
12/13/2000	-	< 0.0120	0.025	0.020	-	-	-
12/14/2000	-	< 0.0087	0.025	0.020	-	-	-
12/15/2000	-	0.0120	0.025	0.020	0.005	-	-
12/16/2000	-	< 0.0036	0.025	0.020	-	-	-
12/17/2000	-	< 0.0036	0.025	0.020	-	-	-
08/26/2001	-	0.017	0.06	0.021	0.006	-	-
08/27/2001	-	<0.0096	0.06	0.021	0.005	-	0.021
08/28/2001	-	<0.0085	0.06	0.021	-	-	-
08/29/2001	-	<0.0094	0.059	0.020	0.005	-	0.021
08/30/2001	-	<0.0123	0.06	0.021	0.005	-	-
08/31/2001	-	<0.005	0.059	0.020	-	-	-
11/25/2001	-	<0.0044	-	-	-	-	-
11/26/2001	-	<0.0119	0.024	0.02	0.005	-	-
11/27/2001	-	0.0137	0.023	0.019	0.007	-	-
11/28/2001	-	<0.0089	0.022	0.019	0.006	-	-
11/29/2001	-	0.0132	0.024	0.02	0.007	-	-
11/30/2001	-	< 0.0043	0.024	0.02	-	-	-
12/09/2001	-	<0.0042	-	-	-	-	-
12/10/2001	-	<0.0042	-	-	-	-	-
12/11/2001	-	<0.0104	-	-	-	-	-
12/12/2001	-	0.0128	0.024	0.02	0.008	-	-
12/13/2001	-	<0.0088	0.024	0.02	-	-	-
12/14/2001	-	0.0134	0.024	0.02	0.007	-	-

Table B-1 (continued). Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Growth of Microbiologically Induced Bacteria and Mollusks, During Toxicity Test Sampling, March 12, 1998 – December 1, 2006

Date	Sodium Hypochlorite mg/L TRC	Towerbrom mg/L TRC	PCL-222 mg/L Phosphate	PCL-401 mg/L Copolymer	CL-363 mg/L DMAD	Cuprostat-PF mg/L Azole	H-130M mg/L Quat
01/02/2002	-	< 0.0079	0.023	0.02	0.006	-	-
01/03/2002	-	< 0.0042	0.023	0.014	-	-	-
01/04/2002	-	0.0124	0.024	0.014	0.009	-	-
01/05/2002	-	< 0.0042	-	-	-	-	-
01/06/2002	-	< 0.0042	-	-	-	-	-
01/07/2002	-	< 0.0089	0.024	0.014	0.006	-	-
02/24/2002	-	< 0.004	-	-	-	-	-
02/25/2002	-	< 0.004	0.023	0.023	-	-	-
02/26/2002	-	0.0143	0.023	0.023	0.007	-	-
02/27/2002	-	< 0.0041	0.023	0.023	-	-	-
02/28/2002	-	< 0.0041	0.024	0.008	-	-	-
03/01/2002	-	< 0.0041	0.024	0.008	-	-	-
05/05/2002	-	-	-	-	-	-	-
05/06/2002	-	-	0.058	0.02	0.014	-	-
05/07/2002	-	-	0.058	0.02	0.015	-	-
05/08/2002	-	-	0.056	0.019	-	-	-
05/09/2002	-	-	0.057	0.02	0.014	-	-
05/10/2002	-	-	0.056	0.019	-	-	-
08/04/2002	-	<0.0058	-	-	-	-	-
08/05/2002	-	<0.0058	0.053	0.018	-	-	0.025
08/06/2002	-	0.0092	0.053	0.018	-	-	-
08/07/2002	-	<0.0107	0.055	0.019	0.007	-	-
08/08/2002	-	<0.0061	0.055	0.019	-	-	-
08/09/2002	-	0.0152	0.054	0.018	0.008	-	-
10/06/2002	-	<0.00497	-	-	-	-	-
10/07/2002	-	0.0153	0.054	0.018	0.009	-	-
10/08/2002	-	<0.0092	0.054	0.018	0.007	-	-
10/09/2002	-	0.0124	0.053	0.018	0.009	-	-
10/10/2002	-	0.0134	0.054	0.018	0.009	-	-
10/11/2002	-	<0.0042	0.054	0.018	-	-	-
01/12/2003	-	<0.0035	-	-	-	-	-
01/13/2003	-	<0.006	0.025	0.019	0.009	-	-
01/14/2003	-	<0.0118	0.026	0.020		-	-
01/15/2003	-	<0.0063	0.026	0.020	0.009	-	-
01/16/2003	-	<0.0034	0.026	0.020		-	-
01/17/2003	-	<0.0034	0.026	0.009	-	-	-
04/06/2003	-	<0.0073	-	-	-	-	-
04/07/2003	-	<0.0189	-	0.021	-	-	-
04/08/2003	-	<0.0117	-	0.021	-	-	-
04/09/2003	-	<0.0139	-	0.021	0.016	-	-
04/10/2003	-	<0.0113	-	0.021	0.018	-	-
04/11/2003	-	<0.0073	-	0.022	-	-	-

Table B-1 (continued). Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Growth of Microbiologically Induced Bacteria and Mollusks, During Toxicity Test Sampling, March 12, 1998 – December 1, 2006

Date	Sodium Hypochlorite mg/L TRC	Towerbrom mg/L TRC	PCL-222 mg/L Phosphate	PCL-401 mg/L Copolymer	CL-363 mg/L DMAD	Cuprostat-PF mg/L Azole	H-130M mg/L Qual
06/15/2003	-	< 0.0045	-	-	-	-	-
06/16/2003	-	< 0.0037	0.057	0.020	-	-	0.022
06/17/2003	-	< 0.0048	0.041	0.014	-	-	0.024
06/18/2003	-	< 0.0048	0.041	0.014	-	-	0.024
06/19/2003	-	< 0.0085	0.058	0.020	-	-	0.025
06/20/2003	-	< 0.0048	0.058	0.020	-	-	0.025
08/03/2003	-	<0.0050	-	-	-	-	-
08/04/2003	-	<0.0050	0.058	0.020	-	-	-
08/05/2003	-	<0.0051	0.057	0.020	-	-	0.025
08/06/2003	-	<0.0084	0.057	0.020	-	-	0.025
08/07/2003	-	0.0129	0.057	0.020	-	-	0.024
08/08/2003	-	0.0153	0.057	0.020	0.009	-	-
10/05/2003	-	<0.0043	0.057	0.020	-	-	-
10/06/2003	-	<0.0043	0.057	0.020	-	-	0.025
10/07/2003	-	<0.0090	0.057	0.020	-	-	0.025
10/08/2003	-	<0.0106	0.057	0.020	-	-	0.025
10/09/2003	-	0.0181	0.026	0.022	-	-	0.025
10/10/2003	-	0.0183	0.026	0.024	0.009	-	-
02/01/2004	-	0.0093	0.027	0.009	-	-	-
02/02/2004	-	<0.0034	0.026	0.009	-	-	-
02/03/2004	-	<0.0034	0.026	0.009	-	-	-
02/04/2004	-	0.0124	0.026	0.009	0.009	-	-
02/05/2004	-	<0.0034	0.026	0.009	-	-	-
02/06/2004	-	0.0105	0.026	0.009	0.010	-	-
05/04/2004	-	<0.0123	0.026	0.019	-	-	0.025
05/05/2004	-	<0.0144	0.026	0.014	0.009	-	0.025
05/06/2004	-	<0.0146	0.037	0.013	-	-	0.025
05/07/2004	-	0.0227	0.058	0.020	0.009	-	0.025
05/08/2004	-	0.016	0.060	0.021	-	-	-
05/09/2004	-	<0.0104	0.058	0.020	-	-	-
07/04/2004	-	0.0217	0.057	0.019	-	-	-
07/05/2004	-	<0.0085	0.057	0.020	0.009	-	-
07/06/2004	-	<0.0077	0.058	0.020	-	-	0.031
07/07/2004	-	0.0252	0.056	0.019	-	-	0.031
07/08/2004	-	0.0223	0.057	0.019	0.009	-	-
07/09/2004	-	0.0182	0.057	0.020	0.009	-	-

Table B-1 (continued). Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Growth of Microbiologically Induced Bacteria and Mollusks, During Toxicity Test Sampling, March 12, 1998 – December 1, 2006

Date	Sodium Hypochlorite mg/L TRC	Towerbrom mg/L TRC	PCL-222 mg/L Phosphate	PCL-401 mg/L Copolymer	CL-363 mg/L DMAD	Cuprostat-PF mg/L Azole	H-130M mg/L Quat	Nalco 73551 mg/L EO/PO	H-150M mg/L Quat
11/07/2004	-	<0.0187	0.000	0.014	-	-	-	-	-
11/08/2004	-	<0.0192	0.047	0.030	-	-	-	-	-
11/09/2004	-	<0.0233	0.048	0.016	-	-	0.041	-	-
11/10/2004	-	<0.0149	0.047	0.016	-	-	0.041	-	-
11/11/2004	-	<0.0149	0.049	0.017	-	-	0.043	-	-
11/12/2004	-	<0.0253	0.048	0.017	-	-	0.042	-	-
02/06/2005	-	<0.0042	0.028	0.010	-	-	-	-	-
02/07/2005	-	<0.0116	0.028	0.010	-	-	-	0.007	-
02/08/2005	-	<0.0080	0.028	0.010	-	-	-	-	-
02/09/2005	-	0.0199	0.028	0.010	-	-	-	-	-
02/10/2005	-	<0.0042	0.028	0.010	-	-	-	-	-
02/11/2005	-	0.0155	0.028	0.010	-	-	-	0.007	-
06/05/2005	-	0.0063	-	-	-	-	-	-	-
06/06/2005	-	0.0043	-	-	-	-	-	-	0.037
06/07/2005	-	0.0103	-	-	-	-	-	-	0.037
06/08/2005	-	0.0295	-	-	-	-	-	-	0.037
06/09/2005	-	0.0129	-	-	-	-	-	-	-
06/10/2005	-	0.0184	-	-	-	-	-	-	-
07/17/2005	-	0.0109	0.026	0.009	-	-	-	-	-
07/18/2005	-	0.0150	0.026	0.009	-	-	-	-	0.036
07/19/2005	-	0.0163	0.026	0.009	-	-	-	-	0.036
07/20/2005	-	0.0209	0.026	0.009	-	-	-	0.014	0.036
07/21/2005	-	0.0242	0.026	0.009	-	-	-	-	-
07/22/2005	-	0.0238	0.054	0.018	-	-	-	0.014	-
10/30/2005	-	0.0068	-	-	-	-	-	-	-
10/31/2005	-	0.0112	-	-	-	-	-	-	-
11/01/2005	-	0.0104	-	-	-	-	-	-	0.035
11/02/2005	-	0.0104	-	-	-	-	-	-	0.036
11/03/2005	-	0.0117	-	-	-	-	-	-	0.036
11/04/2005	-	0.0165	-	-	-	-	-	-	0.035
11/14/2005	-	0.0274	-	-	-	-	-	-	-
11/15/2005	-	0.0256	-	-	-	-	-	-	-
11/16/2005	-	0.0234	-	-	-	-	-	-	-
11/17/2005	-	0.0231	-	-	-	-	-	-	-
11/18/2005	-	0.0200	-	-	-	-	-	-	-
11/19/2005	-	0.0116	-	-	-	-	-	-	-

Table B-1 (continued). Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Growth of Microbiologically Induced Bacteria and Mollusks, During Toxicity Test Sampling, March 12, 1998 – December 1, 2006

Date	Sodium Hypochlorite mg/L TRC	Towerbrom mg/L TRC	PCL-222 mg/L Phosphate	PCL-401 mg/L Copolymer	CL-363 mg/L DMAD	Cuprostat-PF mg/L Azole	H-130M mg/L Quat	Nalco 73551 mg/L EO/PO	H-150M mg/L Quat
11/12/2005	-	0.0055	-	-	-	-	-	-	-
11/13/2005	-	0.0068	-	-	-	-	-	-	0.037
11/14/2005	-	0.0143	-	-	-	-	-	-	0.037
11/15/2005	-	0.0068	-	-	-	-	-	-	0.037
11/16/2005	-	0.0267	-	-	-	-	-	-	0.037
11/17/2005	-	0.0222	-	-	-	-	-	-	-
11/26/2006	-	0.0188	-	-	-	-	-	-	-
11/27/2006	-	0.0138	-	-	-	-	-	-	-
11/28/2006	-	0.0120	-	-	-	-	-	-	-
11/29/2006	-	0.0288	-	-	-	-	-	-	-
11/30/2006	-	0.0376	-	-	-	-	-	-	-
12/01/2006	-	0.0187	-	-	-	-	-	-	-

Sequoyah Nuclear Plant Biomonitoring
November 14-21, 2006

Appendix C

Chain of Custody Records and
Toxicity Test Bench Sheets

BIOMONITORING CHAIN OF CUSTODY RECORD

Client: TVA

Project Name: Sequoyah NP Toxicity

P.O. Number: N/A

Facility Sampled: Sequoyah NP

NPDES Number: TN0026450

Collected By: Chevy Williams, Roy Quinn

Environmental Testing Solution, Inc.
351 Depot Street.
Asheville, NC
28801
Phone: 828-350-9364
Fax: 828-350-9368

Delivered By (Circle One):

FedEx UPS Bus Client

Other (specify): Express Courier

General Comments:

Field Identification / Sample Description	Grab/Comp.	Collection Date/Time		Container Number & Volume Collected	Flow MGD	Rain Event? (Mark as Appropriate)				Project# ~~201~~ 2078 Laboratory Use				
	---	Date	Time	---	---	Yes	If Yes, Inches	No	Trace	ETS Log Number	Arrival Temp. (°C)	By	Time	Appearance
SQN-101-TOX	Comp	11/12/06-11/13/06	0805-0705	2 (2.5gal)	NA			X		061113.01	2.3/2.0	JL	1450	*
SQN-INT-TOX	Comp	11/12/06-11/13/06	0840-0740	1 (2.5 gal)	NA			X		061113.02	1.5	JL	1450	*

Sample Custody – Fill In From Top Down

* Custody seals intact. Samples received in good condition JLunne

Relinquished By (Signature):	Date/Time	Received By (Signature):	Date/Time
Chevy Williams	11/13/06 10:25am	Express Courier	11/13/06 10:25am
Express Courier	11/13/06	ETS	11/13/06
	11-13-06 1450		11-13-06 1450

Instructions: Clients should fill in all areas except those in the "Laboratory Use" block. Biomonitoring samples are preserved by storing them at 6°C and shipping them in ice. The hold time for each sample is 36 hours from the time of collection. Therefore, please collect and ship in such a way that the laboratory will receive the samples with ample time to initiate testing within that time frame. Samples shipped overnight on Friday via FedEx or UPS must be marked for Saturday delivery or they will not arrive until the following Monday.

BIOMONITORING CHAIN OF CUSTODY RECORD

Client: TVA

Project Name: Sequoyah NP Toxicity

P.O. Number: N/A

Facility Sampled: Sequoyah NP

NPDES Number: TN0026450

Collected By: Chevy Williams, Roy Quinn

Environmental Testing Solution, Inc.
351 Depot Street.
Asheville, NC
28801
Phone: 828-350-9364
Fax: 828-350-9368

Delivered By (Circle One):
FedEx UPS Bus Client
Other (specify): Express Courier

General Comments:

Field Identification / Sample Description	Grab/Comp.	Collection Date/Time		Container Number & Volume Collected	Flow MGD	Rain Event? (Mark as Appropriate)				Laboratory Use (project# 2878)				
		Date	Time			Yes	If Yes, Inches	No	Trace	ETS Log Number	Arrival Temp. (°C)	By	Time	Appearance
SQN-101-TOX	Comp	11/14/06-11/15/06	0824-0724	2 (2.5gal)	NA	✓	2.25"			06111513	4.5 / 5.0°C	JJ	1425	*
SQN-INT-TOX	Comp	11/14/06-11/15/06	0843-0743	1 (2.5 gal)	NA	✓	2.25"			06111514	2.4°C	JJ	1425	*

Sample Custody – Fill In From Top Down

* Custody seals intact. Samples received in good condition. JJum

Relinquished By (Signature):	Date/Time	Received By (Signature):	Date/Time
Chevy Williams	11/15/06 0954	Express Courier	11/15/06 9:55
Express Courier	11/15/06	ETS	11/15/06
	11-15-06 1425		11-15-06 1425

Instructions: Clients should fill in all areas except those in the "Laboratory Use" block. Biomonitoring samples are preserved by storing them at 6°C and shipping them in ice. The hold time for each sample is 36 hours from the time of collection. Therefore, please collect and ship in such a way that the laboratory will receive the samples with ample time to initiate testing within that time frame. Samples shipped overnight on Friday via FedEx or UPS must be marked for Saturday delivery or they will not arrive until the following Monday.

BIOMONITORING CHAIN OF CUSTODY RECORD

Client: TVA

Project Name: Sequoyah NP Toxicity

P.O. Number: N/A

Facility Sampled: Sequoyah NP

NPDES Number: TN0026450

Collected By: Chevy Williams, Roy Quinn

Environmental Testing Solution, Inc.
351 Depot Street.
Asheville, NC
28801
Phone: 828-350-9364
Fax: 828-350-9368

Delivered By (Circle One):

FedEx UPS Bus Client

Other (specify): Express Courier

General Comments:

Field Identification / Sample Description	Grab/Comp.	Collection Date/Time		Container Number & Volume Collected	Flow MGD	Rain Event? (Mark as Appropriate)				project# 2878 Laboratory Use				
	----	Date	Time	----	----	Yes	If Yes, Inches	No	Trace	ETS Log Number	Arrival Temp. (°C)	By	Time	Appearance
SQN-101-TOX	Comp	11/16/06-11/17/06	0753-0653	2 (2.5gal)	NA			X		061117.09	3.3/3.7	JL	1405	*
SQN-INT-TOX	Comp	11/16/06-11/17/06	0814-0714	1 (2.5 gal)	NA			X		061117.10	0.7	JL	1405	*

Sample Custody – Fill In From Top Down

* Custody seals intact. Samples received in good condition JLunne

Relinquished By (Signature):	Date/Time	Received By (Signature):	Date/Time
Chevy Williams	11/17/06 10:13	Express Courier	11/17/06 10:13
Express Courier	11/17/06 2:05	ETS	11/17/06 11-17-06 1405

Instructions: Clients should fill in all areas except those in the "Laboratory Use" block. Biomonitoring samples are preserved by storing them at 6°C and shipping them in ice. The hold time for each sample is 36 hours from the time of collection. Therefore, please collect and ship in such a way that the laboratory will receive the samples with ample time to initiate testing within that time frame. Samples shipped overnight on Friday via FedEx or UPS must be marked for Saturday delivery or they will not arrive until the following Monday.

Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013 Method 1000.0)
Species: *Pimephales promelas*

Client: TVA
Facility: Sequoyah Nuclear Plant
NPDES #: TN 0026450
Project #: 2878

County: Hamilton
Treatment: Non-treated
Outfall: 101

Dilution preparation information:						*Comments:*
Dilution prep (%)	11.3	22.6	45.2	72.6	100	
Effluent volume (mL)	282.5	~~339~~ 565	1130	1815	2500	
Diluent volume (mL)	2217.5	~~2161~~ 1935	1370	685	0	
Total volume (mL)	2500	2500	2500	2500	2500	

Test organism information:		*Test information:*	
Organism age:	22.5 TO 24.5 HOURS OLD	Randomizing template:	YELLOW
Date and times organisms were born between:	11-13-06 1400 TO 1600	Incubator number:	3C
Organism source:	ABS BATCH Pp 11-13-06	*Artemia* lot number:	B61204U
Transfer bowl information:	pH = 7.63 Temperature = 24.1 °C	Total drying time:	24.25 HOURS
		Date / Time in: 11-21-06	1350
Average transfer volume:	8.6 ml	Date / Time out: 11-22-06	1400
		Oven temperature:	60°C

Daily feeding and renewal information:

Day	Date	Morning feeding time	Afternoon feeding time	Test initiation, renewal, or termination time	Control water batch used MHSW	Sample numbers used	Analyst
0	11-14-06	——	1600	1425	11-12-06A	061113.01 & 02	JL
1	11-15-06	1000	1605	1430	11-12-06B	061113.01 & 02	JL
2	11-16-06	1000	1600	1409	11-12-06B	061115.13 & 14	JL
3	11-17-06	1003	1611	1355	11-15-06A	061115.13 & 14	JL
4	11-18-06	1002	1605	1345	11-15-06A	061117.09 & 10	JL
5	11-19-06	0953	1600	1330	11-15-06B	061117.09 & 10	JL
6	11-20-06	0955	1602	1336	11-15-06B	061117.09 & 10	JL
7	11-21-06			1328			JL

Control information:		Acceptance criteria
% Mortality:	0%	≤ 20%
Average weight per initial larvae:	0.765	
Average weight per surviving larvae:	0.765	≥ 0.25 mg/larvae

Summary of test endpoints:	
7-day LC_{50}	>100%
NOEC *	<11.3%
LOEC *	11.3%
ChV *	<11.3%
IC_{25}	>100%

* INTERRUPTED DOSE RESPONSE. HYPOTHESIS TESTS ARE UNRELIABLE.

Species: *Pimephales promelas* Date: 11-14-06

Client: TVA / Sequoyah Nuclear Plant - Non-treated

Survival and Growth Data

Day	CONTROL				11.3%				22.6%			
	A	B	C	D	E	F	G	H	I	J	K	L
0	10	10	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10	10	10	10
3	10	10	10	10	10	10	10	10	10	10	10	10
4	10	10	10	10	10	10	10	10	10	10	10	10
5	10	10	10	10	10	10	10	10	10	10	10	10
6	10	10	10	10	10	10	10	10	10	10	10	10
7	10 lg	10	10	10	10	10	10	10	10	10	10	10
A = Pan weight (mg) Color identification: LIGHT BLUE TRAY Analyst: LAB	14.25	14.47	14.22	14.99	13.78	13.97	14.98	14.45	15.00	12.98	13.46	14.88
B = Pan + Larvae weight (mg) Analyst: LAB	22.40	21.79	21.57	22.77	20.40	20.53	21.82	21.89	22.25	20.01	20.71	21.75
Larvae weight (mg) = A – B	8.15	7.32	7.35	7.78	6.62	6.56	6.84	7.44	7.25	7.03	7.25	6.87
Weight per initial number of larvae (mg) = C / Initial number of larvae	0.815	0.732	0.735	0.778	0.662	0.656	0.684	0.744	0.725	0.703	0.725	0.687
Average weight per initial number of larvae (mg)	0.765				0.687				0.710			
Percent reduction from control (%)					10.3%				7.2%			

Comment codes: c = clear, d = dead, fg = fungus, k = killed, m = missing, sk = sick, sm = unusually small, lg = unusually large, d&r = decanted and returned, w = wounded.

Calculations and data reviewed: JL

Comments: * PATHOGENIC GROWTH WAS NOT OBSERVED ON THE MINNOWS IN THE EFFLUENT OR INTAKE TREATMENTS. JLunne

Species: *Pimephales promelas*

Client: TVA / Sequoyah Nuclear Plant - Non-treated Date: 11-14-06

Survival and Growth Data

Day	45.2%				72.6%				100%			
	M	N	O	P	Q	R	S	T	U	V	W	X
0	10	10	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10	10	10	10
3	10	10	10	10	10	10	10	10	10	10	10	10
4	10	10	10	10	10	10	10	10	10	10	10	10
5	10	10	10	10	10	10	10	10	10	10	10	10
6	10	10	10	10	9 1d	10	10	10	10	10	10	10
7	10	10	10	1SM 10	9	10	10	10	10	10	1SM 10	10
A = Pan weight (mg) Color identification: LIGHT BLUE TRAY Analyst: LAB	15.37	14.72	13.76	14.75	13.48	14.21	14.12	13.80	14.12	13.69	14.02	13.42
B = Pan + Larvae weight (mg) Analyst: LAB	22.16	21.29	20.26	20.38	20.10	20.43	20.96	20.40	20.83	21.14	20.85	20.11
Larvae weight (mg) = A – B	6.79	6.57	6.50	5.63	6.62	6.22	6.84	6.60	6.71	7.45	6.83	6.69
Weight per initial number of larvae (mg) = C / Initial number of larvae	0.679	0.657	0.650	0.563	0.662	0.622	0.684	0.660	0.671	0.745	0.683	0.669
Average weight per initial number of larvae (mg)	0.637				0.657				0.692			
Percent reduction from control (%)			16.7%				14.1%				9.5%	

Comment codes: c = clear, d = dead, fg = fungus, k = killed, m = missing, sk = sick, sm = unusually small, lg = unusually large, d&r = decanted and returned, w = wounded.

Calculations and data reviewed: [illegible]

Comments:

Species: *Pimephales promelas*

Client: TVA / Sequoyah Nuclear Plant - Non-treated Date: 11-14-06

Survival and Growth Data

Day	100% Intake			
	Y	Z	AA	BB
0	10	10	10	10
1	10	10	10	10
2	10	10	10	10
3	10	9 id	10	10
4	10	9	10	10
5	10	9	10	10
6	10	9	10	10
7	sm 10	9	10	10
A = Pan weight (mg) Color identification: LIGHT BLUE TRAY Analyst: LAB	13.55	16.04	13.38	13.75
B = Pan + Larvae weight (mg) Analyst: LAB	20.29	22.08	20.80	20.03
Larvae weight (mg) = A – B	6.74	6.04	7.42	6.28
Weight per initial number of larvae (mg) = C / Initial number of larvae	0.674	0.604	0.742	0.628
Average weight per initial number of larvae (mg)	0.662			
Percent reduction from control (%)	13.5%			

Comment codes: c = clear, d = dead, fg = fungus, k = killed, m = missing, sk = sick, sm = unusually small, lg = unusually large, d&r = decanted and returned, w = wounded.

Calculations and data reviewed: dl

Comments:

TVA / Sequoyah Nuclear Plant, Outfall 101
Non-treated
November 14-21, 2006

Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013, Method 1000.0)
Species: *Pimephales promelas*

Quality Control
Verification of Data Entry, Calculations, and Statistical Analyses

Project number: 2878

Reveiwed by:

Concentration (%)	Replicate	Initial number of larvae	Final number of larvae	A = Pan weight (mg)	B = Pan + Larvae weight (mg)	Larvae weight (mg) = A - B	Not for Compliance Assessment, Internal Laboratory QC: Weight / Surviving number of larvae (mg)	Mean weight / Surviving number of larvae (mg)	Coefficient of variation (Mean weight per surviving number of larvae) (%)	Weight / Initial number of larvae (mg)	Mean survival (%)	Mean weight / Initial number of larvae (mg)	Coefficient of variation (Mean weight per initial number of larvae) (%)	Percent reduction from control (%)
Control	A	10	10	14.25	22.40	8.15	0.815	0.765	5.2	0.815	100.0	0.765	5.2	Not applicable
	B	10	10	14.47	21.79	7.32	0.732			0.732				
	C	10	10	14.22	21.57	7.35	0.735			0.735				
	D	10	10	14.99	22.77	7.78	0.778			0.778				
11.3%	E	10	10	13.78	20.40	6.62	0.662	0.687	5.9	0.662	100.0	0.687	5.9	10.3
	F	10	10	13.97	20.53	6.56	0.656			0.656				
	G	10	10	14.98	21.82	6.84	0.684			0.684				
	H	10	10	14.45	21.89	7.44	0.744			0.744				
22.6%	I	10	10	15.00	22.25	7.25	0.725	0.710	2.6	0.725	100.0	0.710	2.6	7.2
	J	10	10	12.98	20.01	7.03	0.703			0.703				
	K	10	10	13.46	20.71	7.25	0.725			0.725				
	L	10	10	14.88	21.75	6.87	0.687			0.687				
45.2%	M	10	10	15.37	22.16	6.79	0.679	0.637	8.0	0.679	100.0	0.637	8.0	16.7
	N	10	10	14.72	21.29	6.57	0.657			0.657				
	O	10	10	13.76	20.26	6.50	0.650			0.650				
	P	10	10	14.75	20.38	5.63	0.563			0.563				
72.6%	Q	10	9	13.48	20.10	6.62	0.736	0.675	7.0	0.662	97.5	0.657	3.9	14.1
	R	10	10	14.21	20.43	6.22	0.622			0.622				
	S	10	10	14.12	20.96	6.84	0.684			0.684				
	T	10	10	13.80	20.40	6.60	0.660			0.660				
100%	U	10	10	14.12	20.83	6.71	0.671	0.692	5.2	0.671	100.0	0.692	5.2	9.5
	V	10	10	13.69	21.14	7.45	0.745			0.745				
	W	10	10	14.02	20.85	6.83	0.683			0.683				
	X	10	10	13.42	20.11	6.69	0.669			0.669				
100% Intake	Y	10	10	13.55	20.29	6.74	0.674	0.679	6.9	0.674	97.5	0.662	9.2	13.5
	Z	10	9	16.04	22.08	6.04	0.671			0.604				
	AA	10	10	13.38	20.80	7.42	0.742			0.742				
	BB	10	10	13.75	20.03	6.28	0.628			0.628				

Outfall 101:
Dunnett's MSD value: 0.0625
PMSD: 8.2

Intake:
Dunnett's MSD value: 0.0703
PMSD: 9.2

MSD = Minimum Significant Difference
PMSD = Percent Minimum Significant Difference

PMSD is a measure of test precision. The PMSD is the minimum percent difference between the control and treatment that can be declared statistically significant in a whole effluent toxicity test. On average, a significant difference occurs for Environmental Testing Solutions, Inc. chronic toxicity tests when a toxicant reduces *Pimephales* growth by 15.0% from the control (determined through reference toxicant testing).
Lower PMSD bound determined by USEPA (10th percentile) = 9.4%.
Upper PMSD bound determined by USEPA (90th percentile) = 35%.
The lower and upper bounds were calculated by the USEPA using 205 tests conducted from 19 laboratories for *Pimephales* growth in chronic reference toxicant tests.

USEPA. 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination Program. EPA-833-R-00-003. US Environmental Protection Agency, Cincinnati, OH.

TVA / Sequoyah Nuclear Plant, Outfall 101
Non-treated
November 14-21, 2006

Statistical Analyses

Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	11/14/2006	Test ID:	PpFRCR	Sample ID:	TVA / Sequoyah Nuclear Plant - Outfall 101
End Date:	11/21/2006	Lab ID:	ETS-Envir. Testing Sol	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:		Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	Non-treated				

Conc-%	1	2	3	4
D-Control	0.8150	0.7320	0.7350	0.7780
11.3	0.6620	0.6560	0.6840	0.7440
22.6	0.7250	0.7030	0.7250	0.6870
45.2	0.6790	0.6570	0.6500	0.5630
72.6	0.6620	0.6220	0.6840	0.6600
100	0.6710	0.7450	0.6830	0.6690

			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	0.7650	1.0000	0.7650	0.7320	0.8150	5.151	4				0.7650	1.0000
*11.3	0.6865	0.8974	0.6865	0.6560	0.7440	5.853	4	3.029	2.410	0.0625	0.6983	0.9127
22.6	0.7100	0.9281	0.7100	0.6870	0.7250	2.607	4	2.122	2.410	0.0625	0.6983	0.9127
*45.2	0.6373	0.8330	0.6373	0.5630	0.6790	8.006	4	4.929	2.410	0.0625	0.6621	0.8655
*72.6	0.6570	0.8588	0.6570	0.6220	0.6840	3.918	4	4.167	2.410	0.0625	0.6621	0.8655
*100	0.6920	0.9046	0.6920	0.6690	0.7450	5.184	4	2.816	2.410	0.0625	0.6621	0.8655

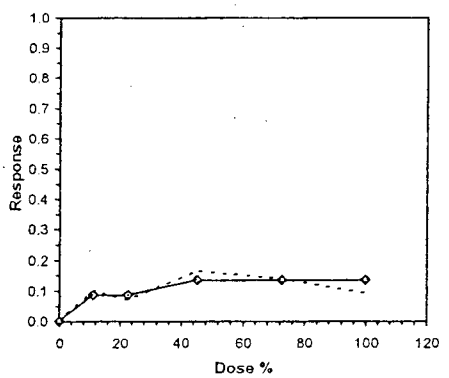
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.966335654	0.884	-0.02448168	-0.12457175
Bartlett's Test indicates equal variances (p = 0.70)	2.993674994	15.08627224		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	<11.3	11.3			0.062466272	0.081655257	0.007922242	0.001343653	0.002135672	5, 18
Treatments vs D-Control										

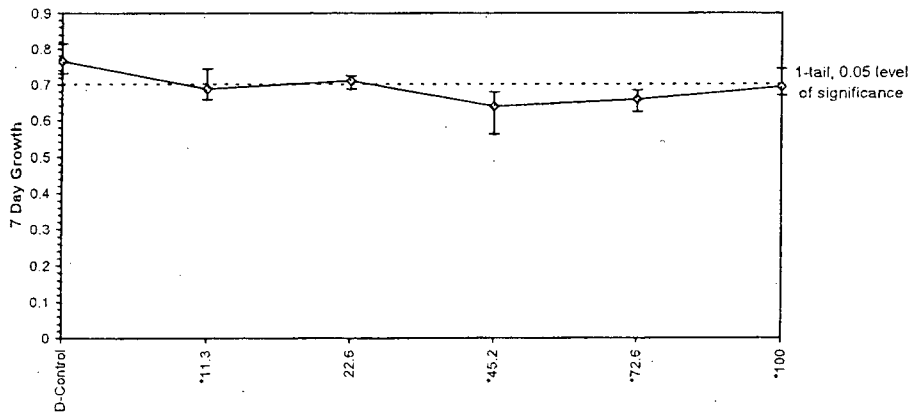
Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05*	6.475	6.109	3.285	39.169	2.0965
IC10	28.693				
IC15	>100				
IC20	>100				
IC25	>100				
IC40	>100				
IC50	>100				

* indicates IC estimate less than the lowest concentration



Dose-Response Plot



sqn_11-14-06data

TVA / Sequoyah Nuclear Plant, Intake
Non-treated
November 14-21, 2006

Statistical Analyses

Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	11/14/2006	Test ID:	PpFRCR	Sample ID:	TVA / Sequoyah Nuclear Plant - Intake
End Date:	11/21/2006	Lab ID:	ETS-Envir. Testing Sol.	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:		Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	Non-treated				

Conc-%	1	2	3	4
D-Control	0.8150	0.7320	0.7350	0.7780
100	0.6740	0.6040	0.7420	0.6280

			Transform: Untransformed						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	0.7650	1.0000	0.7650	0.7320	0.8150	5.151	4				0.7650	1.0000
*100	0.6620	0.8654	0.6620	0.6040	0.7420	9.174	4	2.846	1.943	0.0703	0.6620	0.8654

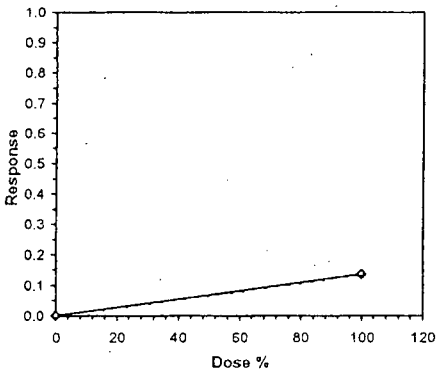
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.923090458	0.749	0.614814118	-0.69233823
F-Test indicates equal variances (p = 0.50)	2.375268459	47.46722794		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs D-Control	0.070335791	0.091942211	0.021218	0.002620333	0.029350473	1, 6

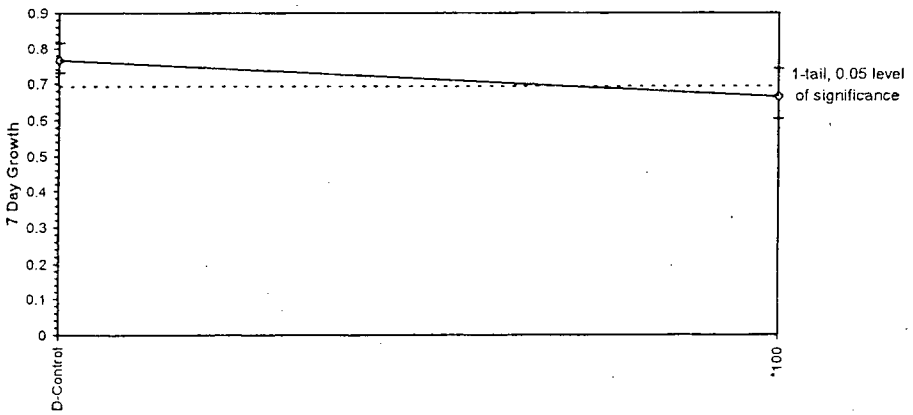
Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05*	37.136			
IC10*	74.272			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			

* indicates IC estimate less than the lowest concentration



Dose-Response Plot



sqn_11-14-06data

TVA / Sequoyah Nuclear Plant, Outfall 101
Non-treated
November 14-21, 2006

Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013, Method 1000.0)

Species: *Pimephales promelas*

Daily Chemical Analyses

Project number: 2878

Reviewed by: J. Jones

Concentration	Parameter	Day 0		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control	pH (SU)	7.67	7.58	7.81	7.45	7.52	7.08	7.55	7.08	7.77	7.26	7.81	7.43	7.81	7.16
	DO (mg/L)	8.1	7.9	8.2	7.7	7.8	7.0	7.7	7.3	7.7	7.9	7.8	7.4	8.0	7.2
	Conductivity (µmhos/cm)	314		320		308		315		316		309		312	
	Alkalinity (mg/L $CaCO_3$)	59		57				59				60			
	Hardness (mg/L $CaCO_3$)	93		93				91				93			
	Temperature (°C)	24.6	24.5	24.7	24.2	24.7	24.4	24.7	24.4	24.8	24.5	24.8	24.4	24.6	24.6
11.3%	pH (SU)	7.65	7.53	7.77	7.44	7.53	7.06	7.38	7.09	7.26	7.18	7.48	7.43	7.76	7.13
	DO (mg/L)	8.0	7.9	8.1	7.6	7.9	6.7	7.9	7.2	7.9	6.8	7.9	7.4	8.0	7.3
	Conductivity (µmhos/cm)	299		295		306		289		293		291		292	
	Temperature (°C)	24.6	24.2	24.7	24.2	24.7	24.7	24.8	24.8	24.8	24.4	24.8	24.2	24.7	24.4
22.6%	pH (SU)	7.66	7.53	7.76	7.41	7.54	7.01	7.38	7.05	7.27	7.18	7.48	7.44	7.77	7.13
	DO (mg/L)	8.0	7.9	8.1	7.6	8.0	6.6	8.0	7.2	7.9	6.5	7.9	7.4	8.1	7.3
	Conductivity (µmhos/cm)	285		286		296		273		278		278		278	
	Temperature (°C)	24.7	24.1	24.8	24.2	24.7	24.5	24.8	24.6	24.9	24.4	24.8	24.1	24.8	24.4
45.2%	pH (SU)	7.66	7.56	7.74	7.40	7.53	7.04	7.36	7.09	7.26	7.19	7.47	7.44	7.75	7.14
	DO (mg/L)	8.0	7.9	8.1	7.5	8.1	6.7	8.0	7.2	7.9	6.5	8.0	7.3	8.1	7.4
	Conductivity (µmhos/cm)	257		258		265		246		251		252		250	
	Temperature (°C)	24.7	24.2	24.8	24.3	24.9	24.5	24.8	24.5	24.9	24.4	24.8	24.3	24.8	24.3
72.6%	pH (SU)	7.65	7.56	7.73	7.40	7.52	7.08	7.34	7.12	7.24	7.18	7.45	7.42	7.73	7.08
	DO (mg/L)	8.1	8.0	8.1	7.5	8.0	6.9	8.0	7.3	8.0	6.7	8.1	7.4	8.2	7.3
	Conductivity (µmhos/cm)	222		223		231		211		217		213		217	
	Temperature (°C)	24.9	24.2	24.8	24.1	24.9	24.5	24.8	24.8	24.9	24.3	24.8	24.2	24.8	24.6
100%	pH (SU)	7.64	7.54	7.71	7.42	7.51	7.06	7.33	7.07	7.22	7.18	7.43	7.46	7.70	7.13
	DO (mg/L)	8.0	8.0	8.2	7.5	7.9	6.8	8.2	7.3	8.2	6.6	8.2	7.2	8.3	7.2
	Conductivity (µmhos/cm)	188		186		198		178		182		182		184	
	Alkalinity (mg/L $CaCO_3$)	66				65				67					
	Hardness (mg/L $CaCO_3$)	77				79				81					
	Total Residual Chlorine (mg/L)	<0.10				<0.10				<0.10					
	Temperature (°C)	25.1	24.4	24.8	24.3	25.0	24.5	25.0	24.6	25.1	24.4	24.9	24.2	24.8	24.7
100% Intake	pH (SU)	7.65	7.55	7.71	7.41	7.51	7.09	7.30	7.10	7.20	7.17	7.41	7.43	7.69	7.12
	DO (mg/L)	8.0	8.0	8.3	7.5	7.8	7.1	8.3	7.5	8.2	6.6	8.2	7.3	8.4	7.5
	Conductivity (µmhos/cm)	184		186		198		180		182		179		183	
	Alkalinity (mg/L $CaCO_3$)	64				66				66					
	Hardness (mg/L $CaCO_3$)	79				77				77					
	Total Residual Chlorine (mg/L)	<0.10				<0.10				<0.10					
	Temperature (°C)	24.9	24.1	24.8	24.3	24.8	24.6	24.9	24.6	24.8	24.3	24.7	24.3	24.7	24.4

Species: *Pimephales promelas* Date: 11-14-06
Client: TVA / Sequoyah Nuclear Plant – Non-treated

Daily Chemistry:

		Day					
		0		1		2	
	Analyst	KEK	KEK	KEK	KEK	KEK	KEK
Concentration	Parameter						
CONTROL	pH (S.U.)	7.67	7.58	7.81	7.45	7.52	7.08
	DO (mg/L)	8.1	7.9	8.2	7.7	7.8	7.0
	Conductivity (µmhos/cm)	314		320		308	
	Alkalinity (mg $CaCO_3$/L)	59		57			
	Hardness (mg $CaCO_3$/L)	93		93			
	Temperature (°C)	24.6	24.5	24.7	24.2	24.7	24.4
11.3%	pH (S.U.)	7.65	7.53	7.79	7.44	7.53	7.06
	DO (mg/L)	8.0	7.9	8.1	7.6	7.9	6.7
	Conductivity (µmhos/cm)	299		295		306	
	Temperature (°C)	24.6	24.2	24.7	24.2	24.7	24.7
22.6%	pH (S.U.)	7.66	7.53	7.76	7.41	7.54	7.01
	DO (mg/L)	8.0	7.9	8.1	7.6	8.0	6.6
	Conductivity (µmhos/cm)	285		286		296	
	Temperature (°C)	24.7	24.1	24.8	24.2	24.7	24.5
45.2%	pH (S.U.)	7.66	7.56	7.74	7.40	7.53	7.04
	DO (mg/L)	8.0	7.9	8.1	7.5	8.1	6.7
	Conductivity (µmhos/cm)	257		258		265	
	Temperature (°C)	24.7	24.2	24.8	24.3	24.9	24.5
72.6%	pH (S.U.)	7.65	7.56	7.73	7.40	7.52	7.08
	DO (mg/L)	8.1	8.0	8.1	7.5	8.0	6.9
	Conductivity (µmhos/cm)	222		223		231	
	Temperature (°C)	24.9	24.2	24.8	24.1	24.9	24.5
100%	pH (S.U.)	7.64	7.54	7.71	7.42	7.51	7.06
	DO (mg/L)	8.0	8.0	8.2	7.5	7.9	6.8
	Conductivity (µmhos/cm)	188		186		198	
	Alkalinity (mg $CaCO_3$/L)	66				65	
	Hardness (mg $CaCO_3$/L)	77				79	
	TR chlorine (mg/L)	<0.10				<0.10	
	Temperature (°C)	25.1	24.4	24.8	24.3	25.0	24.5
100% Intake	pH (S.U.)	7.65	7.55	7.71	7.41	7.51	7.09
	DO (mg/L)	8.0	8.0	8.3	7.5	7.8	7.1
	Conductivity (µmhos/cm)	184		186		198	
	Alkalinity (mg $CaCO_3$/L)	64				66	
	Hardness (mg $CaCO_3$/L)	79				77	
	TR chlorine (mg/L)	<0.10				<0.10	
	Temperature (°C)	24.9	24.1	24.8	24.3	24.8	24.6
		Initial	Final	Initial	Final	Initial	Final

Species: *Pimephales promelas* Date: 11-14-06
Client: TVA / Sequoyah Nuclear Plant – Non-treated

		Day							
		3		4		5		6	
	Analyst	KEN	KEN	KEN	KEN	KEN	KEN	KEN	KEN
Concen-tration	Parameter								
CONTROL	pH (S.U.)	7.55	7.08	7.77	7.26	7.81	7.43	7.81	7.16
	DO (mg/L)	7.7	7.3	7.7	7.9	7.8	7.4	8.0	7.2
	Conductivity (µmhos/cm)	315		316		309		312	
	Alkalinity (mg $CaCO_3$/L)	59				60			
	Hardness (mg $CaCO_3$/L)	91				93			
	Temperature (°C)	24.7	24.4	24.8	24.5	24.8	24.4	24.6	24.6
11.3%	pH (S.U.)	7.38	7.09	7.26	7.18	7.48	7.43	7.76	7.13
	DO (mg/L)	7.9	7.2	7.9	6.8	7.9	7.4	8.0	7.3
	Conductivity (µmhos/cm)	289		293		291		292	
	Temperature (°C)	24.8	24.8	24.8	24.4	24.8	24.2	24.7	24.4
22.6%	pH (S.U.)	7.38	7.05	7.27	7.18	7.48	7.44	7.77	7.13
	DO (mg/L)	8.0	7.2	7.9	6.5	7.9	7.4	8.1	7.3
	Conductivity (µmhos/cm)	273		278		278		278	
	Temperature (°C)	24.8	24.6	24.9	24.4	24.8	24.1	24.8	24.4
45.2%	pH (S.U.)	7.36	7.09	7.26	7.19	7.47	7.44	7.75	7.14
	DO (mg/L)	8.0	7.2	7.9	6.5	8.0	7.3	8.1	7.4
	Conductivity (µmhos/cm)	246		251		252		250	
	Temperature (°C)	24.8	24.5	24.9	24.4	24.8	24.3	24.8	24.3
72.6%	pH (S.U.)	7.34	7.12	7.24	7.18	7.45	7.42	7.73	7.08
	DO (mg/L)	8.0	7.3	8.0	6.7	8.1	7.4	8.2	7.3
	Conductivity (µmhos/cm)	211		217		213		217	
	Temperature (°C)	24.8	24.8	24.9	24.3	24.8	24.2	24.8	24.6
100%	pH (S.U.)	7.33	7.07	7.22	7.18	7.43	7.46	7.90	7.13
	DO (mg/L)	8.2	7.3	8.2	6.6	8.2	7.2	8.3	7.2
	Conductivity (µmhos/cm)	178		182		182		184	
	Alkalinity (mg $CaCO_3$/L)			67					
	Hardness (mg $CaCO_3$/L)			81					
	TR Chlorine (mg/L)			<0.10					
	Temperature (°C)	25.0	24.6	25.1	24.4	24.9	24.2	24.8	24.7
100% Intake	pH (S.U.)	7.30	7.10	7.20	7.17	7.41	7.43	~~7.78~~ 7.9	7.12
	DO (mg/L)	8.3	7.5	8.2	6.6	8.2	7.3	8.4	7.5
	Conductivity (µmhos/cm)	180		182		179		183	
	Alkalinity (mg $CaCO_3$/L)			66					
	Hardness (mg $CaCO_3$/L)			77					
	TR chlorine (mg/L)			<0.10					
	Temperature (°C)	24.9	24.6	24.8	24.3	24.7	24.3	24.7	24.4
		Initial	Final	Initial	Final	Initial	Final	Initial	Final

Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013 Method 1002.0)
Species: *Ceriodaphnia dubia*

Client: TVA
Facility: Sequoyah Nuclear Plant
NPDES #: TN 0026450
Project #: 2878

County: Hamilton
Treatment: Non-treated
Outfall: 101

Dilution preparation information:						*Comments:*
Dilution prep (%)	11.3	22.6	45.2	72.6	100	
Effluent volume (mL)	282.5	~~339~~ 565	1130	1815	2500	
Diluent volume (mL)	2217.5	~~2161~~ 1935	1370	685	0	
Total volume (mL)	2500	2500	2500	2500	2500	

Test organism information:		*Test information:*	
Organism age:	< 24-HOURS OLD	Randomizing template:	~~GREEN~~ PINK
Date and times organisms were born between:	11-13-06 1523 TO 2006	Incubator number and shelf location:	2B1+2
Organism Source Culture board: 11-07-06 B	Cups: 28, 29, 30, 31, 33 34, 36, 42, 43, 44	YCT batch:	10-07-06
Transfer bowl information:	pH = 7.72 Temperature = 24.9	*Selenastrum* batch:	11-13-06

Daily renewal information:

Day	Date	Test initiation, renewal, or termination time	Control water batch used	Sample numbers used	Analyst
0	11-14-06	1218	11-12-06A	061113.01 & 02	JL
1	11-15-06	1135	11-12-06~~A~~B	061113.01 & 02	JL
2	11-16-06	1130	11-12-06B	061115.13 & 14	JL
3	11-17-06	1213	11-15-06A	061115.13 & 14	JL
4	11-18-06	1124	11-15-06A	061117.09 & 10	JL
5	11-19-06	1129	11-15-06B	061117.09 & 10	JL
6	11-20-06	1122	11-15-06B	061117.09 & 10	JL
7	11-21-06	1132			JL

Control information:	1	2	Acceptance criteria	*Summary of test endpoints:*	
% of Male Adults:	0%	0%	≤ 20%	7-day LC50	>100%
% Adults having 3rd Broods:	100%	100%	≥ 80%	NOEC	100%
% Mortality:	0%	0%	≤ 20%	LOEC	>100%
Mean Offspring/Female:	28.9	29.1	≥ 15.0 offspring/female	ChV	>100%
% CV:	6.2%	6.2%	< 40.0 %	IC25	>100%

Species: *Ceriodaphnia dubia*
Client: Sequoyah Nuclear Plant - Non-treated Date: 11-14-06

CONTROL - 1 *Survival and Reproduction Data*

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	4	4	5	4	4	4	4	4	4	4
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	10	10	9	10	9	9	11	10	13	11
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	15	13	13	16	14	17	15	13	15	15
Total young produced		29	27	27	30	~~3~~ 27	30	30	27	32	30
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L
X for 3rd Broods		X	X	X	X	X	X	X	X	X	X

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	28.9

CONC: 11.3% *Survival and Reproduction Data*

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	4	4	5	5	4	5	4	4	4	5
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	10	11	10	12	10	10	11	12	11	11
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	14	14	16	14	17	18	16	13	15	18
Total young produced		28	29	31	31	31	33	31	29	30	34
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	30.7
% Reduction from Control:	-6.2%

Species: *Ceriodaphnia dubia*
Client: Sequoyah Nuclear Plant - Non-treated Date: 11-14-06

CONC: 22.6% *Survival and Reproduction Data*

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	4	4	5	3	4	5	5	5	4	4
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	13	13	10	11	11	10	11	13	12	10
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	*3	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	13	17	17	14	16	16	19	18	19	16
Total young produced		33	34	32	28	31	31	35	36	35	30
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

Note: Adult mortality (L = live, D = dead)
*SPLIT BROOD

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	32.5
% Reduction from Control:	-12.5%

CONC: 45.2% *Survival and Reproduction Data*

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	4	4	5	5	5	4	5	4	4	4
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	14	11	11	11	10	12	12	13	10	11
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	*2	0	0	15	0	0	0	0	16	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	18	18	17	0	19	16	17	14	0	19
Total young produced		38	33	33	31	34	32	34	31	30	34
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

Note: Adult mortality (L = live, D = dead)
*SPLIT BROOD

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	33.0
% Reduction from Control:	-14.2%

Species: *Ceriodaphnia dubia*
Client: Sequoyah Nuclear Plant - Non-treated Date: 11-14-06

CONC: 72.6% *Survival and Reproduction Data*

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	4	4	5	4	5	5	5	5	4	6
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	11	14	10	14	11	11	15	10	12	13
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	16	0	16	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	0	19	0	18	18	16	15	18	19	15
Total young produced		31	37	36	36	34	32	35	33	35	34
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	33.8
% Reduction from Control:	-17.0%

CONC: 100% *Survival and Reproduction Data*

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	4	5	4	6	5	5	4	5	5	5
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	12	13	11	12	10	14	11	14	14	12
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	16	0	18	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	0	15	0	18	18	17	19	14	19	17
Total young produced		32	33	33	36	33	36	~~38~~ 34	33	38	34
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	34.2
% Reduction from Control:	-18.3%

Species: *Ceriodaphnia dubia*
Client: Sequoyah Nuclear Plant - Non-treated Date: 11-14-06

CONTROL - 2 *Survival and Reproduction Data*

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	4	4	4	4	5	4	4	3	4	4
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	10	9	9	9	11	10	10	11	10	12
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	15	13	17	16	14	15	14	17	13	16
Total young produced		29	26	30	29	30	29	28	31	27	32
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	29.1

CONC: 100% Intake *Survival and Reproduction Data*

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	4	4	5	5	5	4	4	4	5	4
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	15	11	11	11	10	14	12	13	10	12
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	0	0	0	0	17	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	19	15	18	18	16	15	0	19	18	18
Total young produced		38	30	34	34	31	33	33	36	33	34
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	33.6
% Reduction from Control:	-15.5%

TVA / Sequoyah Nuclear Plant, Outfall 101
Non-treated
November 14-21, 2006

Verification of *Ceriodaphnia* Reproduction Totals

Control-1

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	4	4	5	4	4	4	4	4	4	4	41
5	10	10	9	10	9	9	11	10	13	11	102
6	0	0	0	0	0	0	0	0	0	0	0
7	15	13	13	16	14	17	15	13	15	15	146
Total	**29**	**27**	**27**	**30**	**27**	**30**	**30**	**27**	**32**	**30**	**289**

11.3%

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	4	4	5	5	4	5	4	4	4	5	44
5	10	11	10	12	10	10	11	12	11	11	108
6	0	0	0	0	0	0	0	0	0	0	0
7	14	14	16	14	17	18	16	13	15	18	155
Total	**28**	**29**	**31**	**31**	**31**	**33**	**31**	**29**	**30**	**34**	**307**

22.6%

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	4	4	5	3	4	5	5	5	4	4	43
5	13	13	10	11	11	10	11	13	12	10	114
6	3	0	0	0	0	0	0	0	0	0	3
7	13	17	17	14	16	16	19	18	19	16	165
Total	**33**	**34**	**32**	**28**	**31**	**31**	**35**	**36**	**35**	**30**	**325**

45.2%

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	4	4	5	5	5	4	5	4	4	4	44
5	14	11	11	11	10	12	12	13	10	11	115
6	2	0	0	15	0	0	0	0	16	0	33
7	18	18	17	0	19	16	17	14	0	19	138
Total	**38**	**33**	**33**	**31**	**34**	**32**	**34**	**31**	**30**	**34**	**330**

72.6%

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	4	4	5	4	5	5	5	5	4	6	47
5	11	14	10	14	11	11	15	10	12	13	121
6	16	0	16	0	0	0	0	0	0	0	32
7	0	19	0	18	18	16	15	18	19	15	138
Total	**31**	**37**	**31**	**36**	**34**	**32**	**35**	**33**	**35**	**34**	**338**

100%

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	4	5	4	6	5	5	4	5	5	5	48
5	12	13	11	12	10	14	11	14	14	12	123
6	16	0	18	0	0	0	0	0	0	0	34
7	0	15	0	18	18	17	19	14	19	17	137
Total	**32**	**33**	**33**	**36**	**33**	**36**	**34**	**33**	**38**	**34**	**342**

Control-2

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	4	4	4	4	5	4	4	3	4	4	40
5	10	9	9	9	11	10	10	11	10	12	101
6	0	0	0	0	0	0	0	0	0	0	0
7	15	13	17	16	14	15	14	17	13	16	150
Total	**29**	**26**	**30**	**29**	**30**	**29**	**28**	**31**	**27**	**32**	**291**

100% Intake

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	4	4	5	5	5	4	4	4	5	4	44
5	15	11	11	11	10	14	12	13	10	12	119
6	0	0	0	0	0	0	17	0	0	0	17
7	19	15	18	18	16	15	0	19	18	18	156
Total	**38**	**30**	**34**	**34**	**31**	**33**	**33**	**36**	**33**	**34**	**336**

TVA / Sequoyah Nuclear Plant, Outfall 101
Non-treated
November 14-21, 2006

Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013, Method 1002.0)
Species: *Ceriodaphnia dubia*

Quality Control
Verification of Data Entry, Calculations, and Statistical Analyses

Project number: 2878

Reveiwed by: Jumse

Concentration (%)	Replicate number										Survival (%)	Average reproduction (offspring/female)	Coefficient of variation (%)	Percent reduction from pooled controls (%)
	1	2	3	4	5	6	7	8	9	10				
Control - 1	29	27	27	30	27	30	30	27	32	30	100	28.9	6.2	Not applicable
11.3%	28	29	31	31	31	33	31	29	30	34	100	30.7	6.0	-6.2
22.6%	33	34	32	28	31	31	35	36	35	30	100	32.5	7.8	-12.5
45.2%	38	33	33	31	34	32	34	31	30	34	100	33.0	6.9	-14.2
72.6%	31	37	31	36	34	32	35	33	35	34	100	33.8	6.0	-17.0
100%	32	33	33	36	33	36	34	33	38	34	100	34.2	5.5	-18.3
Control - 2	29	26	30	29	30	29	28	31	27	32	100	29.1	6.2	Not applicable
100% Intake	38	30	34	34	31	33	33	36	33	34	100	33.6	6.8	-15.5

Outfall 101:
Dunnett's MSD value: 2.123
PMSD: 7.3

Intake:
Dunnett's MSD value: 1.586
PMSD: 5.5

MSD = Minimum Significant Difference
PMSD = Percent Minimum Significant Difference

PMSD is a measure of test precision. The PMSD is the minimum percent difference between the control and treatment that can be declared statistically significant in a whole effluent toxicity test. On average, a significant difference occurs for Environmental Testing Solutions, Inc. chronic toxicity tests when a toxicant reduces *Ceriodaphnia* reproduction by 9.6% from the control.

Lower PMSD bound determined by USEPA (10th percentile) = 11%.

Upper PMSD bound determined by USEPA (90th percentile) = 37%.

The lower and upper bounds were calculated by the USEPA using 393 tests conducted from 33 laboratories for *Ceriodaphnia* reproduction in chronic reference toxicant tests.

USEPA. 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination Program. EPA-833-R-00-003. US Environmental Protection Agency, Cincinnati, OH.

TVA / Sequoyah Nuclear Plant, Outfall 101
Non-treated
November 14-21, 2006

Statistical Analyses

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	11/14/2006	Test ID:	CdFRCR	Sample ID:	TVA / Sequoyah Nuclear Plant - Outfall 101
End Date:	11/21/2006	Lab ID:	ETS-Envir. Testing Sol.	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:		Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	CD-Ceriodaphnia dubia
Comments:	Non-treated				

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	29.000	27.000	27.000	30.000	27.000	30.000	30.000	27.000	32.000	30.000
11.3	28.000	29.000	31.000	31.000	31.000	33.000	31.000	29.000	30.000	34.000
22.6	33.000	34.000	32.000	28.000	31.000	31.000	35.000	36.000	35.000	30.000
45.2	38.000	33.000	33.000	31.000	34.000	32.000	34.000	31.000	30.000	34.000
72.6	31.000	37.000	31.000	36.000	34.000	32.000	35.000	33.000	35.000	34.000
100	32.000	33.000	33.000	36.000	33.000	36.000	34.000	33.000	38.000	34.000

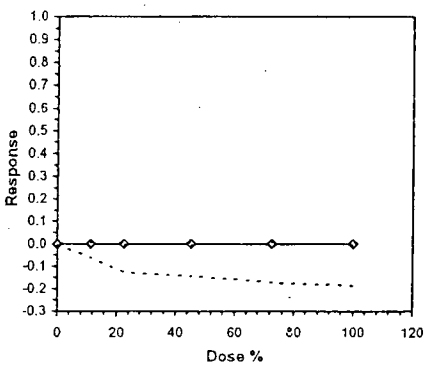
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	28.900	1.0000	28.900	27.000	32.000	6.201	10				32.183	1.0000
11.3	30.700	1.0623	30.700	28.000	34.000	5.957	10	-1.939	2.287	2.123	32.183	1.0000
22.6	32.500	1.1246	32.500	28.000	36.000	7.845	10	-3.878	2.287	2.123	32.183	1.0000
45.2	33.000	1.1419	33.000	30.000	38.000	6.851	10	-4.416	2.287	2.123	32.183	1.0000
72.6	33.800	1.1696	33.800	31.000	37.000	6.047	10	-5.278	2.287	2.123	32.183	1.0000
100	34.200	1.1834	34.200	32.000	38.000	5.479	10	-5.709	2.287	2.123	32.183	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.736118853	1.035	0.267812653	-0.34924831
Bartlett's Test indicates equal variances (p = 0.88)	1.74052	15.08627224		

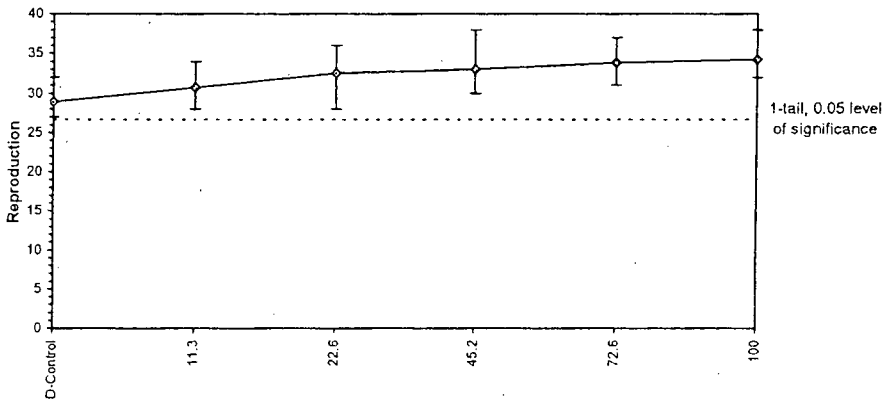
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	2.122849295	0.073454993	40.85666667	4.309259259	1.6E-06	5, 54
Treatments vs D-Control										

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Dose-Response Plot



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TVA / Sequoyah Nuclear Plant, Intake
Non-treated
November 14-21, 2006

Statistical Analyses

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	11/14/2006	Test ID:	CdFRCR	Sample ID:	TVA / Sequoyah Nuclear Plant - Intake
End Date:	11/21/2006	Lab ID:	ETS-Envir. Testing Sol.	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:		Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	CD-Ceriodaphnia dubia
Comments:	Non-treated				

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	29.000	26.000	30.000	29.000	30.000	29.000	28.000	31.000	27.000	32.000
100	38.000	30.000	34.000	34.000	31.000	33.000	33.000	36.000	33.000	34.000

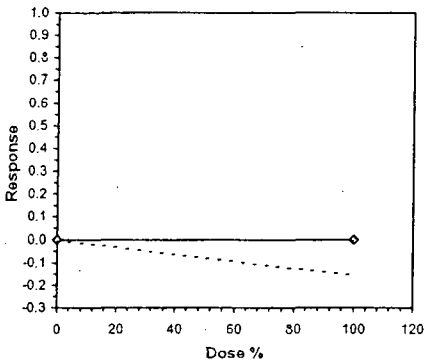
			Transform: Untransformed						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	29.100	1.0000	29.100	26.000	32.000	6.158	10				31.350	1.0000
100	33.600	1.1546	33.600	30.000	38.000	6.758	10	-4.920	1.734	1.586	31.350	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.973339081	0.868	0.197458597	0.234273437
F-Test indicates equal variances (p = 0.49)	1.605536342	6.541089535		

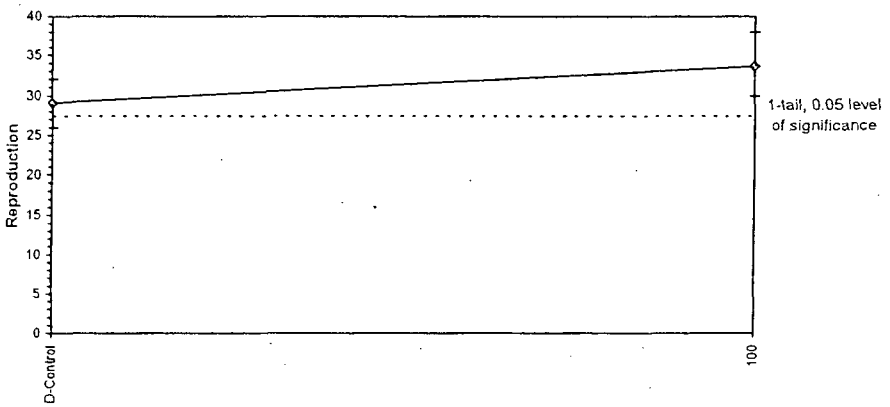
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs D-Control	1.586139066	0.054506497	101.25	4.183333333	1.1E-04	1, 18

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Dose-Response Plot



sqn_11-14-06data

TVA / Sequoyah Nuclear Plant, Outfall 101
Non-treated
November 14-21, 2006

Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013, Method 1002.0)
Species: *Ceriodaphnia dubia*

Daily Chemical Analyses

Project number: 2878

Reviewed by: Yuma

Concentration	Parameter	Day 0		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control	pH (SU)	7.67	7.71	7.81	7.48	7.52	7.34	7.55	7.27	7.77	7.51	7.81	7.67	7.81	7.47
	DO (mg/L)	8.1	8.3	8.2	7.7	7.8	7.6	7.7	8.2	7.7	7.9	7.8	7.9	8.0	8.2
	Conductivity (µmhos/cm)	314		320		308		315		316		309		312	
	Alkalinity (mg/L $CaCO_3$)	59		57				59				60			
	Hardness (mg/L $CaCO_3$)	93		93				91				93			
	Temperature (°C)	24.7	25.1	24.9	24.6	24.6	25.2	24.8	24.9	24.7	25.1	24.8	24.9	24.6	24.8
11.3%	pH (SU)	7.65	7.69	7.77	7.46	7.53	7.34	7.38	7.27	7.26	7.51	7.48	7.67	7.76	7.48
	DO (mg/L)	8.0	8.3	8.0	7.7	7.9	7.6	7.9	8.0	7.9	7.8	7.9	7.8	8.0	8.2
	Conductivity (µmhos/cm)	299		295		306		289		293		291		292	
	Temperature (°C)	24.7	24.8	24.8	24.8	24.7	24.8	24.9	24.9	24.7	24.9	24.8	24.7	24.7	25.1
22.6%	pH (SU)	7.66	7.67	7.76	7.48	7.54	7.35	7.38	7.27	7.27	7.52	7.48	7.68	7.77	7.50
	DO (mg/L)	8.0	8.3	8.1	7.7	8.0	7.6	8.0	7.8	7.9	7.7	7.9	7.8	8.1	8.3
	Conductivity (µmhos/cm)	285		286		296		273		278		278		278	
	Temperature (°C)	24.7	24.8	24.8	24.6	24.7	24.7	24.9	24.8	24.9	25.3	24.9	25.1	24.7	25.0
45.2%	pH (SU)	7.66	7.67	7.74	7.48	7.53	7.35	7.36	7.28	7.26	7.51	7.47	7.68	7.75	7.50
	DO (mg/L)	8.0	8.3	8.1	7.8	8.1	7.6	8.0	7.7	7.9	7.8	8.0	8.0	8.1	8.3
	Conductivity (µmhos/cm)	257		258		265		246		251		252		250	
	Temperature (°C)	24.8	24.9	24.8	24.9	24.7	25.1	24.9	24.9	25.0	25.0	24.9	25.2	24.8	25.2
72.6%	pH (SU)	7.65	7.66	7.73	7.47	7.52	7.38	7.34	7.31	7.24	7.50	7.45	7.69	7.73	7.50
	DO (mg/L)	8.1	8.3	8.1	7.8	8.0	7.6	8.0	7.8	8.0	7.9	8.1	7.9	8.2	8.2
	Conductivity (µmhos/cm)	222		223		231		211		217		213		217	
	Temperature (°C)	24.8	24.8	24.8	24.8	24.8	25.1	25.0	24.9	25.2	25.0	25.0	25.1	24.8	25.2
100%	pH (SU)	7.64	7.67	7.71	7.47	7.51	7.39	7.33	7.30	7.22	7.50	7.43	7.70	7.70	7.54
	DO (mg/L)	8.0	8.3	8.2	7.8	7.9	7.7	8.2	7.8	8.2	7.9	8.2	7.9	8.3	8.1
	Conductivity (µmhos/cm)	188		186		198		178		182		182		184	
	Alkalinity (mg/L $CaCO_3$)	66				65				67					
	Hardness (mg/L $CaCO_3$)	77				79				81					
	Total Residual Chlorine (mg/L)	<0.10				<0.10				<0.10					
	Temperature (°C)	25.2	25.0	24.7	24.8	24.9	24.9	25.2	24.7	25.3	25.1	25.0	24.7	24.8	25.2
100% Intake	pH (SU)	7.65	7.67	7.71	7.48	7.51	7.36	7.30	7.29	7.20	7.47	7.41	7.70	7.69	7.52
	DO (mg/L)	8.0	8.3	8.3	7.7	7.8	7.9	8.3	7.8	8.2	8.0	8.2	8.1	8.4	8.3
	Conductivity (µmhos/cm)	184		186		198		180		182		179		183	
	Alkalinity (mg/L $CaCO_3$)	64				66				66					
	Hardness (mg/L $CaCO_3$)	79				77				77					
	Total Residual Chlorine (mg/L)	<0.10				<0.10				<0.10					
	Temperature (°C)	25.0	24.8	24.8	24.9	24.8	24.9	25.1	24.9	24.9	25.1	24.9	24.9	24.8	25.1

Species: *Ceriodaphnia dubia* Date: 11-14-06

Client: Sequoyah Nuclear Plant - Non-treated

Daily Chemistry:

		Day					
		0		1		2	
	Analyst	KEK	KEK	KEK	KEK	KEK	KEK
Concentration	Parameter						
CONTROL	pH (S.U.)	7.67	7.71	7.81	7.48	7.52	7.34
	DO (mg/L)	8.1	8.3	8.2	7.7	7.8	7.6
	Conductivity (µmhos/cm)	314		320		308	
	Alkalinity (mg $CaCO_3$/L)	59		57			
	Hardness (mg $CaCO_3$/L)	93		93			
	Temperature (°C)	24.7	25.1	24.9	24.6	24.6	25.2
11.3%	pH (S.U.)	7.65	7.69	7.77	7.46	7.53	7.34
	DO (mg/L)	8.0	8.3	8.0	7.7	7.9	7.6
	Conductivity (µmhos/cm)	299		295		300	
	Temperature (°C)	24.7	24.8	24.8	24.8	24.7	24.8
22.6%	pH (S.U.)	7.66	7.67	7.76	7.48	7.54	7.35
	DO (mg/L)	8.0	8.3	8.1	7.7	8.0	7.6
	Conductivity (µmhos/cm)	285		280		296	
	Temperature (°C)	24.7	24.8	24.8	24.6	24.7	24.7
45.2%	pH (S.U.)	7.66	7.67	7.74	7.48	7.53	7.35
	DO (mg/L)	8.0	8.3	8.1	7.8	8.1	7.6
	Conductivity (µmhos/cm)	257		258		265	
	Temperature (°C)	24.8	24.9	24.8	24.9	24.7	25.1
72.6%	pH (S.U.)	7.65	7.66	7.73	7.47	7.52	7.38
	DO (mg/L)	8.1	8.3	8.1	7.8	8.0	7.6
	Conductivity (µmhos/cm)	222		223		231	
	Temperature (°C)	24.8	24.8	24.8	24.8	24.8	25.1
100%	pH (S.U.)	7.64	7.67	7.71	7.47	7.51	7.39
	DO (mg/L)	8.0	8.3	8.2	7.8	7.9	7.7
	Conductivity (µmhos/cm)	188		186		198	
	Alkalinity (mg $CaCO_3$/L)	66				65	
	Hardness (mg $CaCO_3$/L)	77				79	
	TR chlorine (mg/L)	<0.10				<0.10	
	Temperature (°C)	25.2	25.0	24.7	24.8	24.9	24.9
100% Intake	pH (S.U.)	7.65	7.67	7.71	7.48	7.51	7.36
	DO (mg/L)	8.0	8.3	8.3	7.7	7.8	7.9
	Conductivity (µmhos/cm)	184		186		198	
	Alkalinity (mg $CaCO_3$/L)	64				66	
	Hardness (mg $CaCO_3$/L)	79				77	
	TR chlorine (mg/L)	<0.10				<0.10	
	Temperature (°C)	25.0	24.8	24.8	24.9	24.8	24.9
		Initial	Final	Initial	Final	Initial	Final

Species: *Ceriodaphnia dubia*
Client: Sequoyah Nuclear Plant - Non-treated

Date: 11-14-06

		Day							
		3		4		5		6	
	Analyst	KEL	KEL	KEL	KEL	KEL	KEL	KEL	KEL
Concentration	Parameter								
CONTROL	pH (S.U.)	7.55	7.27	7.77	7.51	7.81	7.67	7.81	7.47
	DO (mg/L)	7.7	8.2	7.7	7.9	7.8	7.9	8.0	8.2
	Conductivity (µmhos/cm)	315		316		309		312	
	Alkalinity (mg $CaCO_3$/L)	59				60			
	Hardness (mg $CaCO_3$/L)	91				93			
	Temperature (°C)	24.8	24.9	24.7	25.1	24.8	24.9	24.6	24.8
11.3%	pH (S.U.)	7.38	7.27	7.26	7.51	7.48	7.67	7.76	7.48
	DO (mg/L)	7.9	8.0	7.9	7.8	7.9	7.8	8.0	8.2
	Conductivity (µmhos/cm)	289		293		291		292	
	Temperature (°C)	24.9	24.9	24.7	24.9	24.8	24.7	24.7	25.1
22.6%	pH (S.U.)	7.38	7.27	7.27	7.52	7.48	7.68	7.77	7.50
	DO (mg/L)	8.0	7.8	7.9	7.7	7.9	7.8	~~8.1~~ 8.1	8.3
	Conductivity (µmhos/cm)	273		278		278		278	
	Temperature (°C)	24.9	24.8	24.9	25.3	24.9	25.1	24.7	25.0
45.2%	pH (S.U.)	7.36	7.28	7.26	7.51	7.47	7.68	7.75	7.50
	DO (mg/L)	8.0	7.7	7.9	7.8	8.0	8.0	8.1	8.3
	Conductivity (µmhos/cm)	246		251		252		250	
	Temperature (°C)	24.9	24.9	25.0	25.0	24.9	25.2	24.8	25.2
72.6%	pH (S.U.)	7.34	7.31	7.24	7.50	7.45	7.69	7.73	7.50
	DO (mg/L)	8.0	7.8	8.0	7.9	8.1	7.9	8.2	8.2
	Conductivity (µmhos/cm)	211		217		213		217	
	Temperature (°C)	25.0	24.9	25.2	25.0	25.0	25.1	24.8	25.2
100%	pH (S.U.)	7.33	7.30	7.22	7.50	7.43	7.70	7.70	7.54
	DO (mg/L)	8.2	7.8	8.2	7.9	8.2	7.9	8.3	8.1
	Conductivity (µmhos/cm)	178		182		182		184	
	Alkalinity (mg $CaCO_3$/L)			67					
	Hardness (mg $CaCO_3$/L)			81					
	TR Chlorine (mg/L)			<0.10					
	Temperature (°C)	25.2	24.7	25.3	25.1	25.0	24.7	24.8	25.2
100% Intake	pH (S.U.)	7.30	7.29	7.20	7.47	7.41	7.70	7.69	7.52
	DO (mg/L)	8.3	7.8	8.2	8.0	8.2	8.1	8.4	8.3
	Conductivity (µmhos/cm)	180		182		179		183	
	Alkalinity (mg $CaCO_3$/L)			66					
	Hardness (mg $CaCO_3$/L)			77					
	TR chlorine (mg/L)			<0.10					
	Temperature (°C)	25.1	24.9	24.9	25.1	24.9	24.9	24.8	25.1
		Initial	Final	Initial	Final	Initial	Final	Initial	Final

Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013 Method 1000.0)
Species: *Pimephales promelas*

Client: TVA
Facility: Sequovah Nuclear Plant
NPDES #: TN 0026450
Project #: 2878

County: Hamilton
Treatment: UV-treated
Outfall: 101

Dilution preparation information:						*Comments:*
Dilution prep (%)	11.3	22.6	45.2	72.6	100	Each concentration was treated
Effluent volume (mL)	282.5	~~339~~ 565	1130	1815	2500	for 2 minutes with a UV sterilizer
Diluent volume (mL)	2217.5	~~2160~~ 1935	1370	685	0	to remove pathogenic
Total volume (mL)	2500	2500	2500	2500	2500	interferences.

Test organism information: 22.25 24.25		*Test information:*	
Organism age:	~~21.25~~ TO ~~23.25~~ HOURS OLD	Randomizing template:	BLUE
Date and times organisms were born between:	11-13-06 1400 TO 1600	Incubator number:	3B
Organism source:	ABS BATCH 19 11-13-06	*Artemia* lot number:	B612040
Transfer bowl information:	pH = 7.63 Temperature = 24.1 °C	Total drying time:	24.25 HOURS
		Date / Time in: 11-21-06	~~1345~~ 1350
Average transfer volume:	8.6 ml	Date / Time out: 11-22-06	1400
		Oven temperature:	60°C

Daily feeding and renewal information:

Day	Date	Morning feeding time	Afternoon feeding time	Test initiation, renewal, or termination time	MHS batch used	Sample numbers used	Analyst
0	11-14-06	—	1600	1407	11-12-06A	061113.01 & 02	JH
1	11-15-06	1000	1605	1412	11-12-06B	061113.01 & 02	JH
2	11-16-06	1000	1600	1422	11-12-06B	061115.13 & 14	JH
3	11-17-06	1003	1611	1346	11-15-06A	061115.13 & 14	JH
4	11-18-06	1002	1605	1329	11-15-06A	061117.09 & 10	JH
5	11-19-06	0953	1600	1313	11-15-06B	061117.09 & 10	JH
6	11-20-06	0955	1602	1311	11-15-06B	061117.09 & 10	JH
7	11-21-06			1309			JH

Control information:		Acceptance criteria	*Summary of test endpoints:*	
% Mortality:	0%	≤ 20%	7-day LC_{50}	>100%
Average weight per initial larvae:	0.775		NOEC	100
Average weight per surviving larvae:	0.775	≥ 0.25 mg/larvae	LOEC	>100%
			ChV	>100%
			IC_{25}	>100%

Species: *Pimephales promelas* Date: 11-14-06

Client: TVA / Sequoyah Nuclear Plant - UV-treated

Survival and Growth Data

Day	CONTROL				11.3%				22.6%			
	A	B	C	D	E	F	G	H	I	J	K	L
0	10	10	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10	10	10	10
3	10	10	10	10	10	10	10	10	10	10	10	10
4	10	10	10	10	10	10	10	10	10	10	10	10
5	10	10	10	10	10	10	10	10	10	10	10	10
6	10	10	10	10	10	10	10	10	10	10	10	10
7	10	10	10	10	9 d	10	10	10	9 d	10 lg	10	10
A = Pan weight (mg) Color identification: MAGENTA TRAY Analyst: LAB	13.91	13.38	15.34	15.07	13.02	14.70	13.22	13.66	15.38	14.35	15.20	13.77
B = Pan + Larvae weight (mg) Analyst: LAB	22.00	20.73	23.23	22.73	21.18	22.50	20.43	21.95	22.64	23.74	23.24	21.16
Larvae weight (mg) = A – B	8.09	7.35	7.89	7.66	8.16	7.80	7.21	8.29	7.26	9.39	8.04	7.39
Weight per initial number of larvae (mg) = C / Initial number of larvae	0.809	0.735	0.789	0.766	0.816	0.780	0.721	0.829	0.726	0.939	0.804	0.739
Average weight per initial number of larvae (mg) / Percent reduction from control (%)	0.775				0.787		-1.5%		0.802		-3.5%	

Comment codes: c = clear, d = dead, fg = fungus, k = killed, m = missing, sk = sick, sm = unusually small, lg = unusually large, d&r = decanted and returned, w = wounded.

Calculations and data reviewed: [illegible]

Comments:

Species: *Pimephales promelas*

Client: TVA / Sequoyah Nuclear Plant - UV-treated Date: 11-14-06

Survival and Growth Data

Day	45.2%				72.6%				100%			
	M	N	O	P	Q	R	S	T	U	V	W	X
0	10	10	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10	10	10	10
3	10	10	10	10	10	10	10	10	10	10	10	10
4	10	10	10	10	10	10	10	10	10	10	10	10
5	10	10	10	10	10	10	10	10	10	10	10	10
6	10	10	10	10	10	10	10	10	10	10	10	10
7	10 1sk	10	10	10	9 d	10	10	10	10	10	10	10
A = Pan weight (mg) Color identification: MAGENTA TRAY Analyst: UAB	14.58	15.44	15.14	14.29	15.57	13.64	14.35	14.53	14.97	14.74	13.72	15.02
B = Pan + Larvae weight (mg) Analyst: UAB	20.68	23.58	22.26	22.65	23.44	21.40	21.97	22.07	22.02	22.11	20.82	22.74
Larvae weight (mg) = A – B	6.10	8.14	7.12	8.36	7.87	7.76	7.62	7.54	7.05	7.37	7.10	7.72
Weight per initial number of larvae (mg) = C / Initial number of larvae	0.610	0.814	0.712	0.836	0.787	0.776	0.762	0.754	0.705	0.737	0.710	0.772
Average weight per initial number of larvae (mg)	0.743				0.770				0.731			
Percent reduction from control (%)			4.1%				0.6%				5.6%	

Comment codes: c = clear, d = dead, fg = fungus, k = killed, m = missing, sk = sick, sm = unusually small, lg = unusually large, d&r = decanted and returned, w = wounded.

Calculations and data reviewed: JH

Comments:

Species: *Pimephales promelas*

Client: TVA / Sequoyah Nuclear Plant - UV-treated Date: 11-14-06

Survival and Growth Data

Day	100% Intake			
	Y	Z	AA	BB
0	10	10	10	10
1	10	10	10	10
2	10	10	10	10
3	10	10	10	10
4	10	10	10	10
5	10	10	10	10
6	10	10	10	10
7	10 ISM	10	10	10
A = Pan weight (mg) Color identification: MAGENTA TRAY Analyst: LAB	14.40	14.60	14.64	14.34
B = Pan + Larvae weight (mg) Analyst: LAB	20.86	22.28	21.81	22.06
Larvae weight (mg) = A – B	6.46	7.68	7.17	7.72
Weight per initial number of larvae (mg) = C / Initial number of larvae	0.646	0.768	0.717	0.772
Average weight per initial number of larvae (mg)	0.726			
Percent reduction from control (%)	6.3%			

Comment codes: c = clear, d = dead, fg = fungus, k = killed, m = missing, sk = sick, sm = unusually small, lg = unusually large, d&r = decanted and returned, w = wounded.

Calculations and data reviewed: JL

Comments:

TVA / Sequoyah Nuclear Plant, Outfall 101
UV-treated
November 14-21, 2006

Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013, Method 1000.0)
Species: *Pimephales promelas*

Quality Control
Verification of Data Entry, Calculations, and Statistical Analyses

Project number: 2878

Reveiwed by: [illegible]

Concentration (%)	Replicate	Initial number of larvae	Final number of larvae	A = Pan weight (mg)	B = Pan + Larvae weight (mg)	Larvae weight (mg) = A - B	Not for Compliance Assessment, Internal Laboratory QC: Weight / Surviving number of larvae (mg)	Mean weight / Surviving number of larvae (mg)	Coefficient of variation (Mean weight per surviving number of larvae) (%)	Weight / Initial number of larvae (mg)	Mean survival (%)	Mean weight / Initial number of larvae (mg)	Coefficient of variation (Mean weight per initial number of larvae) (%)	Percent reduction from control (%)
Control	A	10	10	13.91	22.00	8.09	0.809	0.775	4.1	0.809	100.0	0.775	4.1	Not applicable
	B	10	10	13.38	20.73	7.35	0.735			0.735				
	C	10	10	15.34	23.23	7.89	0.789			0.789				
	D	10	10	15.07	22.73	7.66	0.766			0.766				
11.3%	E	10	9	13.02	21.18	8.16	0.907	0.809	9.7	0.816	97.5	0.787	6.1	-1.5
	F	10	10	14.70	22.50	7.80	0.780			0.780				
	G	10	10	13.22	20.43	7.21	0.721			0.721				
	H	10	10	13.66	21.95	8.29	0.829			0.829				
22.6%	I	10	9	15.38	22.64	7.26	0.807	0.822	10.2	0.726	97.5	0.802	12.2	-3.5
	J	10	10	14.35	23.74	9.39	0.939			0.939				
	K	10	10	15.20	23.24	8.04	0.804			0.804				
	L	10	10	13.77	21.16	7.39	0.739			0.739				
45.2%	M	10	10	14.58	20.68	6.10	0.610	0.743	14.0	0.610	100.0	0.743	14.0	4.1
	N	10	10	15.44	23.58	8.14	0.814			0.814				
	O	10	10	15.14	22.26	7.12	0.712			0.712				
	P	10	10	14.29	22.65	8.36	0.836			0.836				
72.6%	Q	10	9	15.57	23.44	7.87	0.874	0.792	7.1	0.787	97.5	0.770	1.9	0.6
	R	10	10	13.64	21.40	7.76	0.776			0.776				
	S	10	10	14.35	21.97	7.62	0.762			0.762				
	T	10	10	14.53	22.07	7.54	0.754			0.754				
100%	U	10	10	14.97	22.02	7.05	0.705	0.731	4.2	0.705	100.0	0.731	4.2	5.6
	V	10	10	14.74	22.11	7.37	0.737			0.737				
	W	10	10	13.72	20.82	7.10	0.710			0.710				
	X	10	10	15.02	22.74	7.72	0.772			0.772				
100% Intake	Y	10	10	14.40	20.86	6.46	0.646	0.726	8.1	0.646	100.0	0.726	8.1	6.3
	Z	10	10	14.60	22.28	7.68	0.768			0.768				
	AA	10	10	14.64	21.81	7.17	0.717			0.717				
	BB	10	10	14.34	22.06	7.72	0.772			0.772				

Outfall 101:
Dunnett's MSD value: 0.1095
PMSD: 14.1

Intake:
Dunnett's MSD value: 0.0649
PMSD: 8.4

MSD = Minimum Significant Difference
PMSD = Percent Minimum Significant Difference

PMSD is a measure of test precision. The PMSD is the minimum percent difference between the control and treatment that can be declared statistically significant in a whole effluent toxicity test. On average, a significant difference occurs for Environmental Testing Solutions, Inc. chronic toxicity tests when a toxicant reduces *Pimephales* growth by 15.0% from the control (determined through reference toxicant testing).

Lower PMSD bound determined by USEPA (10th percentile) = 9.4%.

Upper PMSD bound determined by USEPA (90th percentile) = 35%.

The lower and upper bounds were calculated by the USEPA using 205 tests conducted from 19 laboratories for *Pimephales* growth in chronic reference toxicant tests.

USEPA. 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination Program. EPA-833-R-00-003. US Environmental Protection Agency, Cincinnati, OH.

TVA / Sequoyah Nuclear Plant, Outfall 101
UV-treated
November 14-21, 2006

Statistical Analyses

Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	11/14/2006	Test ID:	PpFRCR	Sample ID:	TVA / Sequoyah Nuclear Plant - Outfall 101
End Date:	11/21/2006	Lab ID:	ETS-Envir. Testing Sol.	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:		Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	UV-treated				

Conc-%	1	2	3	4
D-Control	0.8090	0.7350	0.7890	0.7660
11.3	0.8160	0.7800	0.7210	0.8290
22.6	0.7260	0.9390	0.8040	0.7390
45.2	0.6100	0.8140	0.7120	0.8360
72.6	0.7870	0.7760	0.7620	0.7540
100	0.7050	0.7370	0.7100	0.7720

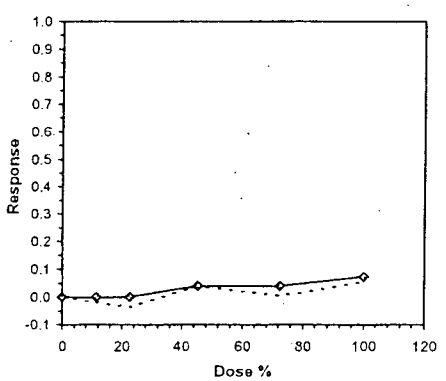
			Transform: Untransformed						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	0.7748	1.0000	0.7748	0.7350	0.8090	4.104	4				0.7878	1.0000
11.3	0.7865	1.0152	0.7865	0.7210	0.8290	6.146	4	-0.259	2.410	0.1095	0.7878	1.0000
22.6	0.8020	1.0352	0.8020	0.7260	0.9390	12.157	4	-0.600	2.410	0.1095	0.7878	1.0000
45.2	0.7430	0.9590	0.7430	0.6100	0.8360	13.974	4	0.699	2.410	0.1095	0.7564	0.9602
72.6	0.7698	0.9935	0.7698	0.7540	0.7870	1.905	4	0.110	2.410	0.1095	0.7564	0.9602
100	0.7310	0.9435	0.7310	0.7050	0.7720	4.205	4	0.963	2.410	0.1095	0.7310	0.9280

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.979922116	0.884	0.130565288	1.129624347
Bartlett's Test indicates equal variances (p = 0.03)	12.26457691	15.08627224		

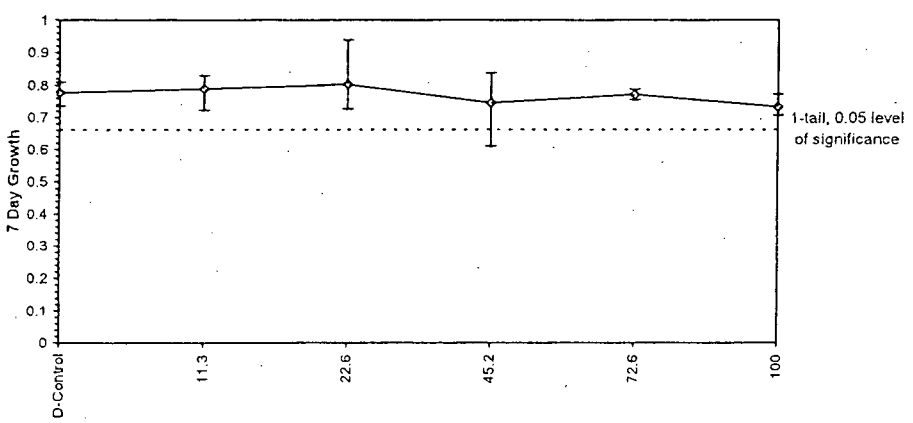
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	0.109544232	0.141393007	0.002832567	0.004132139	0.640509248	5, 18
Treatments vs D-Control										

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	81.252			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Dose-Response Plot



sqn_11-14-06data

TVA / Sequoyah Nuclear Plant, Intake
UV-treated
November 14-21, 2006

Statistical Analyses

Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	11/14/2006	Test ID:	PpFRCR	Sample ID:	TVA / Sequoyah Nuclear Plant - Intake
End Date:	11/21/2006	Lab ID:	ETS-Envir. Testing Sol.	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:		Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	UV-treated				

Conc-%	1	2	3	4
D-Control	0.8090	0.7350	0.7890	0.7660
100	0.6460	0.7680	0.7170	0.7720

			Transform: Untransformed						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	0.7748	1.0000	0.7748	0.7350	0.8090	4.104	4				0.7748	1.0000
100	0.7258	0.9368	0.7258	0.6460	0.7720	8.097	4	1.467	1.943	0.0649	0.7258	0.9368

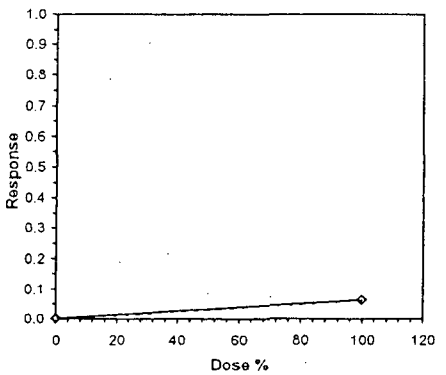
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.919678569	0.749	-0.80552162	-0.01712049
F-Test indicates equal variances (p = 0.34)	3.416288853	47.46722794		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs D-Control	0.064918656	0.083793038	0.004802	0.00223225	0.192823291	1, 6

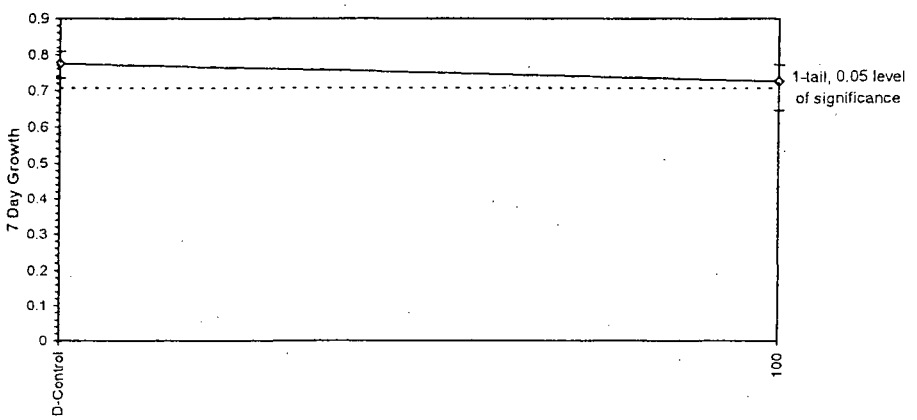
Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05*	79.056			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			

* indicates IC estimate less than the lowest concentration



Dose-Response Plot



sqn_11-14-06data

TVA / Sequoyah Nuclear Plant, Outfall 101
UV-treated
November 14-21, 2006

Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013, Method 1000.0)
Species: *Pimephales promelas*

Daily Chemical Analyses

Project number: 2878

Reviewed by: [signature]

Concentration	Parameter	Day 0		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control	pH (SU)	7.68	7.59	7.69	7.48	7.57	7.20	7.49	7.29	7.50	7.27	7.61	7.46	7.83	7.11
	DO (mg/L)	8.1	7.8	8.2	7.7	7.8	7.3	7.8	7.6	7.9	7.1	7.9	7.5	7.8	7.4
	Conductivity (µmhos/cm)	307		308		307		296		301		297		300	
	Temperature (°C)	24.7	24.5	24.6	24.4	24.8	24.6	24.8	24.6	24.8	24.3	24.9	24.5	24.7	24.3
11.3%	pH (SU)	7.68	7.53	7.68	7.45	7.57	7.17	7.48	7.29	7.50	7.27	7.63	7.47	7.83	7.11
	DO (mg/L)	8.1	7.8	8.2	7.7	7.9	7.2	7.8	7.5	7.8	7.0	7.9	7.5	7.8	7.4
	Conductivity (µmhos/cm)	301		302		304		288		299		298		295	
	Temperature (°C)	24.7	24.2	24.7	24.2	24.8	24.8	24.9	24.7	24.9	24.6	24.9	24.1	24.9	24.7
22.6%	pH (SU)	7.68	7.55	7.68	7.48	7.58	7.18	7.47	7.26	7.50	7.26	7.64	7.43	7.82	7.10
	DO (mg/L)	8.1	7.7	8.2	7.7	8.0	7.2	7.9	7.6	7.8	6.8	7.8	7.4	7.9	7.4
	Conductivity (µmhos/cm)	281		285		293		276		285		282		279	
	Temperature (°C)	24.8	24.7	24.7	24.2	24.8	24.7	24.9	24.7	24.9	24.7	24.9	24.2	24.9	24.6
45.2%	pH (SU)	7.69	7.55	7.68	7.46	7.58	7.13	7.44	7.26	7.49	7.26	7.64	7.43	7.79	7.11
	DO (mg/L)	8.1	7.8	8.2	7.7	8.1	6.9	7.9	7.6	7.9	6.8	7.9	7.3	8.0	7.5
	Conductivity (µmhos/cm)	258		259		267		248		258		254		256	
	Temperature (°C)	24.8	24.3	24.9	24.3	24.8	24.5	24.8	24.7	24.9	24.5	24.9	24.2	24.9	24.6
72.6%	pH (SU)	7.69	7.55	7.67	7.40	7.57	7.11	7.43	7.25	7.48	7.26	7.59	7.50	7.77	7.21
	DO (mg/L)	8.2	7.8	8.1	7.5	8.1	6.8	7.9	7.6	8.0	7.0	8.1	7.4	8.0	7.5
	Conductivity (µmhos/cm)	218		222		230		216		225		220		219	
	Temperature (°C)	24.9	24.3	24.9	24.3	25.0	24.5	24.9	24.5	25.0	24.5	25.0	24.2	24.9	24.3
100%	pH (SU)	7.69	7.57	7.67	7.43	7.57	7.13	7.39	7.36	7.45	7.26	7.58	7.43	7.74	7.16
	DO (mg/L)	8.1	7.9	8.1	7.4	7.9	6.8	8.0	7.5	8.0	6.8	8.1	7.4	8.0	7.6
	Conductivity (µmhos/cm)	188		192		202		188		189		188		190	
	Temperature (°C)	25.1	24.3	24.9	24.2	25.0	24.6	24.9	24.7	25.1	24.6	25.0	24.5	25.0	24.5
100% Intake	pH (SU)	7.68	7.58	7.68	7.43	7.55	7.16	7.36	7.48	7.29	7.25	7.57	7.36	7.72	7.07
	DO (mg/L)	8.2	7.9	8.2	7.4	8.1	6.9	8.0	7.4	8.1	6.9	8.2	7.1	8.0	7.4
	Conductivity (µmhos/cm)	186		185		195		190		192		184		189	
	Temperature (°C)	25.0	24.4	24.8	24.2	24.9	24.4	24.9	24.8	25.0	24.6	25.0	24.3	24.8	24.2

Species: *Pimephales promelas* Date: 11-14-06
Client: TVA / Sequoyah Nuclear Plant – UV-treated

Daily Chemistry:

		Day					
		0		1		2	
	Analyst	MEH	MEH	MEH	MEH	MEH	MEH
Concentration	Parameter						
CONTROL	pH (S.U.)	7.68	7.59	7.69	7.48	7.57	7.20
	DO (mg/L)	8.1	7.8	8.2	7.7	7.8	7.3
	Conductivity (µmhos/cm)	307		308		307	
	Temperature (°C)	24.7	24.5	24.6	24.4	24.8	24.6
11.3%	pH (S.U.)	7.68	7.53	7.68	7.45	7.57	7.17
	DO (mg/L)	8.1	7.8	8.2	7.7	7.9	7.2
	Conductivity (µmhos/cm)	301		302		304	
	Temperature (°C)	24.7	24.2	24.7	24.2	24.8	24.8
22.6%	pH (S.U.)	7.68	7.55	7.68	7.48	7.58	7.18
	DO (mg/L)	8.1	7.7	8.2	7.7	8.0	7.2
	Conductivity (µmhos/cm)	281		285		293	
	Temperature (°C)	24.8	24.7	24.7	24.2	24.8	24.7
45.2%	pH (S.U.)	7.69	7.55	7.68	7.40	7.58	7.13
	DO (mg/L)	8.1	7.8	8.2	7.7	8.1	6.9
	Conductivity (µmhos/cm)	258		259		267	
	Temperature (°C)	24.8	24.3	24.9	24.3	24.8	24.5
72.6%	pH (S.U.)	7.69	7.55	7.67	7.40	7.57	7.11
	DO (mg/L)	8.2	7.8	8.1	7.5	8.1	6.8
	Conductivity (µmhos/cm)	218		222		230	
	Temperature (°C)	24.9	24.3	24.9	24.3	25.0	24.5
100%	pH (S.U.)	7.69	7.57	7.67	7.43	7.57	7.13
	DO (mg/L)	8.1	7.9	8.1	7.4	7.9	6.8
	Conductivity (µmhos/cm)	188		192		202	
	Temperature (°C)	25.1	24.3	24.9	24.2	25.0	24.6
100% Intake	pH (S.U.)	7.68	7.58	7.68	7.43	7.55	7.16
	DO (mg/L)	8.2	7.9	8.2	7.4	8.1	6.9
	Conductivity (µmhos/cm)	186		185		195	
	Temperature (°C)	25.0	24.4	24.8	24.2	~~24.4~~ 24.9	24.4
		Initial	Final	Initial	Final	Initial	Final

Species: *Pimephales promelas* Date: 11-14-06
Client: TVA / Sequoyah Nuclear Plant – UV-treated

		Day							
		3		4		5		6	
	Analyst	KEK	KEK	KEK	KEK	KEK	KEK	KEK	KEK
Concen-tration	Parameter								
CONTROL	pH (S.U.)	7.49	7.29	7.50	7.27	7.61	7.46	7.83	7.11
	DO (mg/L)	7.8	7.6	7.9	7.1	7.9	7.5	7.8	7.4
	Conductivity (µmhos/cm)	296		301		297		300	
	Temperature (°C)	24.8	24.6	24.8	24.3	24.9	24.5	24.7	24.3
11.3%	pH (S.U.)	7.48	7.29	7.50	7.27	7.63	7.47	7.83	7.11
	DO (mg/L)	7.8	7.5	7.8	7.0	7.9	7.5	7.8	7.4
	Conductivity (µmhos/cm)	288		299		298		295	
	Temperature (°C)	24.9	24.7	24.9	24.6	24.9	24.1	24.9	24.7
22.6%	pH (S.U.)	7.47	7.26	7.50	7.26	7.64	7.43	7.82	7.10
	DO (mg/L)	7.9	7.6	7.8	6.8	7.8	7.4	7.9	7.4
	Conductivity (µmhos/cm)	276		285		282		279	
	Temperature (°C)	24.9	24.7	24.9	24.7	24.9	24.2	24.9	24.6
45.2%	pH (S.U.)	7.44	7.26	7.49	7.26	7.64	7.43	7.79	7.11
	DO (mg/L)	7.9	7.6	7.9	6.8	7.9	7.3	8.0	7.5
	Conductivity (µmhos/cm)	248		258		254		256	
	Temperature (°C)	24.8	24.7	24.9	24.5	24.9	24.2	24.9	24.6
72.6%	pH (S.U.)	7.43	7.25	7.48	7.26	7.59	7.50	7.77	7.21
	DO (mg/L)	7.9	7.6	8.0	7.0	8.1	7.4	8.0	7.5
	Conductivity (µmhos/cm)	216		225		220		219	
	Temperature (°C)	24.9	24.5	25.0	24.5	25.0	24.2	24.9	24.3
100%	pH (S.U.)	7.39	7.36	7.45	7.26	7.58	7.43	7.74	7.16
	DO (mg/L)	8.0	7.5	8.0	6.8	8.1	7.4	8.0	7.6
	Conductivity (µmhos/cm)	188		189		188		190	
	Temperature (°C)	24.9	24.7	25.1	24.6	25.0	24.5	25.0	24.5
100% Intake	pH (S.U.)	7.36	7.48	7.29	7.25	7.57	7.36	7.72	7.07
	DO (mg/L)	8.0	7.4	8.1 ~~7.4~~	6.9	8.2	7.1	8.0	7.4
	Conductivity (µmhos/cm)	190		192		184		189	
	Temperature (°C)	24.9	24.8	25.0	24.6	25.0	24.3	24.8	24.2
		Initial	Final	Initial	Final	Initial	Final	Initial	Final

Alkalinity
(EPA Method 310.1)

Matrix: Water, MDL = 1.0 mg $CaCO_3$/L

Time started: 1742
Time ended: 1837

Analyst	KEN
Date analyzed	11-18-06

Titrate samples to pH = 4.50 S.U.

Titrant normality and multiplier determination:

pH of Deionized water = 4.5 S.U.	Titrant reference number	Normality check standard number	Begin ml	End ml	Total ml (E)	Normality (N) of H_2SO_4 = (5 ml Na_2CO_3 x 0.05)/E = 0.25/E (acceptable range = 0.018 - 0.022)	pH Factor or Multiplier = (N x 50000)/ 100 ml sample = N x 500
5.3	1NR241	CHM244	0.1	12.2	12.1	0.0207	10.3

Blank correction 0.0ml - 0.1ml = 0.1ml

Laboratory control standard:

Reference standard number	True value (TV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (MV) (mg $CaCO_3$/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
1NR223	100	100	12.2	21.6	9.4	10.3	97	97.0%

Duplicate sample precision:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg $CaCO_3$/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
11.15.06	SSW H2O	100	21.6	24.8	3.2	10.3	S 33	
↓	Duplicate	↓	24.8	28.0	3.2	↓	D 33	—

Matrix spike recovery:

Reference standard number	Spike value (SV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Spike alkalinity (A) (mg $CaCO_3$/L)
1NR223	50	100	24.8	32.9	8.1	10.3	83

Sample alkalinity (B) (mg $CaCO_3$/L)	Measured spike value (MV) MV = A - B (mg $CaCO_3$/L)	% R = MV / SV x 100 (acceptable range = 75 to 125%)
33	50	100%

Sample measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg $CaCO_3$/L)
11.15.06A	MHS H20	100	32.9	38.6	5.7	10.3	59
11.15.06B	↓	↓	38.8	44.6	5.8	↓	60
11.05.06	↓	↓	0.0	5.8	5.8	↓	60
11.12.06A	↓	↓	5.8	11.5	5.7	↓	59
11.12.06B	↓	↓	11.5	17.0	5.5	↓	57
11-05-06	SSW H20	↓	17.0	20.2	3.2	↓	33
061114.01	Smith Creek 1	↓	20.2	24.2	4.0	↓	41
061116.01	↓ 2	↓	24.3	28.4	4.1	↓	42
061118.07	↓ 3	↓	28.4	32.3	3.9	↓	40

Reviewed by: [illegible] Date reviewed: 11-19-06

Alkalinity
(EPA Method 310.1)

Matrix: Water, MDL = 1.0 mg $CaCO_3$/L

Analyst: KEN
Date analyzed: 11-18-06

Titrate samples to pH = 4.50 S.U.

Titrant normality and multiplier determination:

pH of Deionized water = 4.5 S.U.	Titrant reference number	~~Normality~~ check standard number	Begin ml	End ml	~~Total~~ ml (E)	Normality (N) of H_2SO_4 = (5 ml Na_2CO_3 x 0.05)/E = 0.25/E (acceptable range = 0.018 - 0.022)	pH Factor or Multiplier = (N x 50000)/ 100 ml sample = N x 500

Laboratory control standard:

Reference standard number	True value (TV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (MV) (mg $CaCO_3$/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
1NR223	100	100	32.3	41.6	9.3	10.3	96	96.0%

Duplicate sample precision:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg $CaCO_3$/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
061114.02	Foxwood 2	100	0.0	3.5	3.5	10.3	S 36	
↓	Duplicate	↓	3.5	7.0	3.5	↓	D 36	—

Matrix spike recovery:

Reference standard number	Spike value (SV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Spike alkalinity (A) (mg $CaCO_3$/L)
1NR223	50	100	3.5	11.9	8.4	10.3	86

Sample alkalinity (B) (mg $CaCO_3$/L)	Measured spike value (MV) MV = A - B (mg $CaCO_3$/L)	% R = MV / SV x 100 (acceptable range = 75 to 125%)
36	50	100.0%

Sample measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg $CaCO_3$/L)
061116.03	Foxwood 1	100	11.9	17.3	5.4	10.3	56
061118.16	↓ 3	↓	17.3	21.6	4.3	↓	44
061113.01	TVA SQN 101 1	↓	21.6	28.0	6.4	↓	66
061115.13	↓ 2	↓	28.0	34.3	6.3	↓	65
061117.09	↓ 3	↓	34.3	40.8	6.5	↓	67
061113.02	INT 1	↓	40.8	47.0	6.2	↓	64
061115.14	↓ 2	↓	0.0	6.4	6.4	↓	66
061117.10	↓ 3	↓	6.4	12.8	6.4	↓	66
11-12-06	SALT SW	↓	12.8	22.3	9.5	↓	98

Reviewed by: dl Date reviewed: 11-19-06

Alkalinity
(EPA Method 310.1)

Matrix: Water, MDL = 1.0 mg $CaCO_3$/L

Analyst	KLR
Date analyzed	11.18.06

Titrate samples to pH = 4.50 S.U.

Titrant normality and multiplier determination:

~~pH of Deionized water = 4.5 S.U.~~	~~Titrant reference number~~	~~Normality check standard number~~	~~Begin ml~~	~~End ml~~	~~Total ml (E)~~	~~Normality (N) of H_2SO_4 = (5 ml Na_2CO_3 x 0.05)/E = 0.25/E (acceptable range = 0.018 - 0.022)~~	~~pH Factor or Multiplier = (N x 50000)/ 100 ml sample = N x 500~~

Laboratory control standard:

Reference standard number	True value (TV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (MV) (mg $CaCO_3$/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INR 223	100	100	22.3	32.0	9.7	10.3	100	100.0%

Duplicate sample precision:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg $CaCO_3$/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
061114.05	LeJeune 1	25	32.1	35.1	3.0	(4) 10.3	S 120	
↓	Duplicate	↓	35.2	38.2	3.0	↓ ↓	D 120	—

Matrix spike recovery:

Reference standard number	Spike value (SV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Spike alkalinity (A) (mg $CaCO_3$/L)
	200	25	35.2	42.9	7.7	(4) 10.3	320

Sample alkalinity (B) (mg $CaCO_3$/L)	Measured spike value (MV) MV = A - B (mg $CaCO_3$/L)	% R = MV / SV x 100 (acceptable range = 75 to 125%)
120	200	100.0%

Sample measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg $CaCO_3$/L)
061116.04	LeJeune 2	25	43.0	45.9	2.9	(4) 10.3	120
061118.12	↓ 3	↓	45.9	49.0	3.1	↓	130
061111.12	Hercules 1	↓	0.0	3.0	3.0	↓	120
061114.06	↓ 2	↓	3.3	6.0	2.7	↓	110
061116.02	↓ 3	↓	6.0	9.0	3.0	↓	120
35352	EES 116021	100	9.0	10.6	1.6	↓	16
35353	↓ 116022	↓	10.6	12.4	1.8	↓	18
35354	↓ 116023	↓	12.5	12.7	0.2	↓	2.1
11-13-06	SAHSW	↓	13.0	21.6	8.6	↓	89

Reviewed by: [illegible] Date reviewed: 11-19-06

Alkalinity
(EPA Method 310.1)

Matrix: Water, MDL = 1.0 mg $CaCO_3$/L

Analyst	KEK
Date analyzed	11.18.06

Titrate samples to pH = 4.50 S.U.

~~Titrant normality and multiplier determination:~~

pH of Deionized water = 4.5 S.U.	Titrant reference number	Normality check standard number	Begin ml	End ml	Total ml (E)	Normality (N) of H_2SO_4 = (5 ml Na_2CO_3 x 0.05)/E = 0.25/E (acceptable range = 0.018 - 0.022)	pH Factor or Multiplier = (N x 50000)/ 100 ml sample = N x 500

Laboratory control standard:

Reference standard number	True value (TV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (MV) (mg $CaCO_3$/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
1NR223	100	100	21.6	31.3	9.7	10.3	100	100.0%

Duplicate sample precision:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg $CaCO_3$/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
11.15.06	SALT SW	100	31.3	40.9	9.6	10.3	S 99	
	Duplicate	↓	0.0	9.7	9.7	↓	D 100	1.0%

Matrix spike recovery:

Reference standard number	Spike value (SV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Spike alkalinity (A) (mg $CaCO_3$/L)
1NR223	50	100	0.0	14.5	14.5	10.3	150

Sample alkalinity (B) (mg $CaCO_3$/L)	Measured spike value (MV) MV = A - B (mg $CaCO_3$/L)	% R = MV / SV x 100 (acceptable range = 75 to 125%)
100	50	100.0%

Sample measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg $CaCO_3$/L)
11-16-06A	SALT SW	100	14.5	23.9	9.4	10.3	97
11.16.06B	↓	↓	23.9	33.6	9.7	↓	100
11.18.06	↓	↓	33.6	43.1	9.5	↓	98

Reviewed by: dl Date reviewed: 11-19-06

Total Hardness
(EPA Method 130.2)

Matrix: Water, MDL = 1.0 mg $CaCO_3$/L

Analyst	KEN	Time initiated:	1703
Date analyzed	11-18-06	Time completed:	1730

Titrant normality and multiplier determination:

Titrant reference number	Normality check standard number	Begin ml	End ml	Total ml (E)	Normality (N) of EDTA = 0.2/E (acceptable range = 0.018 - 0.022)	pH Factor or Multiplier = (N x 50000)/ 50 ml sample = N x 1000
1NRAB	1N B204	0.0	9.9	9.9	0.0202	20.2

Laboratory control standard:

Reference standard number	True value (TV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Hardness (MV) (mg $CaCO_3$/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
1NSS436	40	50	9.9	11.8	1.9	20.2	38	95.0%

Duplicate sample precision:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Hardness (mg $CaCO_3$/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
11.15.06	SSW1120	50	11.8	14.0	2.2	20.2	S 44	
↓	Duplicate (B)	↓	14.0	16.1	2.1	↓	D 42	4.6%

Matrix spike recovery:

Reference standard number	Spike value (SV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Spike hardness (A) (mg $CaCO_3$/L)
1NSS436	40	50	14.0	18.1	4.1	20.2	83

Sample hardness (B) (mg $CaCO_3$/L)	Measured spike value (MV) MV = A - B (mg $CaCO_3$/L)	% R = MV / SV x 100 (acceptable range = 75 to 125%)
42	41	102.5%

Sample measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Hardness (mg $CaCO_3$/L)
TV=ND	Blank (should be = 0 mg $CaCO_3$/L)	50	0.0	0.0	0.0	20.2	ND
11.15.06A	MHS H2O		18.1	22.6	4.5		91
11.15.06B			22.6	27.2	4.6		93
11.05.06			27.2	31.9	4.7		95
11.12.06A			31.9	36.5	4.6		93
11.12.06B	↓		36.5	41.1	4.6		93
11.05.06	SSW H2O		41.1	43.2	2.1		42
061114.01	Smith Creek 1		0.0	2.2	2.2		44
061116.01	2		2.2	4.8	2.6		52
061118.07	↓ 3	↓	4.8	7.4	2.6	↓	52

Note: If >15ml of titrant is used, sample must be diluted. Reviewed by: JI Date reviewed 11-19-06

Total Hardness
(EPA Method 130.2)

Matrix: Water, MDL = 1.0 mg $CaCO_3$/L

Analyst	KLK	Time initiated:	
Date analyzed	11-18-06	Time completed:	

Titrant normality and multiplier determination:

Titrant reference number	Normality check standard number	Begin ml	End ml	Total ml (E)	Normality (N) of EDTA = 0.2/E (acceptable range = 0.018 - 0.022)	pH Factor or Multiplier = (N x 50000)/ 50 ml sample = N x 1000

Laboratory control standard:

Reference standard number	True value (TV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Hardness (MV) (mg $CaCO_3$/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INS5436	40	50	7.4	9.5	2.1	20.2	42	105.0%

Duplicate sample precision:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Hardness (mg $CaCO_3$/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
061114.02	Foxwood 1	50	9.5	11.1	1.6	20.2	S 32	
↓	Duplicate (B)	↓	11.1	12.6	1.5	↓	D 30	6.4%

Matrix spike recovery:

Reference standard number	Spike value (SV) (mg $CaCO_3$/L)	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Spike hardness (A) (mg $CaCO_3$/L)
INS5436	40	50	11.1	14.5	3.4	20.2	69

Sample hardness (B) (mg $CaCO_3$/L)	Measured spike value (MV) MV = A - B (mg $CaCO_3$/L)	% R = MV / SV x 100 (acceptable range = 75 to 125%)
30	39	97.5%

Sample measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Hardness (mg $CaCO_3$/L)
	Blank (should be = 0 mg $CaCO_3$/L)						
061116.03	Foxwood 2	50	14.5	16.2	1.7	20.2	34
061118.16	↓ 3	↓	16.2	17.3	1.1	↓	22
061113.01	TVA-SGN 101 1	↓	17.3	21.1	3.8	↓	77
061115.13	↓ 2	↓	21.2	25.1	3.9	↓	79
061117.09	↓ 3	↓	25.1	29.1	4.0	↓	81
061113.02	INT 1	↓	29.1	33.0	3.9	↓	79
061115.14	↓ 2	↓	33.0	36.8	3.8	↓	77
061117.10	↓ 3	↓	36.8	40.6	3.8	↓	77

Note: If >15ml of titrant is used, sample must be diluted. Reviewed by: [illegible] Date reviewed 11-19-06

Total Residual Chlorine
(EPA Method 330.5)

Matrix: Water, MDL = 0.10 mg/L

Meter: Accumet Model AR25 pH/Ion Meter

Analyst	LAB	Iodide reagent:	INR235
Date analyzed	11-14-06	Acid reagent:	INR247

Calibration:

	0.10 mg/L	1.00 mg/L
Reference standard number	INSS353	INSS353

Note: For samples with a residual chlorine of > 1.0 mg/L, the calibration range must be adjusted to bracket the chlorine levels of the samples.

Laboratory control standard:

Reference standard number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INSS353	0.50	0.493	98.6%

Duplicate sample precision:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
061114.06	Hercules, Inc	clear w/particles, no color	S<0.00127	
↓	Duplicate		D<0.000624	LAB

Sample measurements:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)
	Blank (should be = < 0.10 mg/L)		<0.00579
061114.07	Cape Fear SE	slightly cloudy w/particles, pale tan	<0.00351
061114.08	Cape Fear SE up In	slightly cloudy w/particles, pale tan	<0.00716
061114.01	Smith Creek WWTP	clear, no color	<0.000168
061114.02	Foxwood Hills Sel	slightly cloudy w/particles, pale tan	<0.0000212
061114.05	Camp Le Jeune	clear, no color	<0.0000478
061114.03	PCS Phosphate -007	clear, no color	<0.00002462
061114.04	↓ 100	clear, no color	<0.00002462 ~~<0.000246~~ LAB
061113.01	JNA-SQN 101	clear, no color	<0.000371
061113.02	↓ INT	clear, no color	<0.0275

Note: All samples were analyzed in excess of EPA recommended holding time (15 minutes) unless otherwise noted.

Laboratory control standard:

Reference standard number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INSS353	0.50	0.468	93.6%

Reviewed by	[illegible]
Date reviewed	11.14.06

Total Residual Chlorine
(EPA Method 330.5)

Matrix: Water, MDL = 0.10 mg/L
Meter: Accumet Model AR25 pH/Ion Meter

Analyst	LAB	Iodide reagent:	INR235
Date analyzed	11-16-06	Acid reagent:	INR247

Calibration:

	0.10 mg/L	1.00 mg/L
Reference standard number	INSS353	INSS353

Note: For samples with a residual chlorine of > 1.0 mg/L, the calibration range must be adjusted to bracket the chlorine levels of the samples.

Laboratory control standard:

Reference standard number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INSS353	0.50	0.511	102.2%

Duplicate sample precision:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
061116.05	S. Harris edge	clear w/ particles, no color	S <0.0000213	
↓	Duplicate		D 0.0000133	LAB

Sample measurements:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)
	Blank (should be = < 0.10 mg/L)		<0.00681
061116.06	S. Harris	slightly cloudy w/ particles, tan	<0.00658
061116.03	Foxwood Hills	clear w/ particles, no color	<0.00000300
061116.01	Smith Creek	clear, no color	<0.00000809
061116.04	Camp Lejune	clear, no color	<0.0000593
061116.02	Hercules	clear w/ particles, no color	<0.0000197
061115.13	TVA-SQN-101	clear, no color	<0.0000738
061115.14	TVA-SQN-INT	clear, no color	~~<0.000114~~ <0.000114
			LAB
			LAB

Note: All samples were analyzed in excess of EPA recommended holding time (15 minutes) unless otherwise noted.

Laboratory control standard:

Reference standard number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INSS353	0.50	0.537	107.4%

Reviewed by
Date reviewed 11-16-06

Total Residual Chlorine
(EPA Method 330.5)

Matrix: Water, MDL = 0.10 mg/L
Meter: Accumet Model AR25 pH/Ion Meter

Analyst	LAB	Iodide reagent:	INR235
Date analyzed	11-18-06	Acid reagent:	INR247

Calibration:

	0.10 mg/L	1.00 mg/L
Reference standard number	INSS353	INSS353

Note: For samples with a residual chlorine of > 1.0 mg/L, the calibration range must be adjusted to bracket the chlorine levels of the samples.

Laboratory control standard:

Reference standard number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INSS353	0.50	0.544	108.8%

Duplicate sample precision:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
061118.16	Foxwood Hills	slightly cloudy w/part., clear ~~<0.0000000328~~ LAB	S <0.0000100 ~~<0.0000000328~~	
	Duplicate		D <0.0000250	LAB

Sample measurements:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)
	Blank (should be = < 0.10 mg/L)		<0.00584
061117.01	~~Seafear~~ C. Seafear-007	clear, pale tan	<0.000853
061117.02	~~Seafear~~ C. Seafear-INT-UP	clear, pale tan	<0.00648
061117.06	Baxter	Clear, No color	<0.00197
061118.13	Bladeburrow	slightly cloudy w/particles, No color	<0.000181
061117.07	Com-Scope	clear, pale tan	<0.0000398
061118.15	Raleigh CC	clear, No color	0.00286
061118.17	Scarlette Acres	slightly cloudy w/particles, gray	<0.00209
061117.08	~~Spruce~~ Spruce Pine	clear, No color	<0.000193
061118.01	Apex	Clear, No color	<0.0000142

Note: All samples were analyzed in excess of EPA recommended holding time (15 minutes) unless otherwise noted.

Laboratory control standard:

Reference standard number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INSS353	0.50	0.493	98.6%

Reviewed by	KEN
Date reviewed	11-18-06

Total Residual Chlorine
(EPA Method 330.5)

Matrix: Water, MDL = 0.10 mg/L
Meter: Accumet Model AR25 pH/Ion Meter

Analyst	UAB	Iodide reagent:	INR235
Date analyzed	11-18-06	Acid reagent:	INR247

Calibration:

	0.10 mg/L	1.00 mg/L
Reference standard number	INSS353	INSS353

Note: For samples with a residual chlorine of > 1.0 mg/L, the calibration range must be adjusted to bracket the chlorine levels of the samples.

Laboratory control standard:

Reference standard number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
	0.50		UAB

Duplicate sample precision:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
061118.02	Dynea	slightly cloudy, pale yellow	S <0.00255	
↓	Duplicate		D <0.00380	UAB

Sample measurements:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)
	Blank (should be = < 0.10 mg/L)		UAB
061118.04	North Carrie	clear, no color	<0.00117
061118.05 061118.07	Smith Creek	clear, pale yellow	<0.000575
061118.14	BASF	yellow, cloudy w/part.	<0.00219
061118.11	Craven County	clear, no color	<0.000128
061118.06	Raleigh Nuse	clear, no color	<0.0000183
061118.~~08~~ 09	RDU-001	opaque w/part., orange	<0.000205
061118.~~09~~ 10	↓ 003	cloudy w/part., orange	<0.000433
061118.~~10~~ 08	↓ 004	opaque w/part, orange	<0.000280
061118.12	Camp Lejune	clear, no color	<0.000349

Note: All samples were analyzed in excess of EPA recommended holding time (15 minutes) unless otherwise noted.

Laboratory control standard:

Reference standard number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INSS353	0.50	0.489	97.8%

Reviewed by	KEW
Date reviewed	11-18-06

Total Residual Chlorine
(EPA Method 330.5)

Matrix: Water, MDL = 0.10 mg/L
Meter: Accumet Model AR25 pH/Ion Meter

Analyst	LAB	Iodide reagent:	INR235
Date analyzed	11-18-06	Acid reagent:	INR247

Calibration:

	0.10 mg/L	1.00 mg/L
Reference standard number	INSS353	INSS353

Note: For samples with a residual chlorine of > 1.0 mg/L, the calibration range must be adjusted to bracket the chlorine levels of the samples.

Laboratory control standard:

Reference standard number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
	0.50		LAB

Duplicate sample precision:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
06111709	TVA-SQN-101	clear, no color	S <0.00617	
J	Duplicate		D <0.00209	LAB

Sample measurements:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)
	Blank (should be = < 0.10 mg/L)		LAB
061117.10	TVA-SQN-INT	clear, no color	<0.00260

Note: All samples were analyzed in excess of EPA recommended holding time (15 minutes) unless otherwise noted.

Laboratory control standard:

Reference standard number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INSS353	0.50	0.474	94.0%

Reviewed by	KEL
Date reviewed	11.18.06

Sequoyah Nuclear Plant Biomonitoring
November 14-21, 2006

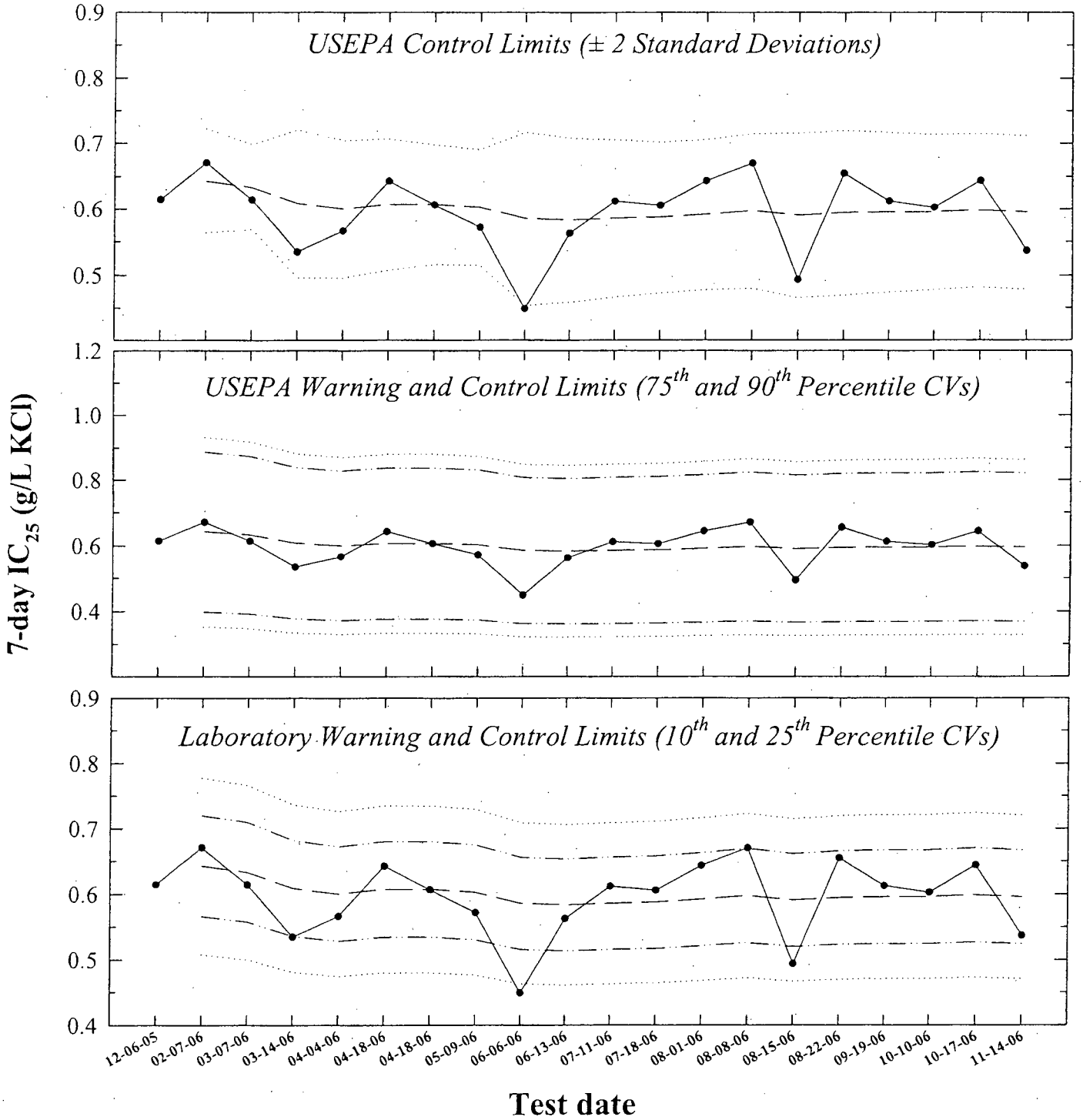
Appendix D

Reference Toxicant Test and
Control Chart

Environmental Testing Solutions, Inc.

Pimephales promelas

Potassium Chloride Chronic Reference Toxicant Control Chart using Moderately Hard Synthetic Water



—•— **7-day IC_{25}** = 25% inhibition concentration. An estimation of the concentration of potassium chloride that would cause a 25% reduction in *Pimephales* growth for the test population.

— — **Central Tendency** (mean IC_{25})

—·—·— **Warning Limits** (mean $IC_{25} \pm S_{A.10}$ or $S_{A.75}$)

····· **Control Limits** (mean $IC_{25} \pm S_{A.25}$, $S_{A.90}$, or 2 Standard Deviations)

Environmental Testing Solutions, Inc.

Pimephales promelas
Potassium Chloride Chronic Reference Toxicant Control Chart
using Moderately Hard Synthetic Water

Test number	Test date	7-day IC_{25} (g/L KCl)	CT (g/L KCl)	S	State and USEPA Control Limits CT - 2S	CT + 2S	$S_{A.10}$	Laboratory Warning Limits CT - $S_{A.10}$	CT + $S_{A.10}$	$S_{A.25}$	Laboratory Control Limits CT - $S_{A.25}$	CT + $S_{A.25}$	$S_{A.75}$	USEPA Warning Limits CT - $S_{A.75}$	CT + $S_{A.75}$	$S_{A.90}$	USEPA Control Limits CT - $S_{A.90}$	CT + $S_{A.90}$	CV
1	12-06-05	0.61																	
2	02-07-06	0.67	0.64	0.04	0.56	0.72	0.08	0.57	0.72	0.13	0.51	0.78	0.24	0.40	0.89	0.29	0.35	0.93	0.06
3	03-07-06	0.61	0.63	0.03	0.57	0.70	0.08	0.56	0.71	0.13	0.50	0.77	0.24	0.39	0.87	0.28	0.35	0.92	0.05
4	03-14-06	0.53	0.61	0.06	0.50	0.72	0.07	0.54	0.68	0.13	0.48	0.74	0.23	0.38	0.84	0.27	0.33	0.88	0.09
5	04-04-06	0.57	0.60	0.05	0.50	0.70	0.07	0.53	0.67	0.13	0.47	0.73	0.23	0.37	0.83	0.27	0.33	0.87	0.09
6	04-18-06	0.64	0.61	0.05	0.51	0.71	0.07	0.53	0.68	0.13	0.48	0.73	0.23	0.38	0.84	0.27	0.33	0.88	0.08
7	04-18-06	0.61	0.61	0.05	0.52	0.70	0.07	0.53	0.68	0.13	0.48	0.73	0.23	0.38	0.84	0.27	0.33	0.88	0.07
8	05-09-06	0.57	0.60	0.04	0.51	0.69	0.07	0.53	0.67	0.13	0.48	0.73	0.23	0.37	0.83	0.27	0.33	0.87	0.07
9	06-06-06	0.45	0.59	0.07	0.45	0.72	0.07	0.52	0.66	0.12	0.46	0.71	0.22	0.36	0.81	0.26	0.32	0.85	0.11
10	06-13-06	0.56	0.58	0.06	0.46	0.71	0.07	0.51	0.65	0.12	0.46	0.71	0.22	0.36	0.80	0.26	0.32	0.85	0.11
11	07-11-06	0.61	0.59	0.06	0.47	0.71	0.07	0.52	0.66	0.12	0.46	0.71	0.22	0.36	0.81	0.26	0.32	0.85	0.10
12	07-18-06	0.61	0.59	0.06	0.47	0.70	0.07	0.52	0.66	0.12	0.46	0.71	0.22	0.36	0.81	0.26	0.32	0.85	0.10
13	08-01-06	0.64	0.59	0.06	0.48	0.71	0.07	0.52	0.66	0.12	0.47	0.72	0.22	0.37	0.82	0.27	0.33	0.86	0.10
14	08-08-06	0.67	0.60	0.06	0.48	0.71	0.07	0.53	0.67	0.13	0.47	0.72	0.23	0.37	0.82	0.27	0.33	0.87	0.10
15	08-15-06	0.49	0.59	0.06	0.47	0.72	0.07	0.52	0.66	0.12	0.47	0.71	0.22	0.37	0.81	0.27	0.32	0.86	0.11
16	08-22-06	0.65	0.59	0.06	0.47	0.72	0.07	0.52	0.67	0.12	0.47	0.72	0.23	0.37	0.82	0.27	0.33	0.86	0.11
17	09-19-06	0.61	0.60	0.06	0.47	0.72	0.07	0.52	0.67	0.13	0.47	0.72	0.23	0.37	0.82	0.27	0.33	0.86	0.10
18	10-10-06	0.60	0.60	0.06	0.48	0.71	0.07	0.52	0.67	0.13	0.47	0.72	0.23	0.37	0.82	0.27	0.33	0.86	0.10
19	10-17-06	0.64	0.60	0.06	0.48	0.72	0.07	0.53	0.67	0.13	0.47	0.72	0.23	0.37	0.83	0.27	0.33	0.87	0.10
20	11-14-06	0.54	0.60	0.06	0.48	0.71	0.07	0.52	0.67	0.12	0.47	0.72	0.23	0.37	0.82	0.27	0.33	0.86	0.10

Note: **7-d IC_{25}** = 7-day 25% inhibition concentration. An estimation of the concentration of potassium chloride that would cause a 25% reduction in Pimephales growth for the test population.

CT = Central tendency (mean IC_{25}).

S = Standard deviation of the IC_{25} values.

Laboratory Control and Warning Limits

Laboratory control and warning limits were established using the standard deviation of the IC_{25} values corresponding to the 10th and 25th percentile CVs. These ranges are more stringent than the control and warning limits recommended by USEPA for the test method and endpoint.

$S_{A.10}$ = Standard deviation corresponding to the 10th percentile CV. ($S_{A.10}$ = 0.12)

$S_{A.25}$ = Standard deviation corresponding to the 25th percentile CV. ($S_{A.25}$ = 0.21)

USEPA Control and Warning Limits

$S_{A.75}$ = Standard deviation corresponding to the 75th percentile CV. ($S_{A.75}$ = 0.38)

$S_{A.90}$ = Standard deviation corresponding to the 90th percentile CV. ($S_{A.90}$ = 0.45)

CV = Coefficient of variation of the IC_{25} values.

USEPA. 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination Program. EPA-833-R-00-003. US Environmental Protection Agency, Cincinnati, OH.

Organisms obtained from Aquatic BioSystems, Inc.

Environmental Testing Solutions, Inc.

Precision of Endpoint Measurements

Pimephales promelas
Potassium Chloride Chronic Reference Toxicant Data using Moderately Hard Synthetic Water

Test number	Test date	Control Survival (%)	Control Mean Growth (mg/larvae)	CT for Control Growth (mg/larvae)	CV (%)	CT for Control Growth CV (%)	MSD	PMSD (%)	CT for PMSD (%)
1	12-06-05	100	0.626		7.1		0.06	10.0	
2	02-07-06	100	0.711	0.669	7.8	7.5	0.09	13.2	11.6
3	03-07-06	100	0.774	0.704	8.4	7.8	0.10	13.3	12.2
4	03-14-06	100	0.745	0.714	9.7	8.3	0.14	18.9	13.8
5	04-04-06	100	0.766	0.724	11.5	8.9	0.08	10.7	13.2
6	04-18-06	100	0.621	0.707	9.7	9.0	0.09	13.8	13.3
7	04-18-06	100	0.668	0.702	13.3	9.7	0.10	15.4	13.6
8	05-09-06	100	0.841	0.719	7.5	9.4	0.12	14.4	13.7
9	06-06-06	100	0.783	0.726	5.9	9.0	0.08	9.6	13.2
10	06-13-06	97.5	0.709	0.724	8.2	8.9	0.16	22.0	14.1
11	07-11-06	100	0.673	0.720	2.5	8.3	0.09	13.1	14.0
12	07-18-06	97.5	0.623	0.712	17.1	9.1	0.10	16.6	14.2
13	08-01-06	100	0.746	0.714	10.5	9.2	0.13	17.0	14.5
14	08-08-06	100	0.613	0.707	10.4	9.3	0.08	13.6	14.4
15	08-15-06	100	0.765	0.711	8.0	9.2	0.16	20.4	14.8
16	08-22-06	100	0.768	0.714	8.7	9.2	0.12	15.5	14.8
17	09-19-06	100	0.699	0.713	12.7	9.4	0.12	17.2	15.0
18	10-10-06	100	0.685	0.712	5.1	9.1	0.10	14.0	14.9
19	10-17-06	100	0.781	0.716	7.3	9.0	0.15	18.7	15.1
20	11-14-06	100	0.737	0.717	5.3	8.8	0.10	13.4	15.0

Note: CV = Coefficient of variation for control growth.
On average, the CV for control growth is **8.8%** in Environmental Testing Solutions, Inc. *Pimephales* chronic toxicity tests.
Lower CV bound determined by USEPA (10th percentile) = 3.5%.
Upper CV bound determined by USEPA (90th percentile) = 20%

MSD = Minimum Significant Difference

PMSD = Percent Minimum Significant Difference
PMSD is a measure of test precision. The PMSD is the minimum percent difference between the control and treatment that can be declared statistically significant in a whole effluent toxicity test. On average, a significant difference occurs for Environmental Testing Solutions, Inc. chronic toxicity tests when a toxicant reduces *Pimephales* growth by **15.0%** from the control.
Lower PMSD bound determined by USEPA (10th percentile) = 9.4%.
Upper PMSD bound determined by USEPA (90th percentile) = 35%.

CT = Central Tendancy (mean Control Growth, CV, or PMSD)

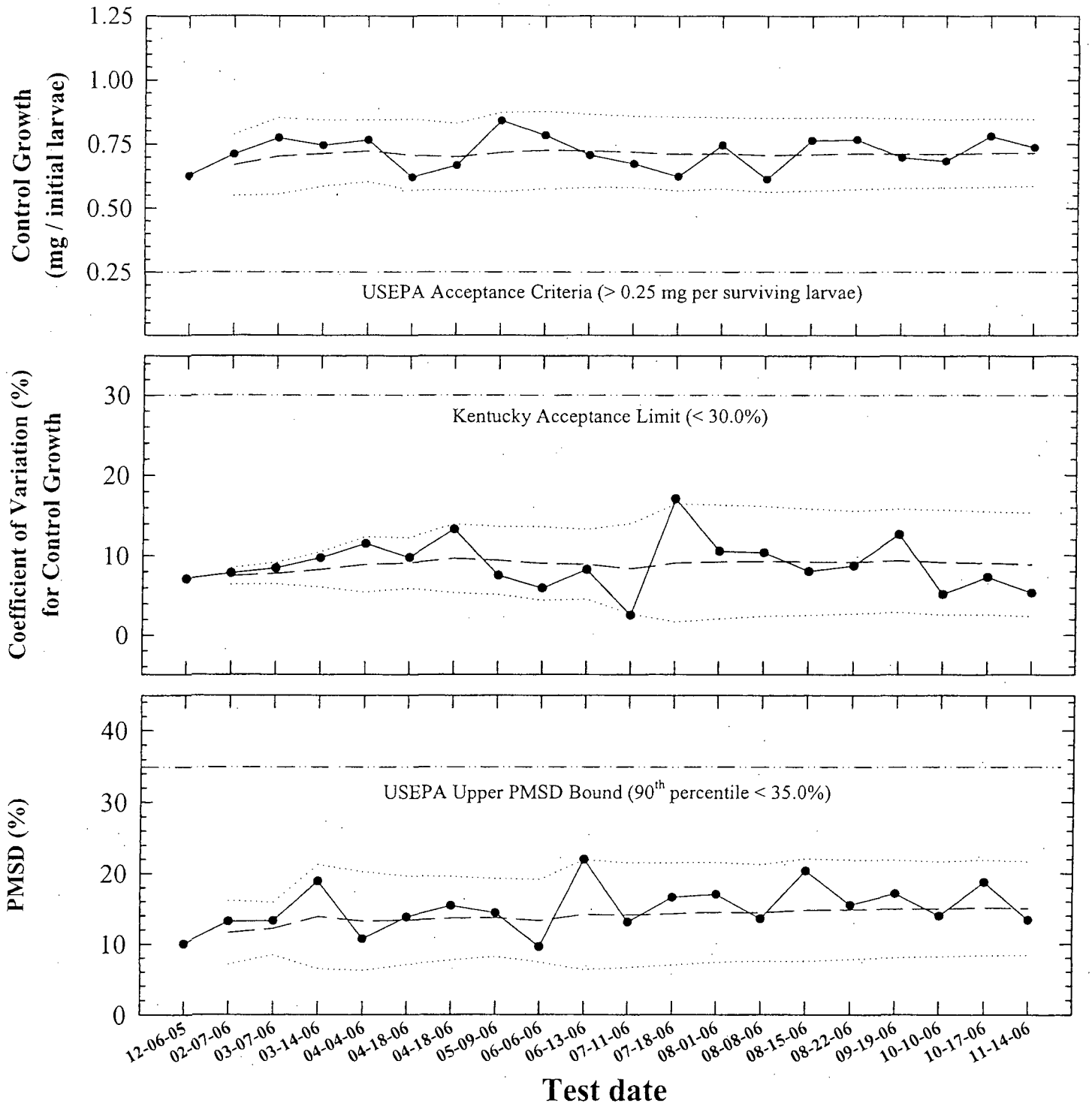
The lower and upper bounds were calculated by the USEPA using 205 tests conducted from 19 laboratories for *Pimephales* growth in chronic reference toxicant tests.

USEPA. 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination Program. EPA-833-R-00-003. US Environmental Protection Agency, Cincinnati, OH.

Organisms obtained from Aquatic BioSystems, Inc.

Environmental Testing Solutions, Inc.

Pimephales promelas Control Growth, Coefficient of Variation, and PMSD in Potassium Chloride Chronic Reference Toxicant Tests



—•— **Control Reproduction, Coefficient of Variation (CV), or Percent Minimum Significant Difference (PMSD)** PMSD is the minimum significant difference between the control and treatment that can be declared statistically significant.

— — **Central Tendency** (mean Control Growth, CV, or PMSD)

..... **Control Limits** (mean Control Growth, CV, or PMSD ± 2 Standard Deviations)

Potassium Chloride Chronic Reference Toxicant Test
(EPA-821-R-02-013 Method 1000.0)
Species: *Pimephales promelas*

PpKClCR Test Number: 105

Dilution preparation information:						*Comments:*
KCl CHM number:		CHM 267				
Stock preparation:		50 g KCl/L: Dissolve 50 g KCl in 1-L Deionized water				
Dilution prep (mg/L)	300	450	600	750	900	
Stock volume (mL)	6	9	12	15	18	
Diluent volume (mL)	994	991	988	985	982	
Total volume (mL)	1000	1000	1000	1000	1000	

Test organism information:		*Test information:*	
Organism age:	22.75 TO 24.75 HOURS OLD	Randomizing template:	PURPLE
Date and times organisms were born between:	11-13-06 1400 TO 1600	Incubator number and shelf location:	3E
Organism source:	ABS BATCH Pp 11-13-06	*Artemia* lot number:	BG 1204 U
Transfer bowl information:	pH = 7.63 SU Temperature = 24.2 °C	Total drying time:	24.25 HOURS
		Date / Time in: 11-21-06	1350
Average transfer volume:	8.6 mL	Date / Time out: 11-22-06	1400
		Oven temperature:	60°C

Daily feeding and renewal information:

Day	Date	Morning feeding time	Afternoon feeding time	Test initiation, renewal, or termination time	MHS batch used	Analyst
0	11-14-06	—	1600	1440	11-12-06A	JL
1	11-15-06	1000	1605	1447	11-12-06B	JL
2	11-16-06	1000	1600	1434	11-12-06B	JL
3	11-17-06	1003	1611	1410	11-15-06A	JL
4	11-18-06	1002	1605	1400	11-15-06A	JL
5	11-19-06	0953	1600	1348	11-15-06B	JL
6	11-20-06	0955	1602	1351	11-15-06B	JL
7	11-21-06			1345		JL

Control information:		Acceptance criteria
% Mortality:	0%	≤ 20%
Average weight per initial larvae:	0.737	
Average weight per surviving larvae:	0.737	≥ 0.25 mg/larvae

Summary of test endpoints:	
7-day LC_{50}	728.4
NOEC	<300
LOEC	300
ChV	<300
IC_{25}	536.8

Species: *Pimephales promelas* PpKClCR Test Number: 105

Survival and Growth Data

Day	Control				300 mg KCl/L				450 mg KCl/L			
	A	B	C	D	E	F	G	H	I	J	K	L
0	10	10	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10	10	9 d	10
3	10	10	10	10	10	10	10	10	10	10	9	9 d
4	10	10	10	10	10	10	10	10	10	10	9	9
5	10	10	10	10	10	10	10	10	10	10	9	9
6	10	10	10	10	10	10	10	10	10	10	9	9
7	10	10	10	10	1 SM 10	10	10	10	10	1 SM 10	9	9
A = Pan weight (mg) Tray color code:: RED TRAY Analyst: LAB	13.16	14.83	12.52	13.78	15.82	13.72	14.56	14.50	14.33	14.10	15.67	13.60
B = Pan + Larvae weight (mg) Analyst: LAB	20.90	22.20	20.07	20.61	21.04	19.49	21.42	21.42	21.05	20.41	22.11	18.91
Larvae weight (mg) = A – B	7.74	7.37	7.55	6.83	5.22	5.77	6.86	6.92	6.72	6.31	6.44	5.31
Weight per initial number of larvae (mg) = C / Initial number of larvae	0.774	0.737	0.755	0.683	0.522	0.577	0.686	0.692	0.672	0.631	0.644	0.531
Average weight per initial number of larvae (mg) / Percent reduction from control (%)	0.737				0.619		16.0%		0.620		16.0%	

Comment codes: c = clear, d = dead, fg = fungus, k = killed, m = missing, sk = sick, sm = unusually small, lg = unusually large, d&r = decanted and returned, w = wounded.

Calculations and data reviewed: JL

Comments:

Species: *Pimephales promelas* PpKClCR Test Number: 105

Survival and Growth Data

Day	600 mg KCl/L				750 mg KCl/L				900 mg KCl/L			
	M	N	O	P	Q	R	S	T	U	V	W	X
0	10	10	10	10	10	10	10	10	10	10	10	10
1	9 1d	10	8 2d	9 1d	6 4d	6 4d	7 3d	7 3d	3 7d	5 5d	2 8d	3 7d
2	8 1d	10	7 1d	9	5 1d	5 1d	6 1d	7	3	5	2	3
3	8	10	7	9	5	5	6	6 1d	3	4 1d	2	3
4	8	10	7	9	5	5	6	6	2 1d	3 1d	2	3
5	7 1d	10	7	9	5	5	6	6	2	3	2	2 1d
6	7	8 2d	7	8 1d	5	5	6	4 2d	2	3	2	1 1d
7	7	8	7 2fg	8	5	5	6	4	2	3 1sm	2	1
A = Pan weight (mg) Tray color code:: RED TRAY Analyst: LAB	13.34	14.82	13.18	14.37	13.38	14.34	14.37	13.94	14.50	14.04	13.93	15.19
B = Pan + Larvae weight (mg) Analyst: LAB	17.05	19.85	19.20	19.79	16.52	17.94	18.10	16.44	15.81	15.59	15.38	15.93
Larvae weight (mg) = A – B	3.71	5.03	6.02	5.42	3.14	3.60	3.73	2.50	1.31	1.55	1.45	0.74
Weight per initial number of larvae (mg) = C / Initial number of larvae	0.371	0.503	0.602	0.542	0.314	0.360	0.373	0.250	0.131	0.155	1.45	0.074
Average weight per initial number of larvae (mg)	0.505				0.324				0.126			
Percent reduction from control (%)			31.67%				56.0%				82.9%	

Comment codes: c = clear, d = dead, fg = fungus, k = killed, m = missing, sk = sick, sm = unusually small, lg = unusually large, d&r = decanted and returned, w = wounded.

Calculations and data reviewed: dl

Comments:

Environmental Testing Solutions, Inc.

Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013, Method 1000.0)
Species: *Pimephales promelas*

Quality Control
Verification of Data Entry, Calculations, and Statistical Analyses

Test number: PpKCICR # 145 (#105 at 351 Depot St.)

Test dates: November 14-21, 2006

Reveiwed by:

Concentration (mg/L KCl)	Replicate	Initial number of larvae	Final number of larvae	A = Pan weight (mg)	B = Pan + Larvae weight (mg)	Larvae weight (mg) = A - B	Weight / Surviving number of larvae (mg)	Mean weight/ Surviving number of larvae (mg)	Coefficient of variation (Mean weight per surviving number of larvae) (%)	Weight / Initial number of larvae (mg)	Mean survival (%)	Mean weight/ Initial number of larvae (mg)	Coefficient of variation (%)	Percent reduction from control (%)
Control	A	10	10	13.16	20.90	7.74	0.774	0.737	5.3	0.774	100.0	0.737	5.3	Not applicable
	B	10	10	14.83	22.20	7.37	0.737			0.737				
	C	10	10	12.52	20.07	7.55	0.755			0.755				
	D	10	10	13.78	20.61	6.83	0.683			0.683				
300	E	10	10	15.82	21.04	5.22	0.522	0.619	13.5	0.522	100.0	0.619	13.5	16.0
	F	10	10	13.72	19.49	5.77	0.577			0.577				
	G	10	10	14.56	21.42	6.86	0.686			0.686				
	H	10	10	14.50	21.42	6.92	0.692			0.692				
450	I	10	10	14.33	21.05	6.72	0.672	0.652	8.3	0.672	95.0	0.620	9.9	16.0
	J	10	10	14.10	20.41	6.31	0.631			0.631				
	K	10	9	15.67	22.11	6.44	0.716			0.644				
	L	10	9	13.60	18.91	5.31	0.590			0.531				
600	M	10	7	13.34	17.05	3.71	0.530	0.674	20.5	0.371	75.0	0.505	19.4	31.6
	N	10	8	14.82	19.85	5.03	0.629			0.503				
	O	10	7	13.18	19.20	6.02	0.860			0.602				
	P	10	8	14.37	19.79	5.42	0.678			0.542				
750	Q	10	5	13.38	16.52	3.14	0.628	0.649	7.3	0.314	50.0	0.324	17.1	56.0
	R	10	5	14.34	17.94	3.60	0.720			0.360				
	S	10	6	14.37	18.10	3.73	0.622			0.373				
	T	10	4	13.94	16.44	2.50	0.625			0.250				
900	U	10	2	14.50	15.81	1.31	0.655	0.659	15.5	0.131	20.0	0.126	28.7	82.9
	V	10	3	14.04	15.59	1.55	0.517			0.155				
	W	10	2	13.93	15.38	1.45	0.725			0.145				
	X	10	1	15.19	15.93	0.74	0.740			0.074				

Dunnett's MSD value: 0.0987

PMSD: 13.4

MSD = Minimum Significant Difference

PMSD = Percent Minimum Significant Difference

PMSD is a measure of test precision. The PMSD is the minimum percent difference between the control and treatment that can be declared statistically significant in a whole effluent toxicity test. On average, a significant difference occurs for Environmental Testing Solutions, Inc. chronic toxicity tests when a toxicant reduces *Pimephales* growth by 15.0% from the control (determined through reference toxicant testing).

Lower PMSD bound determined by USEPA (10th percentile) = 9.4%.

Upper PMSD bound determined by USEPA (90th percentile) = 35%.

The lower and upper bounds were calculated by the USEPA using 205 tests conducted from 19 laboratories for Pimephales growth in chronic reference toxicant tests.

USEPA. 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination Program. EPA-833-R-00-003. US Environmental Protection Agency, Cincinnati, OH.

Organisms obtained from Aquatic BioSystems, Inc.

Environmental Testing Solutions, Inc.
Statistical Analyses

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	11/14/2006	Test ID:	PpKClCR	Sample ID:	REF-Ref Toxicant
End Date:	11/21/2006	Lab ID:	ETS-Envir. Testing Sol	Sample Type:	KCL-Potassium chloride
Sample Date:		Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:					

Conc-mg/L	1	2	3	4
D-Control	1.0000	1.0000	1.0000	1.0000
300	1.0000	1.0000	1.0000	1.0000
450	1.0000	1.0000	0.9000	0.9000
600	0.7000	0.8000	0.7000	0.8000
750	0.5000	0.5000	0.6000	0.4000
900	0.2000	0.3000	0.2000	0.1000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
D-Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4			0	40
300	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00	0	40
450	0.9500	0.9500	1.3305	1.2490	1.4120	7.072	4	14.00	10.00	2	40
*600	0.7500	0.7500	1.0492	0.9912	1.1071	6.383	4	10.00	10.00	10	40
*750	0.5000	0.5000	0.7854	0.6847	0.8861	10.467	4	10.00	10.00	20	40
*900	0.2000	0.2000	0.4572	0.3218	0.5796	23.087	4	10.00	10.00	32	40

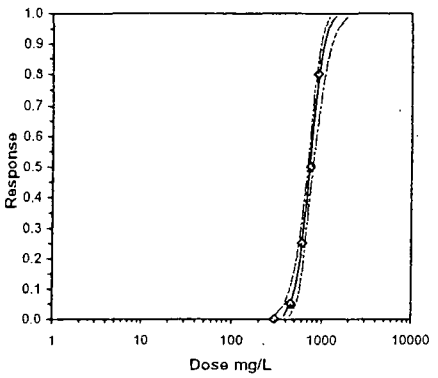
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.927304924	0.884	-0.11783462	-0.07299576
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	450	600	519.6152423	
Treatments vs D-Control				

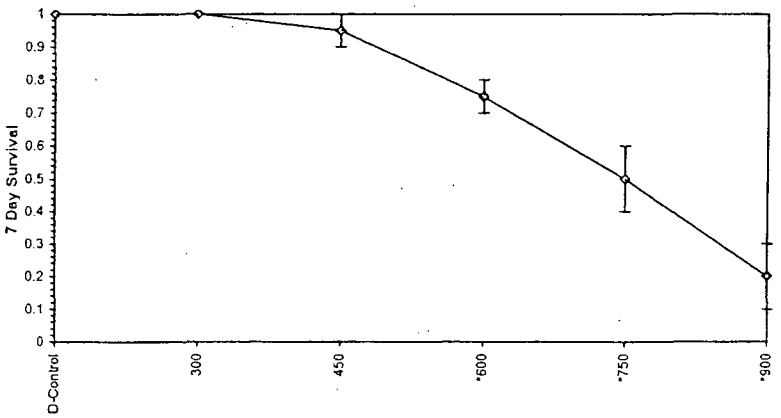
Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	8.218545127	1.18554237	5.894882038	10.54220822	0	0.510637251	7.814727783	0.92	2.862395394	0.121676037	3
Intercept	-18.5247257	3.373327762	-25.1364483	-11.9130032							
TSCR											

Point	Probits	mg/L	95% Fiducial Limits	
EC01	2.674	379.6073413	295.2835229	439.0208562
EC05	3.355	459.468902	383.559901	511.8507084
EC10	3.718	508.6994638	440.1419331	556.5132553
EC15	3.964	544.8617129	482.2758146	589.6651074
EC20	4.158	575.4270324	517.9312937	618.2379899
EC25	4.326	603.012277	549.8515822	644.7448404
EC40	4.747	678.5301092	633.4494993	723.2887018
EC50	5.000	728.4427003	683.7392443	781.8840101
EC60	5.253	782.0268659	733.1090911	850.8899764
EC75	5.674	879.9634494	814.8968753	989.3037695
EC80	5.842	922.1477985	848.0480517	1052.488559
EC85	6.036	973.8779028	887.6041206	1132.258219
EC90	6.282	1043.108519	939.1191681	1242.443569
EC95	6.645	1154.874127	1019.754797	1427.556739
EC99	7.326	1397.83602	1187.558721	1856.463025



Dose-Response Plot



Organisms obtained from Aquatic BioSystems, Inc.

Environmental Testing Solutions, Inc.

Statistical Analyses

Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	11/14/2006	Test ID:	PpKCICR	Sample ID:	REF-Ref Toxicant
End Date:	11/21/2006	Lab ID:	ETS-Envir. Testing Sol.	Sample Type:	KCL-Potassium chloride
Sample Date:		Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:					

Conc-mg/L	1	2	3	4
D-Control	0.7740	0.7370	0.7550	0.6830
300	0.5220	0.5770	0.6860	0.6920
450	0.6720	0.6310	0.6440	0.5310
600	0.3710	0.5030	0.6020	0.5420
750	0.3140	0.3600	0.3730	0.2500
900	0.1310	0.1550	0.1450	0.0740

			Transform: Untransformed					1-Tailed			Isotonic	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	0.7373	1.0000	0.7373	0.6830	0.7740	5.316	4				0.7373	1.0000
*300	0.6193	0.8399	0.6193	0.5220	0.6920	13.508	4	2.605	2.180	0.0987	0.6194	0.8401
*450	0.6195	0.8403	0.6195	0.5310	0.6720	9.916	4	2.600	2.180	0.0987	0.6194	0.8401
600	0.5045	0.6843	0.5045	0.3710	0.6020	19.400	4				0.5045	0.6843
750	0.3243	0.4398	0.3243	0.2500	0.3730	17.146	4				0.3243	0.4398
900	0.1263	0.1712	0.1263	0.0740	0.1550	28.671	4				0.1263	0.1712

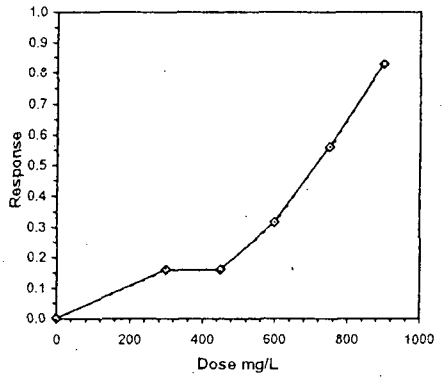
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.924493849	0.805	-0.53262068	-0.95050657
Bartlett's Test indicates equal variances (p = 0.50)	1.389453173	9.2103405		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	<300	300			0.098731115	0.133918094	0.018526083	0.004102278	0.043841291	2, 9
Treatments vs D-Control										

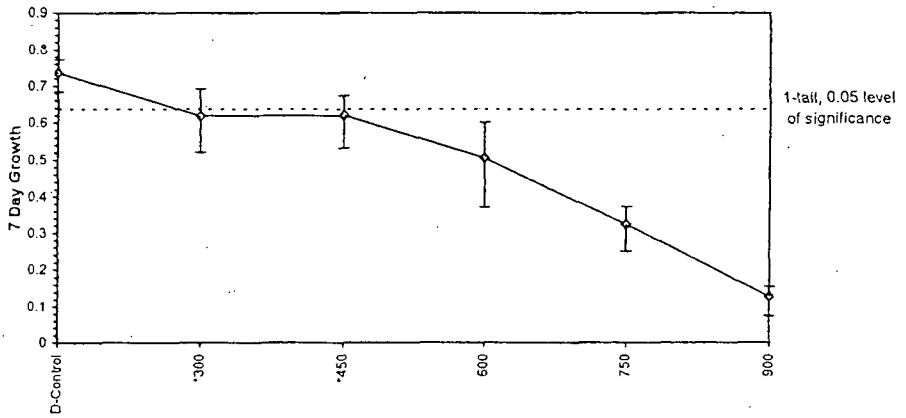
Linear Interpolation (200 Resamples)

Point	mg/L	SD	95% CL(Exp)		Skew
IC05*	93.82	47.73	51.72	346.70	2.4121
IC10*	187.64	73.50	103.45	609.95	1.4317
IC15*	281.45	98.11	155.17	615.17	0.2127
IC20	488.62	75.26	138.89	622.17	-1.2522
IC25	536.75	42.15	421.08	668.52	0.2086
IC40	651.72	29.45	524.79	716.72	-1.1008
IC50	713.07	20.57	644.68	778.29	-0.1493

* indicates IC estimate less than the lowest concentration



Dose-Response Plot



Organisms obtained from Aquatic BioSystems, Inc.

Species: *Pimephales promelas* PpKClCR Test Number: 105

Daily Chemistry:

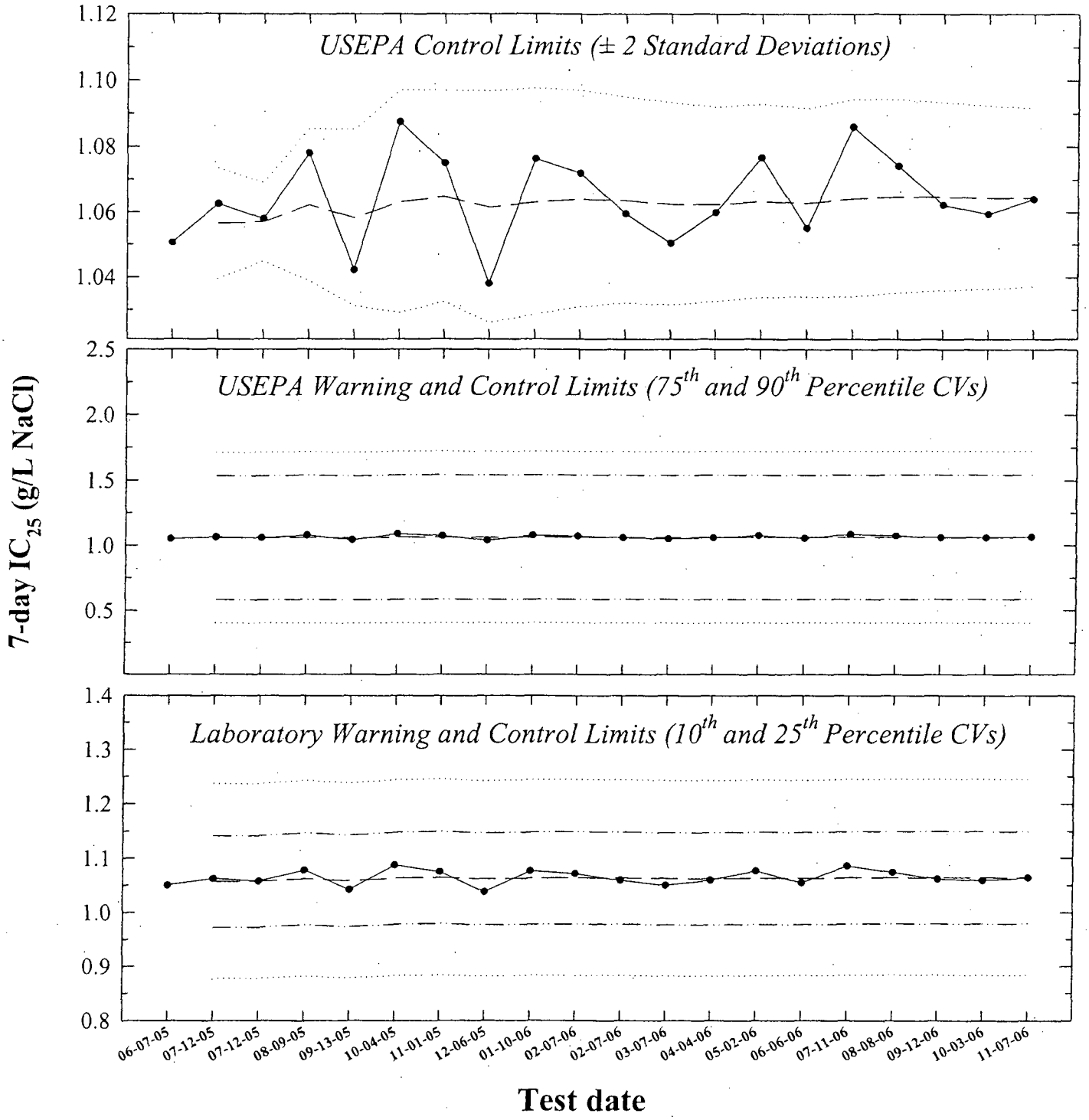
		Day					
		0		1		2	
	Analyst	MEK	MEK	MEK	MEK	MEK	MEK
Concentration	Parameter						
CONTROL	pH (S.U.)	7.67	7.71	7.81	7.33	7.52	7.17
	DO (mg/L)	8.1	7.7	8.2	7.9	7.8	7.2
	Conductivity (µmhos/cm)	314		320		308	
	Alkalinity (mg $CaCO_3$/L)	59		57			
	Hardness (mg $CaCO_3$/L)	93		93			
	Temperature (°C)	24.7	24.5	24.8	24.4	24.7	24.5
300 mg KCl/L	pH (S.U.)	7.74	7.81	7.88	7.39	7.49	7.25
	DO (mg/L)	8.2	7.7	8.2	8.0	8.1	7.2
	Conductivity (µmhos/cm)	843		848		835	
	Temperature (°C)	24.6	24.4	24.7	24.7	24.6	24.3
450 mg KCl/L	pH (S.U.)	7.75	7.84	7.93	7.41	7.52	7.24
	DO (mg/L)	8.1	7.8	8.2	8.0	8.1	7.2
	Conductivity (µmhos/cm)	1080		1150		1130	
	Temperature (°C)	24.6	24.6	24.7	24.3	24.9	24.6
600 mg KCl/L	pH (S.U.)	7.77	7.82	7.95	7.45	7.56	7.31
	DO (mg/L)	8.2	7.9	8.3	8.0	8.1	7.2
	Conductivity (µmhos/cm)	1410		1400		1390	
	Temperature (°C)	24.6	24.2	24.7	24.4	24.7	24.6
750 mg KCl/L	pH (S.U.)	7.79	7.87	7.98	7.48	7.59	7.35
	DO (mg/L)	8.2	7.9	8.3	8.0	8.1	7.2
	Conductivity (µmhos/cm)	1660		1660		1650	
	Temperature (°C)	24.9	24.6	24.7	24.4	24.8	24.5
900 mg KCl/L	pH (S.U.)	7.79	7.87	7.97	7.51	7.60	7.42
	DO (mg/L)	8.2	8.0	8.3	8.0	8.1	7.3
	Conductivity (µmhos/cm)	1930		1940		1950	
	Temperature (°C)	24.7	24.6	24.7	24.3	24.8	24.5
STOCK	Conductivity (µmhos/cm)	72,900		—		73800	
		Initial	Final	Initial	Final	Initial	Final

Species: *Pimephales promelas* PpKClCR Test Number: 105

		Day							
		3		4		5		6	
	Analyst	KEH	KEH	KEH	KEH	KEH	KEH	KEH	KEH
Concentration	Parameter								
CONTROL	pH (S.U.)	7.55	7.26	7.77	7.34	7.81	7.41	7.81	7.56
	DO (mg/L)	7.7	7.0	7.7	6.9	7.8	7.2	8.0	7.2
	Conductivity (µmhos/cm)	315		316		309		312	
	Alkalinity (mg $CaCO_3$/L)	59				60			
	Hardness (mg $CaCO_3$/L)	91				93			
	Temperature (°C)	24.7	24.6	24.7	24.5	24.8	24.6	24.5	24.7
300 mg KCl/L	pH (S.U.)	7.64	7.22	7.79	7.32	7.79	7.36	7.87	7.54
	DO (mg/L)	7.8	7.0	7.7	6.9	7.8	6.8	7.9	7.2
	Conductivity (µmhos/cm)	810		817		813		828	
	Temperature (°C)	24.8	24.5	24.8	24.4	24.9	24.4	24.7	24.6
450 mg KCl/L	pH (S.U.)	7.66	7.25	7.77	7.31	7.79	7.36	7.88	7.54
	DO (mg/L)	7.7	6.9	7.7	6.9	7.7	6.7	8.0	7.2
	Conductivity (µmhos/cm)	1110		1120		1110		1110	
	Temperature (°C)	24.7	24.5	24.8	24.4	24.9	24.6	24.7	24.3
600 mg KCl/L	pH (S.U.)	7.67	7.29	7.76	7.29	7.80	7.35	7.88	7.54
	DO (mg/L)	7.8	7.0	7.8	6.8	7.9	6.8	8.1	7.2
	Conductivity (µmhos/cm)	1450		1410		1400		1420	
	Temperature (°C)	24.7	24.7	24.7	24.4	24.8	24.7	24.6	24.2
750 mg KCl/L	pH (S.U.)	7.69	7.32	7.76	7.32	7.79	7.50	7.89	7.56
	DO (mg/L)	7.8	7.1	7.8	6.7	7.9	6.8	8.2	7.2
	Conductivity (µmhos/cm)	1700		1690		1670		1660	
	Temperature (°C)	24.7	24.5	24.8	24.4	24.9	24.2	24.6	24.2
900 mg KCl/L	pH (S.U.)	7.70	7.39	7.75	7.35	7.78	7.57	7.90	7.59
	DO (mg/L)	7.7	7.1	7.8	6.7	8.0	7.2	8.1	7.4
	Conductivity (µmhos/cm)	1970		1940		1920		1940	
	Temperature (°C)	24.7	24.5	24.7	24.4	24.7	24.4	24.7	24.4
STOCK	Conductivity (µmhos/cm)	—		72300		—		75600	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final

Environmental Testing Solutions, Inc.

Ceriodaphnia dubia
Sodium Chloride Chronic Reference Toxicant Control Chart using Moderately Hard Synthetic Water



—•— **7-day IC_{25}** = 25% inhibition concentration. An estimation of the concentration of sodium chloride that would cause a 25% reduction in *Ceriodaphnia* reproduction for the test population.

— — **Central Tendency** (mean IC_{25})

—·—·- **Warning Limits** (mean $IC_{25} \pm S_{A.10}$ or $S_{A.75}$)

····· **Control Limits** (mean $IC_{25} \pm S_{A.25}$, $S_{A.90}$, or 2 Standard Deviations)

Environmental Testing Solutions, Inc.

Ceriodaphnia dubia
Sodium Chloride Chronic Reference Toxicant Control Chart
using Moderately Hard Synthetic Water

Test number	Test date	7-day IC_{25} (g/L NaCl)	CT (g/L NaCl)	S	State and USEPA Control Limits CT - 2S	CT + 2S	$S_{A.10}$	Laboratory Warning Limits CT - $S_{A.10}$	CT + $S_{A.10}$	$S_{A.25}$	Laboratory Control Limits CT - $S_{A.25}$	CT + $S_{A.25}$	$S_{A.75}$	USEPA Warning Limits CT - $S_{A.75}$	CT + $S_{A.75}$	$S_{A.90}$	USEPA Control Limits CT - $S_{A.90}$	CT + $S_{A.90}$	CV
1	06-07-05	1.05																	
2	07-12-05	1.06	1.06	0.01	1.04	1.07	0.08	0.97	1.14	0.18	0.88	1.24	0.48	0.58	1.53	0.66	0.40	1.71	0.01
3	07-12-05	1.06	1.06	0.01	1.04	1.07	0.08	0.97	1.14	0.18	0.88	1.24	0.48	0.58	1.53	0.66	0.40	1.71	0.01
4	08-09-05	1.08	1.06	0.01	1.04	1.09	0.08	0.98	1.15	0.18	0.88	1.24	0.48	0.58	1.54	0.66	0.40	1.72	0.01
5	09-13-05	1.04	1.06	0.01	1.03	1.09	0.08	0.97	1.14	0.18	0.88	1.24	0.48	0.58	1.53	0.66	0.40	1.71	0.01
6	10-04-05	1.09	1.06	0.02	1.03	1.10	0.09	0.98	1.15	0.18	0.88	1.24	0.48	0.58	1.54	0.66	0.40	1.72	0.02
7	11-01-05	1.08	1.06	0.02	1.03	1.10	0.09	0.98	1.15	0.18	0.88	1.25	0.48	0.59	1.54	0.66	0.40	1.73	0.02
8	12-06-05	1.04	1.06	0.02	1.03	1.10	0.08	0.98	1.15	0.18	0.88	1.24	0.48	0.58	1.54	0.66	0.40	1.72	0.02
9	01-10-06	1.08	1.06	0.02	1.03	1.10	0.09	0.98	1.15	0.18	0.88	1.24	0.48	0.58	1.54	0.66	0.40	1.72	0.02
10	02-07-06	1.07	1.06	0.02	1.03	1.10	0.09	0.98	1.15	0.18	0.88	1.24	0.48	0.59	1.54	0.66	0.40	1.72	0.02
11	02-07-06	1.06	1.06	0.02	1.03	1.10	0.09	0.98	1.15	0.18	0.88	1.24	0.48	0.58	1.54	0.66	0.40	1.72	0.01
12	03-07-06	1.05	1.06	0.02	1.03	1.09	0.08	0.98	1.15	0.18	0.88	1.24	0.48	0.58	1.54	0.66	0.40	1.72	0.01
13	04-04-06	1.06	1.06	0.01	1.03	1.09	0.08	0.98	1.15	0.18	0.88	1.24	0.48	0.58	1.54	0.66	0.40	1.72	0.01
14	05-02-06	1.08	1.06	0.01	1.03	1.09	0.09	0.98	1.15	0.18	0.88	1.24	0.48	0.58	1.54	0.66	0.40	1.72	0.01
15	06-06-06	1.06	1.06	0.01	1.03	1.09	0.09	0.98	1.15	0.18	0.88	1.24	0.48	0.58	1.54	0.66	0.40	1.72	0.01
16	07-11-06	1.09	1.06	0.02	1.03	1.09	0.09	0.98	1.15	0.18	0.88	1.25	0.48	0.59	1.54	0.66	0.40	1.72	0.01
17	08-08-06	1.07	1.06	0.01	1.04	1.09	0.09	0.98	1.15	0.18	0.88	1.25	0.48	0.59	1.54	0.66	0.40	1.72	0.01
18	09-12-06	1.06	1.06	0.01	1.04	1.09	0.09	0.98	1.15	0.18	0.88	1.25	0.48	0.59	1.54	0.66	0.40	1.72	0.01
19	10-03-06	1.06	1.06	0.01	1.04	1.09	0.09	0.98	1.15	0.18	0.88	1.25	0.48	0.59	1.54	0.66	0.40	1.72	0.01
20	11-07-06	1.06	1.06	0.01	1.04	1.09	0.09	0.98	1.15	0.18	0.88	1.25	0.48	0.59	1.54	0.66	0.40	1.72	0.01

Note: **7-d IC_{25}** = 7-day 25% inhibition concentration. An estimation of the concentration of sodium chloride that would cause a 25% reduction in *Ceriodaphnia* reproduction for the test population.

CT = Central tendency (mean IC_{25}).

S = Standard deviation of the IC_{25} values.

Laboratory Control and Warning Limits

Laboratory control and warning limits were established using the standard deviation of the IC_{25} values corresponding to the 10th and 25th percentile CVs. These ranges are more stringent than the control and warning limits recommended by USEPA for the test method and endpoint.

$S_{A.10}$ = Standard deviation corresponding to the 10th percentile CV. ($S_{A.10}$ = 0.08)

$S_{A.25}$ = Standard deviation corresponding to the 25th percentile CV. ($S_{A.25}$ = 0.17)

USEPA Control and Warning Limits

$S_{A.75}$ = Standard deviation corresponding to the 75th percentile CV. ($S_{A.75}$ = 0.45)

$S_{A.90}$ = Standard deviation corresponding to the 90th percentile CV. ($S_{A.90}$ = 0.62)

CV = Coefficient of variation of the IC_{25} values.

USEPA. 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination Program. EPA-833-R-00-003. US Environmental Protection Agency, Cincinnati, OH.

Environmental Testing Solutions, Inc.

Precision of Endpoint Measurements

Ceriodaphnia dubia
Sodium Chloride Chronic Reference Toxicant Data using Moderately Hard Synthetic Water

Test number	Test date	Control Survival (%)	Control Mean Reproduction (offspring/female)	CT for Control Mean Reproduction (offspring/female)	CV (%)	CT for Control Reproduction CV (%)	MSD	PMSD (%)	CT for PMSD (%)
1	06-07-05	100	30.4		5.0		2.6	8.5	
2	07-12-05	100	30.4	30.4	7.5	6.2	2.7	8.8	8.7
3	07-12-05	100	31.1	30.6	7.2	6.5	3.2	10.2	9.2
4	08-09-05	100	28.3	30.1	7.3	6.7	2.9	10.3	9.5
5	09-13-05	100	27.9	29.6	7.3	6.8	3.9	13.9	10.3
6	10-04-05	100	27.0	29.2	5.8	6.7	3.0	11.1	10.5
7	11-01-05	100	28.4	29.1	10.3	7.2	3.8	13.2	10.9
8	12-06-05	100	32.6	29.5	6.3	7.1	2.3	7.1	10.4
9	01-10-06	100	29.2	29.5	4.8	6.8	2.3	7.8	10.1
10	02-07-06	100	30.7	29.6	6.0	6.7	2.4	7.9	9.9
11	02-07-06	100	29.9	29.6	6.8	6.7	2.2	7.5	9.7
12	03-07-06	100	28.8	29.6	5.9	6.7	2.6	8.9	9.6
13	04-04-06	100	27.0	29.4	5.2	6.5	2.1	7.6	9.5
14	05-02-06	100	28.6	29.3	8.6	6.7	2.7	9.3	9.4
15	06-06-06	100	30.3	29.4	5.2	6.6	3.0	9.8	9.5
16	07-11-06	100	29.0	29.4	5.4	6.5	2.5	8.6	9.4
17	08-08-06	100	28.6	29.3	8.9	6.7	3.7	12.8	9.6
18	09-12-06	100	30.9	29.4	5.4	6.6	3.3	10.6	9.7
19	10-03-06	100	32.3	29.5	4.6	6.5	3.1	9.5	9.7
20	11-07-06	100	31.0	29.6	6.3	6.5	2.4	7.8	9.6

Note:

CV = Coefficient of variation for control reproduction.
On average, the CV for control reproduction is **6.5%** in Environmental Testing Solutions, Inc. *Ceriodaphnia* chronic toxicity tests.
Lower CV bound determined by USEPA (10th percentile) = 8.9%.
Upper CV bound determined by USEPA (90th percentile) = 42%

MSD = Minimum Significant Difference

PMSD = Percent Minimum Significant Difference
PMSD is a measure of test precision. The PMSD is the minimum percent difference between the control and treatment that can be declared statistically significant in a whole effluent toxicity test. On average, a significant difference occurs for Environmental Testing Solutions, Inc. chronic toxicity tests when a toxicant reduces *Ceriodaphnia* reproduction by **9.6%** from the control.
Lower PMSD bound determined by USEPA (10th percentile) = 11%.
Upper PMSD bound determined by USEPA (90th percentile) = 37%.

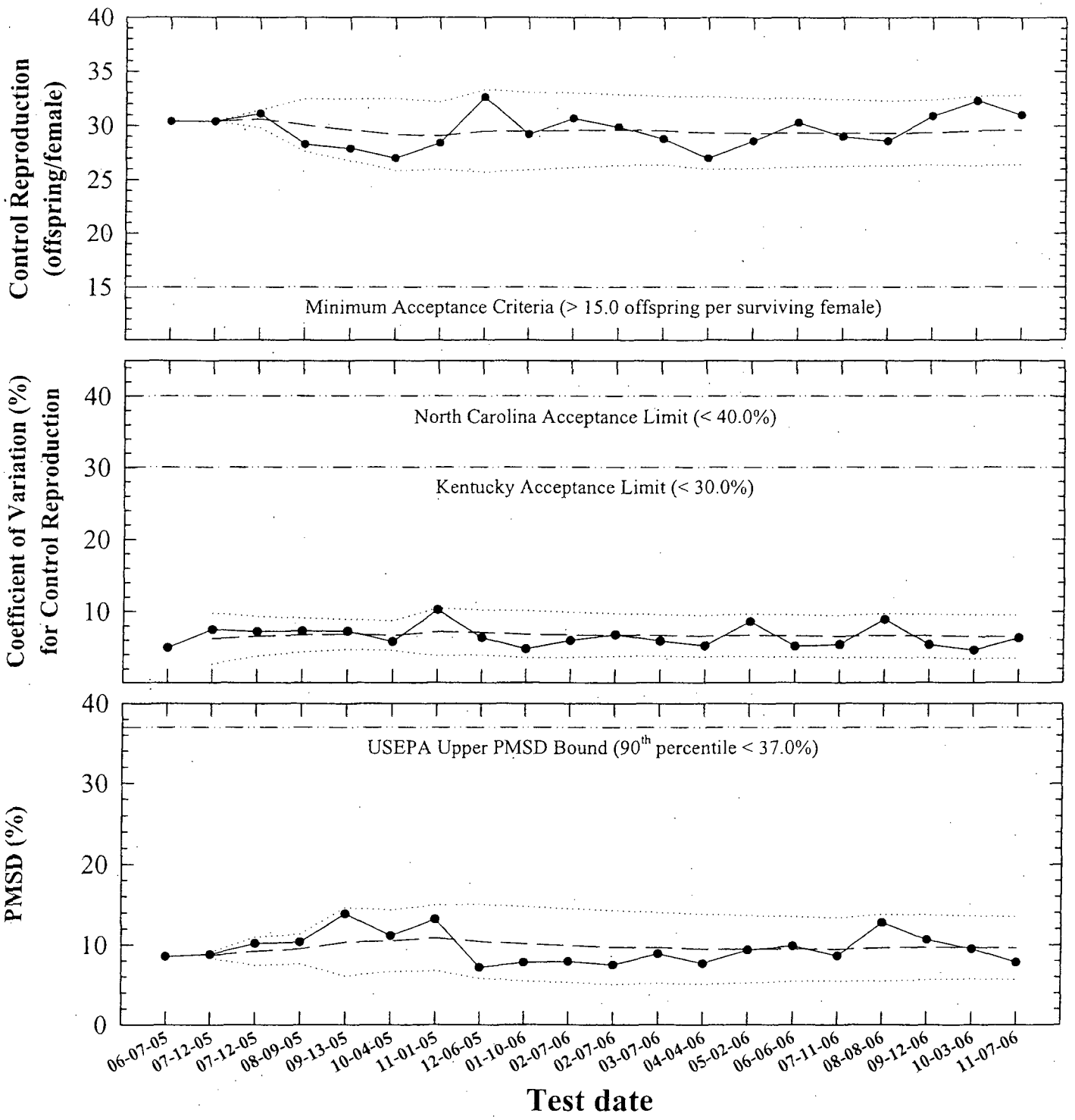
CT = Central Tendancy (Mean Control Reproduction, CV, or PMSD)

The lower and upper bounds were calculated by the USEPA using 393 tests conducted from 33 laboratories for *Ceriodaphnia* reproduction in chronic reference toxicant tests.

USEPA. 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination Program. EPA-833-R-00-003. US Environmental Protection Agency, Cincinnati, OH.

Environmental Testing Solutions, Inc.

Ceriodaphnia dubia Control Reproduction, Coefficient of Variation, and PMSD in Sodium Chloride Chronic Reference Toxicant Tests



—•— **Control Reproduction, Coefficient of Variation (CV), or Percent Minimum Significant Difference (PMSD)** PMSD is the minimum significant difference between the control and treatment that can be declared statistically significant.

— — **Central Tendency** (mean Control Reproduction, CV, or PMSD)

····· **Control Limits** (mean Control Reproduction, CV, or PMSD ± 2 Standard Deviations)

Sodium Chloride Chronic Reference Toxicant Test
(EPA-821-R-02-013 Method 1002.0)
Species: *Ceriodaphnia dubia*

CdNaCLCR #: 55

Dilution preparation information:						*Comments:*
NaCl CHM number:	CHM 120					
Stock preparation:	100 g NaCl/l (dissolve 50 g NaCl in 500 ml deionized water)					
Dilution prep (mg/L)	600	800	1000	1200	1400	
Stock volume (mL)	9	12	15	18	21	
Diluent volume (mL)	1491	1488	1485	1482	1479	
Total volume (mL)	1500	1500	1500	1500	1500	

Test organism information:		*Test information:*	
Organism age:	< 24-hours old	Randomizing template:	ORANGE
Date and times organisms were born between:	11-06-06 1547 TO 2002	Incubator number and shelf location:	2B1
Organism source: 10-31-06A	CWS: 1,2,3,4,5,6,10,14,15,20	YCT batch:	10-07-06
Transfer bowl information:	pH = 7.83 SU Temperature = 24.6°C	*Selenastrum* batch:	10-28-06

Daily renewal information:

Day	Date	Test initiation, renewal, or termination time	MHS water batch used	Analyst
0	11-07-06	1127	10-27-06 B	JH
1	11-08-06	1030	10-27-06 B	JH
2	11-09-06	1120	10-27-06 C	JH
3	11-10-06	1034	10-27-06 C	JH
4	11-11-06	1042	10-27-06 C	JH
5	11-12-06	1033	10-27-06 C	JH
6	11-13-06	~~1103~~ 1203	10-27-06 C	JH
7	11-14-06	1034		JH

Control information:		Acceptance criteria	*Summary of test endpoints:*	
% of Male Adults:	0%	≤ 20%	7-day LC50	>1400
% Adults having 3rd Broods:	100%	≥ 80%	NOEC	1000
% Mortality:	0%	≤ 20%	LOEC	1200
Mean Offspring/Female:	31.0	≥ 15.0 offspring/female	ChV	1095.4
% CV:	6.3%	< 40.0 %	IC25	1064.0

Species: *Ceriodaphnia dubia*

CdNaCLCR #: 55

CONTROL

Survival and Reproduction Data

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	6	5	5	5	4	5	5	4	4	4
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	10	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	13	10	11	12	12	9	13	10	10
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	16	15	15	15	13	17	18	15	14	15
Total young produced		32	33	30	31	29	34	32	32	28	29
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L
X for 3rd Broods		X	X	X	X	X	X	X	X	X	X

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	31.0

600 mg NaCl/L

Survival and Reproduction Data

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	4	5	5	5	5	5	4	6	4	4
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	0	11	0	11	13	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	12	0	10	0	0	13	11	11	10	12
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	16	18	14	15	17	15	15	14	18	14
Total young produced		32	34	29	31	35	33	30	31	32	30
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	31.7
% Reduction from Control:	-2.3%

Species: *Ceriodaphnia dubia*

CdNaCLCR #: 55

800 mg NaCl/L

Survival and Reproduction Data

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	5	5	5	4	5	4	4	4	5	5
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	0	10	11	12	0	12	0	0	11	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	13	0	0	0	10	0	9	10	0	10
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	14	14	17	16	15	15	19	16	17	13
Total young produced		32	29	33	32	30	31	32	30	33	28
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	31.0
% Reduction from Control:	0%

1000 mg NaCl/L

Survival and Reproduction Data

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	6	4	4	4	5	5	4	4	5	4
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	14	10	0	10	11	10	12	12	10	10
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	9	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	14	13	16	15	15	18	15	13	17	14
Total young produced		34	27	29	29	31	33	31	29	32	28
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	30.3
% Reduction from Control:	2.3%

Species: *Ceriodaphnia dubia*

CdNaCLCR #: 55

1200 mg NaCl/L

Survival and Reproduction Data

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	3	2	2	0	2	4	1	1	3	3
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	10	0	2	8	2	12	0	5	5	3
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	6	0	0	0	0	2	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	0	0	6	0	8	0	1	0	0	0
Total young produced		13	8	10	8	12	16	4	6	8	6
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	9.1
% Reduction from Control:	70.6%

1400 mg NaCl/L

Survival and Reproduction Data

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	2	0	0	0	1	0	0	2	2	1
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	5	0	0	0	0	4	3	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	3	0	0	0	0	0	0	2	0
	Adult mortality	L	L	L	D	L	L	L	L	D	L
7	Young produced	0	0	0	↓	0	0	0	0	↓	0
Total young produced		7	3	0	0	1	4	3	2	4	1
Final Adult Mortality		L	L	L	D	L	L	L	L	D	L

Note: Adult mortality (L = live, D = dead)

Concentration:	
% Mortality:	20%
Mean Offspring/Female:	2.5
% Reduction from Control:	91.9%

Environmental Testing Solutions, Inc.

Verification of *Ceriodaphnia* Reproduction Totals

Control

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	6	5	5	5	4	5	5	4	4	4	47
5	10	0	0	0	0	0	0	0	0	0	10
6	0	13	10	11	12	12	9	13	10	10	100
7	16	15	15	15	13	17	18	15	14	15	153
Total	**32**	**33**	**30**	**31**	**29**	**34**	**32**	**32**	**28**	**29**	**310**

1000 mg NaCl/L

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	6	4	4	4	5	5	4	4	5	4	45
5	14	10	0	10	11	10	12	12	10	10	99
6	0	0	9	0	0	0	0	0	0	0	9
7	14	13	16	15	15	18	15	13	17	14	150
Total	**34**	**27**	**29**	**29**	**31**	**33**	**31**	**29**	**32**	**28**	**303**

600 mg NaCl/L

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	4	5	5	5	5	5	4	6	4	4	47
5	0	11	0	11	13	0	0	0	0	0	35
6	12	0	10	0	0	13	11	11	10	12	79
7	16	18	14	15	17	15	15	14	18	14	156
Total	**32**	**34**	**29**	**31**	**35**	**33**	**30**	**31**	**32**	**30**	**317**

1200 mg NaCl/L

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	3	2	2	0	2	4	1	1	3	3	21
5	10	0	2	8	2	12	0	5	5	3	47
6	0	6	0	0	0	0	2	0	0	0	8
7	0	0	6	0	8	0	1	0	0	0	15
Total	**13**	**8**	**10**	**8**	**12**	**16**	**4**	**6**	**8**	**6**	**91**

800 mg NaCl/L

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	5	5	5	4	5	4	4	4	5	5	46
5	0	10	11	12	0	12	0	0	11	0	56
6	13	0	0	0	10	0	9	10	0	10	52
7	14	14	17	16	15	15	19	16	17	13	156
Total	**32**	**29**	**33**	**32**	**30**	**31**	**32**	**30**	**33**	**28**	**310**

1400 mg NaCl/L

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	2	0	0	0	1	0	0	2	2	1	8
5	5	0	0	0	0	4	3	0	0	0	12
6	0	3	0	0	0	0	0	0	2	0	5
7	0	0	0	0	0	0	0	0	0	0	0
Total	**7**	**3**	**0**	**0**	**1**	**4**	**3**	**2**	**4**	**1**	**25**

Environmental Testing Solutions, Inc.

Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013, Method 1002.0)
Species: *Ceriodaphnia dubia*

Quality Control
Verification of Data Entry, Calculations, and Statistical Analyses

Test number: CdNaClCR #84 (#55 at 351 Depot St.)

Test dates: November 07-14, 2006

Reveiwed by: [signature]

Concentration (mg/L NaCl)	Replicate number										Survival (%)	Average reproduction (offspring/female)	Coefficient of variation (%)	Percent reduction from control (%)
	1	2	3	4	5	6	7	8	9	10				
Control	32	33	30	31	29	34	32	32	28	29	100	31.0	6.3	Not applicable
600	32	34	29	31	35	33	30	31	32	30	100	31.7	6.0	-2.3
800	32	29	33	32	30	31	32	30	33	28	100	31.0	5.5	0.0
1000	34	27	29	29	31	33	31	29	32	28	100	30.3	7.5	2.3
1200	13	8	10	8	12	16	4	6	8	6	100	9.1	40.3	70.6
1400	7	3	0	0	1	4	3	2	4	1	80	2.5	86.9	91.9

Dunnett's MSD value: 2.417

PMSD: 7.8

MSD = Minimum Significant Difference

PMSD = Percent Minimum Significant Difference

PMSD is a measure of test precision. The PMSD is the minimum percent difference between the control and treatment that can be declared statistically significant in a whole effluent toxicity test. On average, a significant difference occurs for Environmental Testing Solutions, Inc. chronic toxicity tests when a toxicant reduces *Ceriodaphnia* reproduction by **9.6%** from the control.

Lower PMSD bound determined by USEPA (10th percentile) = 11%.

Upper PMSD bound determined by USEPA (90th percentile) = 37%.

The lower and upper bounds were calculated by the USEPA using 393 tests conducted from 33 laboratories for *Ceriodaphnia* reproduction in chronic reference toxicant tests.

USEPA. 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination Program. EPA-833-R-00-003. US Environmental Protection Agency, Cincinnati, OH.

Environmental Testing Solutions, Inc.

Statistical Analyses

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	11/7/2006	Test ID:	CdNaClCR	Sample ID:	REF-Ref Toxicant
End Date:	11/14/2006	Lab ID:	ETS-Envir. Testing Sol.	Sample Type:	NACL-Sodium chloride
Sample Date:		Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-mg/L	1	2	3	4	5	6	7	8	9	10
D-Control	32.000	33.000	30.000	31.000	29.000	34.000	32.000	32.000	28.000	29.000
600	32.000	34.000	29.000	31.000	35.000	33.000	30.000	31.000	32.000	30.000
800	32.000	29.000	33.000	32.000	30.000	31.000	32.000	30.000	33.000	28.000
1000	34.000	27.000	29.000	29.000	31.000	33.000	31.000	29.000	32.000	28.000
1200	13.000	8.000	10.000	8.000	12.000	16.000	4.000	6.000	8.000	6.000
1400	7.000	3.000	0.000	0.000	1.000	4.000	3.000	2.000	4.000	1.000

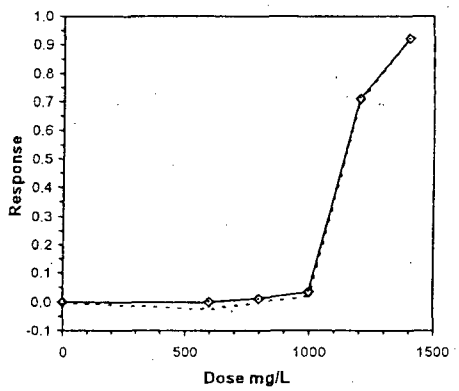
			Transform: Untransformed						1-Tailed		Isotonic	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	31.000	1.0000	31.000	28.000	34.000	6.270	10				31.350	1.0000
600	31.700	1.0226	31.700	29.000	35.000	5.958	10	-0.662	2.287	2.417	31.350	1.0000
800	31.000	1.0000	31.000	28.000	33.000	5.483	10	0.000	2.287	2.417	31.000	0.9888
1000	30.300	0.9774	30.300	27.000	34.000	7.469	10	0.662	2.287	2.417	30.300	0.9665
*1200	9.100	0.2935	9.100	4.000	16.000	40.276	10	20.721	2.287	2.417	9.100	0.2903
*1400	2.500	0.0806	2.500	0.000	7.000	86.923	10	26.966	2.287	2.417	2.500	0.0797

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.81748134	1.035	0.44619717	0.3712335
Bartlett's Test indicates equal variances (p = 0.18)	7.55277777	15.0862722		

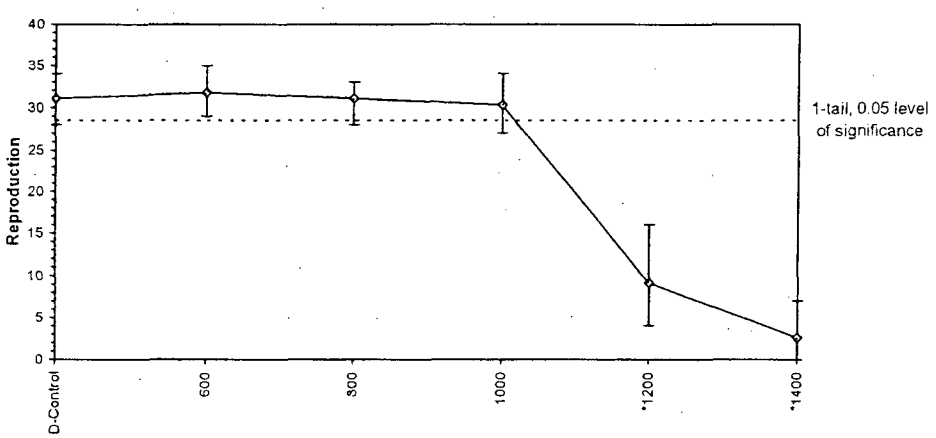
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	1000	1200	1095.44512		2.41677734	0.07796056	1738.96	5.58518519	1.6E-38	5, 54
Treatments vs D-Control										

Linear Interpolation (200 Resamples)

Point	mg/L	SD	95% CL		Skew
IC05	1004.88208	51.0038904	825.635417	1014.14902	-2.5889
IC10	1019.66981	5.96832498	1007.34438	1028.34195	-0.3117
IC15	1034.45755	5.61835965	1023.38686	1043.09093	-0.2720
IC20	1049.24528	5.40692453	1038.23354	1057.91483	-0.2188
IC25	1064.03302	5.35046783	1052.85837	1072.74883	-0.1422
IC40	1108.39623	6.09494531	1095.59506	1118.42537	0.2053
IC50	1137.9717	7.17272292	1123.85682	1151.46069	0.4115



Dose-Response Plot



Species: *Ceriodaphnia dubia*

CdNaCLCR #: 55

Daily Chemistry:

		Day					
		0		1		2	
	Analyst	KEN	KEN	KEN	KEN	KEN	KEN
Concentration	Parameter						
CONTROL	pH (S.U.)	7.82	7.91	7.99	7.86	7.80	7.69
	DO (mg/L)	7.6	7.8	7.8	7.9	7.8	8.0
	Conductivity (µmhos/cm)	312		318		312	
	Alkalinity (mg $CaCO_3$/L)	59				61	
	Hardness (mg $CaCO_3$/L)	84				84	
	Temperature (°C)	24.5	24.9	24.4	25.0	24.7	24.7
600 mg NaCl/L	pH (S.U.)	7.89	7.90	7.97	7.87	7.93	7.72
	DO (mg/L)	7.6	7.8	7.9	7.8	7.8	8.0
	Conductivity (µmhos/cm)	1510		1500		1490	
	Temperature (°C)	24.7	25.2	24.4	24.8	24.6	24.7
800 mg NaCl/L	pH (S.U.)	7.91	7.89	7.96	7.90	7.94	7.72
	DO (mg/L)	7.6	7.9	7.9	7.8	7.8	8.1
	Conductivity (µmhos/cm)	1980		1910		1910	
	Temperature (°C)	24.4	25.3	24.4	24.9	24.7	24.7
1000 mg NaCl/L	pH (S.U.)	7.90	7.89	7.95	7.92	7.94	7.75
	DO (mg/L)	7.7	7.9	7.9	7.9	7.9	8.1
	Conductivity (µmhos/cm)	2360		2300		2360	
	Temperature (°C)	24.6	25.1	24.5	24.9	24.7	24.6
1200 mg NaCl/L	pH (S.U.)	7.91	7.91	7.96	7.96	7.95	7.74
	DO (mg/L)	7.7	7.8	7.9	7.9	7.9	8.2
	Conductivity (µmhos/cm)	2780		2710		2700	
	Temperature (°C)	24.6	25.1	24.6	25.1	24.5	24.7
1400 mg NaCl/L	pH (S.U.)	7.90	7.91	7.93	7.92	7.95	7.73
	DO (mg/L)	7.7	7.8	7.9	7.8	7.9	8.2
	Conductivity (µmhos/cm)	3110		3060		3050	
	Temperature (°C)	24.6	25.0	24.4	25.1	24.6	24.6
STOCK	Conductivity (µmhos/cm)	129000					
		Initial	Final	Initial	Final	Initial	Final

Species: *Ceriodaphnia dubia*

CdNaCLCR #: 55

		Day							
		3		4		5		6	
	Analyst	KEH	KEH	KEH	KEH	KEH	KEH	KEH	KEH
Concentration	Parameter								
CONTROL	pH (S.U.)	7.67	7.74	7.89	7.83	8.11	7.90	7.99	7.89
	DO (mg/L)	7.8	7.6	7.5	7.8	7.8	8.0	8.1	7.7
	Conductivity (µmhos/cm)	301		303		308		312	
	Alkalinity (mg $CaCO_3$/L)								
	Hardness (mg $CaCO_3$/L)								
	Temperature (°C)	24.8	24.7	24.9	24.9	24.8	24.8	24.7	24.9
600 mg NaCl/L	pH (S.U.)	7.76	7.75	7.80	7.82	7.96	7.91	8.00	7.91
	DO (mg/L)	7.9	7.6	7.5	7.8	7.7	8.0	8.2	7.6
	Conductivity (µmhos/cm)	1510		1470		1470		1420	
	Temperature (°C)	24.8	25.1	24.7	25.0	24.6	24.8	24.7	25.2
800 mg NaCl/L	pH (S.U.)	7.79	7.75	7.81	7.84	8.01	7.95	8.07	7.93
	DO (mg/L)	7.9	7.6	7.5	7.9	7.8	8.1	8.2	7.5
	Conductivity (µmhos/cm)	1850		1820		1880		1850	
	Temperature (°C)	24.7	25.1	24.8	25.2	24.7	25.1	24.6	24.9
1000 mg NaCl/L	pH (S.U.)	7.77	7.78	7.79	7.84	8.00	7.95	8.07	7.93
	DO (mg/L)	8.1	7.7	7.5	7.9	7.8	8.1	8.2	7.6
	Conductivity (µmhos/cm)	2240		2250		2300		2320	
	Temperature (°C)	24.8	25.0	24.8	25.0	24.8	24.8	24.8	24.8
1200 mg NaCl/L	pH (S.U.)	7.79	7.75	7.79	7.83	7.99	7.95	8.07	7.93
	DO (mg/L)	8.1	7.7	7.5	7.9	7.8	8.1	8.3	7.7
	Conductivity (µmhos/cm)	2640		2670		2670		2670	
	Temperature (°C)	24.7	24.9	24.6	25.1	24.6	25.0	24.5	24.8
1400 mg NaCl/L	pH (S.U.)	7.79	7.73	7.78	7.84	7.98	7.94	8.07	7.94
	DO (mg/L)	8.1	7.8	7.5	7.9	7.9	8.0	8.3	7.7
	Conductivity (µmhos/cm)	2970		2980		3010		3010	
	Temperature (°C)	24.7	25.0	24.9	24.9	24.7	25.0	24.6	25.1
STOCK	Conductivity (µmhos/cm)	—		127000		—		—	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE SB-2A)
SODDY - DAISY TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY

ATTN: Stephanie A. Howard

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

TN0026450	103 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From	06	11	01	To	06	11	30

MAJOR
(SUBR 01)
F - FINAL
LOW VOL. WASTE TREATMENT POND
EFFLUENT

*** NO DISCHARGE [ ] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	********	********	**	7.1	********	8.2	12	0	14 / 30	GRAB
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	**	6.0 MINIMUM	********	9.0 MAXIMUM	SU		THREE/ WEEK	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	91	105	26	********	8	10	19	0	5 / 30	GRAB
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	380 MO AVG	1250 DAILY MX	LBS/DY	********	30 MO AVG	100 DAILY MX	MG/L		WEEKLY	GRAB
OIL AND GREASE	SAMPLE MEASUREMENT	<59	<68	26	********	<5	<6	19	0	5 / 30	GRAB
00556 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	190 MO AVG	250 DAILY MX	LBS/DY	********	15 MO AVG	20 DAILY MX	MG/L		WEEKLY	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	1.325	1.584	03	********	********	********	**	0	30 / 30	TOTALZ
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	********	********	********	**		SEE PERMIT	TOTALZ
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
J. Randy Douet Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Stephanie A. Howard Principal Environmental Engineer SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-6700	06	12	13
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE SB-2A)
SODDY - DAISY TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY

ATTN: Stephanie A. Howard

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

TN0026450	107 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From	06	11	01	To	06	11	30

MAJOR
(SUBR 01)
F - FINAL
METAL CLEANING WASTE POND
EFFLUENT

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	********	********	**		********		12			
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	6.0 MINIMUM	********	9.0 MAXIMUM	SU		DAILY	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	********	********	**	********	********		19			
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	30 DAILY MX	MG/L		DAILY	COMPOS
OIL AND GREASE	SAMPLE MEASUREMENT	********	********	**	********	********		19			
00556 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	15 DAILY MX	MG/L		DAILY	GRAB
PHOSPHORUS, TOTAL (AS P)	SAMPLE MEASUREMENT	********	********	**	********	********		19			
00665 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	1.0 DAILY MX	MG/L		DAILY	COMPOS
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT	********	********	**	********	********		19			
01042 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	1.0 DAILY MX	MG/L		DAILY	COMPOS
IRON, TOTAL (AS FE)	SAMPLE MEASUREMENT	********	********	**	********	********		19			
01045 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	1.0 DAILY MX	MG/L		DAILY	COMPOS
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			03	********	********	********	**			
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	********	********	********	****		DAILY	CALCTD

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
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TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

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

No Discharge this Period

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE SB-2A)
SODDY - DAISY TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY

ATTN: Stephanie A. Howard

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

TN0026450	110 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From	06	11	01	To	06	11	30

MAJOR
(SUBR 01)
F - FINAL
RECYCLED COOLING WATER
EFFLUENT

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	04	********	********		04			
00010 Z 0 0 INSTREAM MONITORING	PERMIT REQUIREMENT	********	********	DEG C	********	********	38.3 DAILY MX	DEG C		DAILY	GRAB-4
PH	SAMPLE MEASUREMENT	********	********	**		********		12			
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	6.0 MINIMUM	********	9.0 MAXIMUM	SU		WEEKLY	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	********	********	**	********	********		19			
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	30 DAILY MX	MG/L		DAILY	COMPOS
OIL AND GREASE	SAMPLE MEASUREMENT	********	********	**	********	********		19			
00556 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	15 DAILY MX	MG/L		DAILY	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			03	********	********	********	**			
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	********	********	********	****		DAILY	CALCTD
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	********	********	**	********	********		19			
50060 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	0.10 DAILY MX	MG/L		WEEKLY	GRAB-4
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
J. Randy Douet Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Stephanie A. Howard Principal Environmental Engineer	423	843-6700	06	12	13
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

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

No Discharge this Period

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE SB-2A)
SODDY - DAISY TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY

ATTN: Stephanie A. Howard

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

TN0026450	110 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From	06	11	01	To	06	11	30

MAJOR
(SUBR 01)
F - FINAL
RECYCLED COOLING WATER
EFFLUENT

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**		********	********	23			
TRP3B 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	45.2 MINIMUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**		********	********	23			
TRP6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	45.2 MINIMUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
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TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

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

No Discharge this Period

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE SB-2A)
SODDY - DAISY TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY

ATTN: Stephanie A. Howard

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

TN0026450	116 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	06	11	01	To	06	11	30

MAJOR
(SUBR 01)
F - FINAL
BACKWASH
EFFLUENT

*** NO DISCHARGE [ ] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
DEBRIS, FLOATING (SEVERITY)	SAMPLE MEASUREMENT	********	********	**	********	********	0	9A	0	1 / 30	VISUAL
01345 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	REPORT MO TOTAL	PASS=0 FAIL=1		SEE PERMIT	VISUAL
OIL AND GREASE VISUAL	SAMPLE MEASUREMENT	********	0	94	********	********	********	**	0	1 / 30	VISUAL
84066 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	REPORT MO TOTAL	YES=1 NO=0	********	********	********	****		SEE PERMIT	VISUAL
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
J. Randy Douet Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Stephanie A. Howard Principal Environmental Engineer	423	843-6700	06	12	13
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

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

Operations performs visual inspections for floating debris and oil and grease during all backwashes.

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE SB-2A)
SODDY - DAISY TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY

ATTN: Stephanie A. Howard

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

TN0026450	117 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From	06	11	01	To	06	11	30

MAJOR
(SUBR 01)
F - FINAL
BACKWASH
EFFLUENT

*** NO DISCHARGE [ ] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
DEBRIS, FLOATING (SEVERITY)	SAMPLE MEASUREMENT	********	********	**	********	********	0	9A	0	1 / 30	VISUAL
01345 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	REPORT MO TOTAL	PASS=0 FAIL=1		SEE PERMIT	VISUAL
OIL AND GREASE VISUAL	SAMPLE MEASUREMENT	********	0	94	********	********	********	**	0	1 / 30	VISUAL
84066 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	REPORT MO TOTAL	YES=1 NO=0	********	********	********	***		SEE PERMIT	VISUAL
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
J. Randy Douet Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Stephanie A. Howard Principal Environmental Engineer	423	843-6700	06	12	13
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

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

Operations performs visual inspections for floating debris and oil and grease during all backwashes.

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE SB-2A)
SODDY - DAISY TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY

ATTN: Stephanie A. Howard

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

TN0026450	118 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From	06	11	01	To	06	11	30

MAJOR
(SUBR 01)
F - FINAL
WASTEWATER & STORM WATER
EFFLUENT

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
OXYGEN, DISSOLVED (DO)	SAMPLE MEASUREMENT	********	********	**		********	********	19			
00300 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	2.0 DAILY MN	********	********	MG/L		TWICE/ WEEK	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	********	********	**	********	********		19			
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	100 DAILY MX	MG/L		TWICE/ WEEK	GRAB
SOLIDS, SETTLEABLE	SAMPLE MEASUREMENT	********	********	**	********	********		25			
00545 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	****	********	********	1.0 DAILY MX	ML/L		ONCE/ MONTH	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			03	********	********	********	**			
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	********	********	********	*		ONCE/ BATCH	ESTIMA
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
J. Randy Douet Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Stephanie A. Howard Principal Environmental Engineer	423	843-6700	06	12	13
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

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

During this reporting period, there has been no flow from the Dredge Pond other than that resulting from rainfall.