S58 120815 800 - NPDES CORRESPONDENCE

August 15, 2012

Ms. Christina Morgan
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

Dear Ms. Morgan:

TENNESSEE VALLEY AUTHORITY (TVA) - SEQUOYAH NUCLEAR PLANT (SQN) - NPDES PERMIT NO. TN0026450 - DISCHARGE MONITORING REPORT (DMR) FOR JULY 2012

Enclosed is the July 2012 Discharge Monitoring Report for Sequoyah Nuclear Plant. There were no exceedances during the monitoring period. During July, natural conditions caused the 24-hour average ambient river temperature to exceed 29.4°C for 18 days, including 7/29 and 7/30 when the Instream Monitoring temperature measured 30.6°C. The plant continued to operate in helper mode throughout this period and complied with the elevated 1-hour average river temperature limit of 33.9°C at the downstream edge of the mixing zone as required by Part 1.A.1.f of the NPDES permit. If you have any questions or need additional information, please contact Brad Love by email at bmlove@tva.gov or by phone at (423) 843-6714.

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.

Paul R. Simmons

Plant Manager

Signatory Authority for: John T. Carlin Site Vice President

Sequoyah Nuclear Plant

Enclosures

cc (Enclosures):

Chattanooga Environmental Field Office 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, DC 20555

S.D. Booker, MOB 1F-WBN B. E. Brickhouse, BR 4A-C J. T. Carlin, OPS 4A-SQN J. A. Cross, POB 2A-SQN T.R. Markum, BR 4A-C D. B. Nida, BR 4A-C J.W. Proffitt, OPS 4C-SQN
A. A. Ray, WT 11A-K
G. R. Signer, WT 6A-K
P.R. Simmons, POB 2B-SQN
B. N. Smith (EDMS), MPB 1E-M



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

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Sincerel

Paul R. Simmons Plant Manager

Signatory Authority for: John T. Carlin Site Vice President Sequoyah Nuclear Plant

Enclosures cc (Enclosures):

Chattanooga Environmental Field Office 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, DC 20555

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) **MAJOR** DISCHARGE MONITORING REPORT (DMR) TVA - SEQUOYAH NUCLEAR PLANT (SUBR 01) Address P.O. BOX 2000 TN0026450 101 G F - FINAL (INTEROFFICE OPS-5N-SQN) SODDY - DAISY, TN 37384 PERMIT NUMBER DISCHARGE NUMBER **DIFFUSER DISCHARGE** TVA - SEQUOYAH NUCLEAR PLANT Facility **EFFLUENT** MONITORING PERIOD Location HAMILTON COUNTY YEAR MO DAY YEAR MO DAY *** NO DISCHARGE From 12 07 01 To 12 07 31 ATTN: Brad Love

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NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	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 personnely	and de	TEL	EPHONE		DATE	
Paul R. Simmons	properly gather and evaluate the information submitted. Based on my inquiry of the person or						
Company Diggs Manager	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 laise information,	Sequoyah Plant Manager SIGNATURE OF PRINCIPAL EXECUTIVE	423	843-6502	12	08	15
TYPED OR PRINTED	including the possibility of fine and imprisonment for knowing viciations.	OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	МО	DAY

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

No closed mode operation. Veliger monitoring data is included as an attachment. Natural conditions caused the 24-hour average ambient river temperature to exceed 29.4°C for 18 days, including 7/29 and 7/30 when the Instream Monitoring temperature measured 30.6°C. The plant continued to operate in helper mode throughout this period as required by Part 1.A.1.f of the NPDES permit.

Form Approved

OMB No. 2040-0004

	Mean # of Water			Mean# of	Water	···	NOTES: %	
Sample Date	ZM/m3	% Settlers	Temp. (*C)	Sample Date	Asiatic Clams/m3	Temp. (°C)	LOCATION SUB LOCATION	Gravid Asiatic COLLECTED BY Clam
01/03/2012	14	100	26	01/03/2012	0	26	1-25-545	PKS
01/10/2012	0	0	9	01/10/2011	0	9	RCW	WBE
01/17/2011	0	0	10	01/17/2011	0	10	1-ISV-24-1234	PB
01/24/2012	0	0	13	01/24/2012	0	13	1-25-545	WDT
01/31/2012	0	0	17.6	01/31/2012	0	17.6	1-25-545	CR
02/07/2012	0	0	12	02/07/2012	0	12	1-25-545	BB
02/14/2012	0	0	8.3	02/14/2012	0	8.3	1-24-1234	WE
02/21/2012	0	0	26.5	02/21/2012	0	26.5	1-25-545	CR
02/28/2012	0	0	11.1	02/28/2011	0	11.1	1-ISV-24-1234	WBE
03/06/2012	0	0	11.7	03/06/2012	0	11.7	1-ISV-24-1234	WBE
03/13/2012	0	0	13	03/13/2012	0	13	1-ISV-24-1234	WBE
03/20/2012	0	0	14.6	03/20/2012	0	14.6	1-ISV-24-1234	WBE
03/27/2012	1623	1.3	17.2	03/27/2012	0	17.2	1-ISV-24-1234	WBE
04/03/2012	229	0	18	04/03/2012	0	18	1-ISV-24-1234	PB
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PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) Name TVA - SEQUOYAH NUCLEAR PLANT Address P.O. BOX 2000		Different)	NATIONAL F	POLLUTANT DISCH DISCHARGE M	(SUBR 01) OMB No. 2040				d. J-0004				
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COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

Toxicity was not sampled in July 2012.

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) Name TVA - SEQUOYAH NUCLEAR PLANT Address P.O. BOX 2000			NATIONAL POLLI DIS	UTANT DISCHA	(SUBR 01) Form Approv							
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COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

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PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) Name TVA - SEQUOYAH NUCLEAR PLANT					ARGE ELIMINATION SY	,,	" INAJOR COM Approved,					
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NAME/TITLE PRINCIPAL EXECUTIVE OFFICER 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 TELEPHONE DATE 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 Paul R. Simmons Sequoyan Plant Manager 423 843-6502 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, 12 80 15 Sequoyah Plant Manager SIGNATURE OF PRINCIPAL EXECUTIVE including the possibility of fine and imprisonment for knowing violations. OFFICER OR AUTHORIZED AGENT AREA CODE NUMBER MO YEAR DAY TYPED OR PRINTED

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

No Discharge this Period

PERMIT REQUIREMENT

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) Name TVA - SEQUOYAH NUCLEAR PLANT Address P.O. BOX 2000					IARGE ELIMINATION S ONITORING REPOR	(SUBR 01) Form Approved OMB No. 2040					
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Paul R. Simmons	properly gather persons who ma	and evaluate the information and evaluate the system, or the	rith a system designed to ation submitted. Based on se persons directly respo , to the best of my knowle	my inquiry of the mail in the	he person or ering the	Sequoyah Pla	ant Manager	423 84	13-6502	12	08 15
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COMMENTS AND EXPLANATION OF A No Discharge this Period	NY VIOLATIONS (Refer	rence all attachments	here)					CODE			
EPA Form 3320-1 (REV 3/99)	Previous editions may be	used					<u> </u>		i	Page 1 of	

PERMITTEE NAME/ADDRESS (Include Name TVA - SEQUOYAH NUCLI Address P.O. BOX 2000	EAR PLANT	Different) 	DIS	CHARGE MO	ARGE ELIMINATION SY PNITORING REPORT	(DMR)	MAJOR (SUBR 01) F - FINAL		Fe	orm Approved MB No. 2040-	0004
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SODDY - DAISY, TN 37384 Facility TVA - SEQUOYAH NUCLEAR	PLANT	_	L PERMI	T NUMBER	DISCHAR	GE NUMBER	WASTEWATER & ST	IORM WA	IER		
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PARAMETER		QUAN	TITY OR LOADING			QUALITY OR CO	NCENTRATION		NO. EX	FREQUENCY OF	SAMPLE TYPE
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OXYGEN, DISSOLVED (DO)	SAMPLE MEASUREMENT	*****	*****	**		*****	杂杂杂杂杂杂杂	19			
00300 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT			****	2 MINIMUM	******	*****	MG/L		TWICE/	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	******	****	**	*****	******		19			
00530 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	******	******	***		******	100 DAILY MX	MG/L		TWICE/ WEEK	GRAB
SOLIDS, SETTLEABLE	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		25	1300,4.00		
00545 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*******	******	***	******	*******	1 DAILY MX	ML/L		ONCE/ MONTH	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			03	*****	*****	*****	**			The state of the s
 50050 1 0	PERMIT	Dog Mon	Pog Mon	MGD	*****	Annanan	******	*	30013	CONCE/	ESTIMA

Paul R. Simmons

Paul R. Simmons

Sequoyah Plant Manager

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 property 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.

Signat

MO AVG

DAILY MX

Sequoyah Plant Manager 423 843-6502 12 08 15
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.

EFFLUENT GROSS

REQUIREMENT

SAMPLE
MEASUREMENT
PERMIT
REQUIREMENT
SAMPLE
MEASUREMENT
PERMIT
REQUIREMENT
SAMPLE
MEASUREMENT
PERMIT
PERMIT
REQUIREMENT
PERMIT
REQUIREMENT

BATCH

REVIEW/CONCURRENCE SHEET

DOCUMENT NAME: <u>SEQUOYAH NUCLEAR PLANT – July 2012 DMR</u>

ORGANIZATION: Environmental

DOCUMENT PREPARED BY: Brad Love

DATE: <u>8/03/2012</u>

CONCURRENCES								
Name	R V	C N	Signature - Comment	Date				
B.M. Love	Х		40/0	8/3/12				
L.M. Koby	Х		779	8/13/12				
J.A. Cross		X	Aure Wows	8/13/12				

<u>INSTRUCTIONS</u>: Originator will determine the review/concurrence assignment.

REVIEW:

Examine technical content and commitments made. A review (RV) should confirm the truth and accuracy of factual statements and indicate agreement with commitments made which are applicable to the

reviewer's organization.

CONCURRENCE: Indication of agreement with the document as a whole.

Concurrence (CN) signifies that the document is responsive to the intended purpose, logical in construction, and clear in meaning in the eyes of the recipient. A concurrence signature indicates that the individual

would be willing to sign the document for the agency.

S58 120910 800 - NPDES CORRESPONDENCE

September 10, 2012

Ms. Christina Morgan
Tennessee Department of Environment
and Conservation
Division of Water Pollution Control
Enforcement & Compliance Section
6th Floor, L & C Annex
401 Church Street
Nashville, Tennessee 37219

Dear Ms. Morgan:

TENNESSEE VALLEY AUTHORITY (TVA) - SEQUOYAH NUCLEAR PLANT (SQN) - NPDES PERMIT NO. TN0026450 - DISCHARGE MONITORING REPORT (DMR) FOR AUGUST 2012

Enclosed is the August 2012 Discharge Monitoring Report for Sequoyah Nuclear Plant. There were no exceedances during the monitoring period. If you have any questions or need additional information, please contact Brad Love by email at bmlove@tva.gov or by phone at (423) 843-6714.

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.

Sincerely,

Site Vice President Sequevah Nuclear Plant

Enclosures

cc (Enclosures):

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

S.D. Booker, MOB 1F-WBN B. E. Brickhouse, BR 4A-C J. T. Carlin, OPS 4A-SQN J. A. Cross, POB 2A-SQN T.R. Markum, BR 4A-C D. B. Nida, BR 4A-C U.S. Nuclear Regulatory Commission Attn: Document Control Desk Washington, DC 20555

J.W. Proffitt, OPS 4C-SQN
A. A. Ray, WT 11A-K
G. R. Signer, WT 6A-K
P.R. Simmons, POB 2B-SQN
B. N. Smith (EDMS), MPB 1E-M



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

September 10, 2012

Ms. Christina Morgan
Tennessee Department of Environment
and Conservation
Division of Water Pollution Control
Enforcement & Compliance Section
6th Floor, L & C Annex
401 Church Street
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Simoere

Site Vice President

Sequoyah Nuclear Plant

Enclosures cc (Enclosures):

Chattanooga Environmental Field Office 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, DC 20555

REVIEW/CONCURRENCE SHEET

DOCUMENT NAME: <u>SEQUOYAH NUCLEAR PLANT – August 2012 DMR</u>

ORGANIZATION: Environmental

DOCUMENT PREPARED BY: Brad Love

DATE: 9/06/2012

CONCURRENCES								
Name	R V	CN	Signature - Comment	Date				
B.M. Love	Х		600	9/7/12				
L.M. Koby	Х		A	9/9/12				
J.A. Cross		X	Tanekticoes	9/10/12				

<u>INSTRUCTIONS</u>: Originator will determine the review/concurrence assignment.

REVIEW:

Examine technical content and commitments made. A

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Indication of agreement with the document as a whole.

Concurrence (CN) signifies that the document is responsive to the intended purpose, logical in construction, and clear in meaning in the eyes of the recipient. A concurrence signature indicates that the individual

would be willing to sign the document for the agency.

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) TVA - SEQUOYAH NUCLEAR PLANT Address P.O. BOX 2000 (INTEROFFICE OPS-5N-SQN) SODDY - DAISY, TN 37384 TVA - SEQUOYAH NUCLEAR PLANT Facility

Location HAMILTON COUNTY

ATTN: Brad Love

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

MAJOR (SUBR 01)

Form Approved. OMB No. 2040-0004

TN0026450 PERMIT NUMBER

101 G DISCHARGE NUMBER F - FINAL **DIFFUSER DISCHARGE**

EFFLUENT

MONITORING PERIOD YEAR MO YEAR MO DAY DAY From 12 80 01 То 12 80 31

*** NO DISCHARGE

NOTE: Read instructions before completing this form.

PARAMETER		QUA	NTITY OR LOADING			QUALITY OR CON	CENTRATION			FREQUENCY	Y SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS	1	ANALYSIS	
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	******	*****	42.4	04	0	31 / 31	RCORDR
00010 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	***	*****	*****	Req. Mon. DAILY MAX	DEG. C.		CONTI NUOUS	CALCTD
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	******	*****	**	******	******	30.4	04	0	31 / 31	MODELD
00010 Z 0 INSTREAM MONITORING	PERMIT REQUIREMENT	*****	*****	***	*****	*****	30.5 DAILY MX	DEG. C.		CONTI NUOUS	CALCTD
TEMP. DIFF. BETWEEN SAMP. & UPSTRM DEG.C	SAMPLE MEASUREMENT	******	*****	**	*****	******	2	04	0	31 / 31	CALCTD
00016 1 S EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	****.	*****	******	3 DAILY MX	DEG. C.		CONTI	CALCTD
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	*****	1770	03	******	******	*****	**	0	31 / 31	RCORDR
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	Req. Mon. DAILY MAX	MGD	*****	*****	*****	****		CONTI	RCORDR
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	*****	*****	**	******	0.019	0.045	. 19	0	25 / 31	GRAB
50060 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	******	*****	***	*****	0.1 MO AVG	0.1 DAILY MAX	MG/L		FIVE PER WEEK	CALCTD
TEMPERATURE - C, RATE OF CHANGE	SAMPLE MEASUREMENT	******	0	62	******	******		**	0	31 / 31	CALCTD
82234 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	******	2 DAILY MX	DEG C/HR	******	******	*****	****		CONTI NUOUS	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

I Certify under penalty of law that this document and all attachment
direction or supervision in accordance with a system designed to a properly gather and evaluate the information submitted. Based on r
persons who manage the system, or those persons directly respons
information, the information submitted is, to the best of my knowled

TYPED OR PRINTED

ts were prepared under my ssure that qualified personne my inquiry of the person or sible for gathering the dge 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.

TELEPHONE DATE districtly Site Vice President 423 843-7001 09 10 12 SIGNATURE OF PRINCIPAL EXECUTIVE AREA CODE OFFICER OR AUTHORIZED AGENT NUMBER MO YEAR DAY

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

No closed mode operation. Veliger monitoring data is included as an attachment. The following injections occurred: 1. Floguard MS6236 (max. calc. conc. was 0.032mg/L--limit 0.2mg/L) 2. Biodetergent 73551 (max. calc. conc. was 0.029mg/L--limit 2.0mg/L) 3. Spectrus CT1300 (max. calc. conc. was 0.037mg/L--limit 0.050mg/L)

	Maan # of		Motor		Mean# of	10/-4	· · · · · · · · · · · · · · · · · · ·	NOTES: %	
Sample Date	Mean # of ZM/m3	% Settlers	Water Temp. (°C)	Sample Date	Asiatic Clams/m3	Water Temp. (°C)	LOCATION SUB LOCA	TION Gravid Asiatic Clam	COLLECTED BY
01/03/2012	14	100	26	01/03/2012	0	26	1-25-5	45	PKS
01/10/2012	0	0	9	01/10/2011	0	9	RCW		WBE
01/17/2011	0	0	10	01/17/2011	0	10	1-ISV-24-	1234	PB
01/24/2012	0	0	13	01/24/2012	0	13	1-25-5	45	WDT
01/31/2012	0	0	17.6	01/31/2012	0	17.6	1-25-5	45	CR
02/07/2012	0	0	12	02/07/2012	0	12	1-25-5	45	BB
02/14/2012	0	0	8.3	02/14/2012	0	8.3	1-24-12	234	WE
02/21/2012	0	0	26.5	02/21/2012	0	26.5	1-25-5	45	CR
02/28/2012	0	0	11.1	02/28/2011	0	11.1	1-ISV-24	1234	WBE
03/06/2012	0	0	11.7	03/06/2012	0	11.7	1-ISV-24	1234	WBE
03/13/2012	0	0	13	03/13/2012	0	13	1-ISV-24	1234	WBE
03/20/2012	0	0	14.6	03/20/2012	0	14.6	1-ISV-24	1234	WBE
03/27/2012	1623	1.3	17.2	03/27/2012	0	17.2	1-ISV-24	1234	WBE
04/03/2012	229	0	18	04/03/2012	0	· 18	1-ISV-24	1234	PB
04/10/2012	79	20	22	04/10/2012	0	22	1-ISV-24	1234	PB
04/18/2012	326	5	18.8	04/18/2012	0	18.8	1-ISV-24	1234	MJW
May 2012									No Samples Collected
June 2012									No Samples Collected
July 2012									No Samples Collected
August 2012									No Samples Collected

Name IVA - SEQUOTAH NUCLEAR	TVA - SEQUOYAH NUCLEAR PLANT		DISCHARGE MONITORING REP			(SUBR 01)			OMB No. 2040-0004			
Address P.O. BOX 2000			TNI	0026450		101 T	F - FINAL					
(INTEROFFICE OPS-5N-SQN) SODDY - DAISY, TN 37384					BIOGLIAE							
Facility TVA - SEQUOYAH NUCLEAR PLA			PERM	IIT NUMBER	DISCHAF	RGE NUMBER	BIOMONITORING	FOR OUTF	ALL 101			
Location HAMILTON COUNTY		_		MONI	TORING PERIOD)	EFFLUENT					
			YEAR	MO DAY	YEAR	MO DAY	*** NO DISCHA	PCE	***			
ATTN: Brad Love			From 12	08 01	To 12	08 31						
DADAMETER							NOTE: Read in	structions beto				 -
PARAMETER		QUAN	NTITY OR LOADING			QUALITY OR C	ONCENTRATION		NO.	FREQUENC' OF	1	MPLE YPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS	= -^	ANALYSIS	"	IPE
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	******	******	**	Other	******	******	23				
TRP3B 1 0	PERMIT	*****	******	****	43.2	*****	*****	PERCENT	.	SEMI	COM	MPOS
EFFLUENT GROSS	REQUIREMENT				MINIMUM					ANNUAL		
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	******	******	**	Other	******	******	23				
TRP6C 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	******	****	43.2 MIMINUM	******	******	PERCENT		SEMI ANNUAL	1	MPOS
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											
	SAMPLE MEASUREMENT							-				
	PERMIT REQUIREMENT											
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											
NAME/TITLE PRINCIPAL EXECUTIVE OFFIC	CER Certify under pen		cument and all attachme			M		TELEPI	HONE		DATE	
John T. Carlin	properly gather and	d evaluate the informa	th a system designed to tion submitted. Based or	n my inquiry of the	person or	V/M/	le.			1		
Sequoyah Site Vice President	persons who mana information, the inf and complete. I arr	ige the system, or thos ormation submitted is a aware that there are	se persons directly respo , to the best of my knowl significant penalties for s	nsible for gatherion edge and belief, to submitting false in	ng the rue, accurate,	SATURE OF PRIN	Ace President	423 8	43-7001	12	09	10
TYPED OR PRINTED	including the possi	bility of fine and impris	sonment for knowing viol	ations.	6	DEFICER OR AUT	HORIZED AGENT	AREA N	UMBER	YEAR	МО	DAY

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

MAJOR

EPA Form 3320-1 (REV 3/99)

Previous editions may be used

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

TVA - SEQUOYAH NUCLEAR PLANT

Page 1 of 1

Form Approved.

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)	NATIONAL POLLUTANT DISCHARGE EI	,,	MAJOR Form Approved.	
Name TVA - SEQUOYAH NUCLEAR PLANT	DISCHARGE MONITORI	ING REPORT (DMR)	(SUBR 01) OMB No. 2040-000)4
Address P.O. BOX 2000	T110000450	400.0	(/	
(INTEROFFICE OPS-5N-SQN)	TN0026450	103 G	F - FINAL	
SODDY - DAISY, TN 37384	PERMIT NUMBER	DISCHARGE NUMBER	LOW VOL. WASTE TREATMENT POND	
Facility TVA - SEQUOYAH NUCLEAR PLANT				
Location HAMILTON COUNTY	MONITORIN	IG PERIOD	EFFLUENT	
	YEAR MO DAY	YEAR MO DAY	*** NO DISCHARGE ***	
ATTN: Brad Love	From 12 08 01 7	To 12 08 31	NO DISCHARGE	
			NOTE: Read instructions before completing this form.	

					, . 		NOTE: Read instru	actions befor	NO.		
PARAMETER		QUAN	ITITY OR LOADING			QUALITY OR CONCENTRATION				FREQUENCY OF	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS		ANALYSIS	}
PH	SAMPLE MEASUREMENT	*****	*****	**	7	******	8	12	0	14/31	GRAB
00400 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	*****	**	6 MINIMUM	******	9 MAXIMUM	SU		THREE/ WEEK	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*****	*****	**	******	7	9	19	0	2/31	GRAB
00530 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	*****	**	******	30 MO AVG	100 DAILY MX	MG/L		TWICE/ MONTH	GRAB
OIL AND GREASE	SAMPLE MEASUREMENT	*****	******	**	*****	<5	<6	19	0	2/31	GRAB
00556 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	*****	**	*****	15 MO AVG	20 DAILY MX	MG/L		TWICE/ MONTH	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	1.073	1.165	03	*****	******	*****	**	0	31 / 31	RCORDE
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	Req. Mon. MO AVG	Req. Mon DAILY MX	MGD	*****	******	******	**		SEE PERMIT	RCORDE
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

		KAI	TE	LEPHONE		DATE	
John T. Carlin	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	Secret Site Vice President					
Sequoyah Site Vice President	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,	SIGNATURE OF PRINCIPAL EXECUTIVE	423	843-7001	12	09	10
TYPED OR PRINTED	including the possibility of fine and imprisonment for knowing violations.	OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	МО	DAY
COMMENTS AND EXPLANATION OF ANYLYIOLAS	TIONS (Defended to the text)	= :					

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

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) **MAJOR** TVA - SEQUOYAH NUCLEAR PLANT DISCHARGE MONITORING REPORT (DMR) Name (SUBR 01) Address P.O. BOX 2000 TN0026450 110 G F - FINAL (INTEROFFICE OPS-5N-SQN) SODDY - DAISY, TN 37384 PERMIT NUMBER DISCHARGE NUMBER **RECYCLED COOLING WATER** TVA - SEQUOYAH NUCLEAR PLANT Facility **EFFLUENT** MONITORING PERIOD Location HAMILTON COUNTY YEAR MO DAY YEAR MO DAY *** NO DISCHARGE From 12 80 01 To 80 12 31 ATTN: Brad Love

PARAMETER		OUA	NTITY OR LOADING			QUALITY OR CONC	NOTE: Read instr			FREQUENCY	
PARAMETER		QUA	NITIT OR LOADING			QUALITY OR CONC	ENIKATION		EX	OF	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS		ANALYSIS	
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	*****	******		04			
00010 1 0	PERMIT	*****	******	**	******	******	REPORT	DEG C		CONTIN	CALCTD
EFFLUENT GROSS VALUE	REQUIREMENT		1			·	DAILY MX			UOUS	
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		04			
00010 Z 0	PERMIT	******	*****	**	******	*****	30.5	DEG C		CONTIN	CALCTD
INSTREAM MONITORING	REQUIREMENT						DAILY MX			UOUS	
TEMP. DIFF. BETWEEN SAMP. & UPSTRM DEG.C	SAMPLE MEASUREMENT	******	*****	**	******	******		04			
00016 1 0	PERMIT	******	*****	**	*****	******	5	DEG C		CONTIN	CALCTD
EFFLUENT GROSS VALUE	REQUIREMENT						DAILY MX			UOUS	
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	******		03	*****	*****	******	**			
50050 1 0	PERMIT	*****	Req. Mon.	MGD	******	******	******	**		CONTIN	RCORDR
EFFLUENT GROSS VALUE	REQUIREMENT		DAILY MX							UOUS	
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	******	******	**	******			19			
50060 1 0	PERMIT	******	*****	**	*****	0.1	0.1	MG/L		Five per	CALCTD
EFFLUENT GROSS VALUE	REQUIREMENT					MO AVG	DAILY MX			Week	
TEMPERATURE - C, RATE OF CHANGE	SAMPLE MEASUREMENT	******		04	*****	*****	*****	**			
82234 1 0	PERMIT	*****	2	DEG C	*****	*****	******	**		CONTIN	CALCTD
EFFLUENT GROSS VALUE	REQUIREMENT		DAILY MX						<u> </u>	UOUS	_
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER | Certify under penalty of law that this document and all attachments were prepared under my **TELEPHONE** DATE direction or supervision in accordance with a system designed to assure that qualified personne John T. Carlin 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 gethering the Many Site Vice President information, the information submitted is , to the best of my knowledge and belief, true, accurate, 423 843-7001 12 09 10 Sequoyah Site Vice President and complete. I am aware that there are significant penalties for submitting false information, SIGNATURE OF PRINCIPAL EXECUTIVE including the possibility of fine and imprisonment for knowing violations. OFFICER OR AUTHORIZED AGENT AREA NUMBER YEAR MO DAY TYPED OR PRINTED CODE

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

No Discharge this Period

Form Approved.

XX

OMB No. 2040-0004

PERMITTEE NAME/ADDRESS (Include Name TVA - SEQUOYAH NUC		Different)			GE ELIMINATION S TORING REPOR		MAJOR (SUBR 01)			orm Approved MB No. 2040-	
Address P.O. BOX 2000 (INTEROFFICE OPS-5N-S0 SODDY - DAISY, TN 37384		· 		0026450 IT NUMBER	DISCHAF	110 T	F - FINAL RECYCLED COOLII	NG WATER			
Facility TVA - SEQUOYAH NUCLE Location HAMILTON COUNTY ATTN: Brad Love	AR PLANT	<u> </u>	YEAR 12		PERIOD YEAR TO 12		*** NO DISCHAR	GE M	*** compl	eting this form	•
PARAMETER		QUAN AVERAGE	MAXIMUM	UNITS	MINIMUM	QUALITY OR CO	DNCENTRATION	UNITS	NO. EX	FREQUENCY OF ANALYSIS	
ICAS ATATRE TRAVALIR	CAMPLE		****	1		*****					$\overline{}$

PARAMETER		QUAN	ITITY OR LOADING			QUALITY OR CONC	ENTRATION	-	NO. EX	FREQUENCY	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS		ANALYSIS	
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	*****	*****	**		*****	******	23			
TRP3B 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	******	****	43.2 MINIMUM	*****	*****	PERCENT		SEMI ANNUAL	COMPOS
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	******	*****	**		*****	******	23			
TRP6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	******	****	43.2 MINIMUM	*****	*****	PERCENT		SEMI ANNUAL	COMPOS
	SAMPLE MEASUREMENT										1
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
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	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT	-									
	PERMIT REQUIREMENT										

	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	(N)A	TE	LEPHONE		DATE	
John T. Carlin	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	Sagueta Sito Vice President	400	040 7004	4.0		
Sequoyan Site vice President	information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	SIGNATURE OF PRINCIPAL EXECUTIVE	423	843-7001	12	09	10
TYPED OR PRINTED	inclouing the possibility of line and imprisonment for knowing violations.	OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	МО	DAY

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

No Discharge this Period

<u>Name</u>	TVA - SEQUOYAH NUCLEAR PLANT
<u>Address</u>	P.O. BOX 2000
	(INTEROFFICE OPS-5N-SQN)
	SODDY - DAISY, TN 37384
Facility	TVA - SEQUOYAH NUCLEAR PLANT
Location	HAMILTON COUNTY

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

MAJOR (SUBR 01) Form Approved.

OMB No. 2040-0004

TN0026450 PERMIT NUMBER

118 G DISCHARGE NUMBER F - FINAL WASTEWATER & STORM WATER

EFFLUENT

*** NO DISCHARGE XX ***

NOTE: Read instructions before completing this form. **PARAMETER** QUANTITY OR LOADING QUALITY OR CONCENTRATION FREQUENCY NO. SAMPLE EX TYPE **ANALYSIS AVERAGE** MAXIMUM UNITS MINIMUM **AVERAGE** MAXIMUM UNITS SAMPLE ****** ***** OXYGEN, DISSOLVED (DO) ***** ***** 19 **MEASUREMENT** PERMIT **** ***** ***** ***** ***** TWICE/ GRAB 00300 1 0 2 MG/L REQUIREMENT EFFLUENT GROSS WEEK MINIMUM SAMPLE ***** ***** ****** SOLIDS, TOTAL SUSPENDED 19 **MEASUREMENT** **** ****** ***** TWICE/ PERMIT ***** ***** MG/L GRAB 00530 1 0 100 REQUIREMENT WEEK EFFLUENT GROSS **DAILY MX** ***** ***** ****** SAMPLE ****** SOLIDS, SETTLEABLE 25 **MEASUREMENT** PERMIT ***** ***** **** ***** ***** ML/L ONCE/ GRAB 00545 1 0 REQUIREMENT MONTH EFFLUENT GROSS **DAILY MX** SAMPLE ****** ****** ***** FLOW, IN CONDUIT OR THRU 03 **MEASUREMENT** TREATMENT PLANT 50050 1 PERMIT MGD ***** ****** ****** ONCE/ **ESTIMA** Reg. Mon. Rea. Mon. REQUIREMENT **BATCH** EFFLUENT GROSS **MO AVG DAILY MX** SAMPLE MEASUREMENT PERMIT REQUIREMENT SAMPLE MEASUREMENT PERMIT REQUIREMENT SAMPLE MEASUREMENT PERMIT REQUIREMENT

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	
	direction properly of persons v
Sequoyah Site Vice President	information

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.

TELEPHONE DATE Sequeyar Site Vice President 423 843-7001 12 09 10 SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT AREA NUMBER MO YEAR DAY CODE

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.

S58 121010 800 - NPDES CORRESPONDENCE

October 10, 2012

Ms. Christina Morgan
Tennessee Department of Environment
and Conservation
Division of Water Pollution Control
Enforcement & Compliance Section
6th Floor, L & C Annex
401 Church Street
Nashville, Tennessee 37219

Dear Ms. Morgan:

TENNESSEE VALLEY AUTHORITY (TVA) - SEQUOYAH NUCLEAR PLANT (SQN) - NPDES PERMIT NO. TN0026450 - DISCHARGE MONITORING REPORT (DMR) FOR SEPTEMBER 2012 AND REVISED DMR FOR AUGUST 2012

Enclosed is the September 2012 Discharge Monitoring Report for Sequoyah Nuclear Plant. The toxicity report and revision to Discharge Number 101T, Biomonitoring for Outfall 101 for August 2012, are also attached. There were no exceedances during the monitoring period. If you have any questions or need additional information, please contact Brad Love by email at bmlove@tva.gov or by phone at (423) 843-6714.

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.

Site Vice President Sequeyah Nuclear Plant

Enclosures

cc (Enclosures):

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

S.D. Booker, MOB 1F-WBN B. E. Brickhouse, BR 4A-C J. T. Carlin, OPS 4A-SQN J. A. Cross, POB 2A-SQN T.R. Markum, BR 4A-C D. B. Nida, BR 4A-C U.S. Nuclear Regulatory Commission Attn: Document Control Desk Washington, DC 20555

J.W. Proffitt, OPS 4C-SQN A. A. Ray, WT 11A-K G. R. Signer, WT 6A-K P.R. Simmons, POB 2B-SQN B. N. Smith (EDMS), MPB 1E-M



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

October 10, 2012

Ms. Christina Morgan
Tennessee Department of Environment
and Conservation
Division of Water Pollution Control
Enforcement & Compliance Section
6th Floor, L & C Annex
401 Church Street
Nashville, Tennessee 37219

Dear Ms. Morgan:

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Site Vice President Sequoyah Nuclear Plant

Enclosures

cc (Enclosures):

Chattanooga Environmental Field Office 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, DC 20555

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) Name TVA - SEQUOYAH NUCLEAR PLANT	NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPL DISCHARGE MONITORING REPORT (DMR)	MAJOR (SUBR 01)
Address P.O. BOX 2000 (INTEROFFICE OPS-5N-SQN)	TN0026450 101 G	F - FINAL
SODDY - DAISY, TN 37384	PERMIT NUMBER DISCHARGE NUMB	ER DIFFUSER DISCHA
Facility TVA - SEQUOYAH NUCLEAR PLANT Location HAMILTON COUNTY	MONITORING PERIOD	EFFLUENT
	From 12 09 01 To 12 09 3	NO DISCHAR
ATTN: Brad Love	From 12 09 01 To 12 09 3	NOTE: Read inst

Form Approved. OMB No. 2040-0004

ARGE

RGE

									ructions before completing this for			
PARAMETER		QUA	NTITY OR LOADING			QUALITY OR CONC	ENTRATION		NO. EX	FREQUENCY OF	SAMPLE	
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS		ANALYSIS		
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	****	*****	**	*****	*****	41.3	04	0	30 / 30	RCORDR	
00010 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	******	***	*****	*******	Reg. Mon.	DEG. C.		CONTI	CALCTD	
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	******	*****	29.1	04	0	30 / 30	MODELD	
00010 Z 0 INSTREAM MONITORING	PERMIT REQUIREMENT	*****	******	****	*****	******	30.5 DAILY MX	DEG. C.		CONTI	CALCTD	
TEMP. DIFF. BETWEEN SAMP. & UPSTRM DEG.C	SAMPLE MEASUREMENT	****	*****	**	*****	*****	3	04	0	30 / 30	CALCTD	
00016 1 S EFFLUENT GROSS	PERMIT REQUIREMENT	******	*****	****	*****	******	3 DAILY MX	DEG. C.		CONTI	CALCTD	
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	*****	1761	03	******	*****	*****	**	0	30 / 30	RCORDR	
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	Req. Mon. DAILY MAX	MGD	*****	*****	*****	****		CONTI	RCORDR	
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	****	****	**	******	0.017	0.032	19	0	24/30	GRAB	
50060 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	****	*****	0.1 MO AVG	0.1 DAILY MAX	MG/L		FIVE PER WEEK	CALCTD	
TEMPERATURE - C, RATE OF CHANGE	SAMPLE MEASUREMENT	*****	0	62	*****	*****		**	0	30 / 30	CALCTD	
82234 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	2 DAILY MX	DEG C/HR				****		CONTI	CALCTD	
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											

	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	100/1		TE	LEPHONE		DATE	
John T. Carlin	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	AND MAIN I	ite Vice President					
	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,		PRINCIPAL EXECUTIVE	423 	843-7001	12	10	10
TYPED OR PRINTED	including the possibility of fine and imprisonment for knowing violations.	OFFICER OR A	UTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

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

No closed mode operation. Veliger monitoring data is included as an attachment. The following injections occurred: 1. Floguard MS6236 (max. calc. conc. was 0.057mg/L-limit 0.2mg/L) 2. Biodetergent 73551 (max. calc. conc. was 0.038mg/L-limit 2.0mg/L) 3. Spectrus CT1300 (max. calc. conc. was 0.037mg/L-limit 0.050mg/L)

Sample Date	Mean # of ZM/m3	% Settlers	Water Temp. (°C)	Sample Date	Mean# of Asiatic Clams/m3	Water Temp. (°C)	LOCATION	SUB LOCATION	NOTES: % Gravid Asiatic Clam	COLLECTED BY
01/03/2012	14	100	26	01/03/2012	0	26		1-25-545	·	PKS
1/10/2012	0	0	9	01/10/2011	0	9	RCW			WBE
01/17/2011	0	0	10	01/17/2011	0	10		1-ISV-24-1234		PB
01/24/2012	0	0	13	01/24/2012	0	.13		1-25-545		WDT
01/31/2012	0	0	17.6	01/31/2012	0	17.6		1-25-545		CR
02/07/2012	0	0	12	02/07/2012	0	12		1-25-545		BB .
02/14/2012	0	0	8.3	02/14/2012	0	8.3		1-24-1234		WE
02/21/2012	0	0	26.5	02/21/2012	0	26.5		1-25-545		CR
02/28/2012	0	0	11.1	02/28/2011	0	11.1		1-ISV-24-1234		WBE
3/06/2012	0	0	11.7	03/06/2012	0	11.7		1-ISV-24-1234		WBE
3/13/2012	0	0	13	03/13/2012	0	13		1-ISV-24-1234		WBE
03/20/2012	0	0	14.6	03/20/2012	0	14.6		1-ISV-24-1234		WBE
03/27/2012	1623	1.3	17.2	03/27/2012	0	17.2		1-ISV-24-1234		WBE
04/03/2012	229	0	18	04/03/2012	0	18		1-ISV-24-1234		PB
04/10/2012	79	20	22	04/10/2012	0	22		1-ISV-24-1234	•	PB
04/18/2012	326	- 5	18.8	04/18/2012	0	18.8		1-ISV-24-1234	•	MJW
May 2012										No Samples Collected
June 2012										No Samples Collected
July 2012		•								No Samples Collected
August 2012										No Samples Collected
eptember 2012							•			No Samples Collected

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) Name TVA - SEQUOYAH NUCLEAR PLANT Address P.O. BOX 2000				DISCHARGE MONITORING REPORT (DMR)						MAJO (SUBR		•		m Approved MB No. 2040		
(INTEROFFICE OPS-5N-SQN)		· _			026450			. 101		F - FIN						
SODDY - DAISY, TN 37384 Facility TVA - SEQUOYAH NUCLEAR PL				PERMI	T NUMBER	<u> </u>	DISCHA	RGE N	UMBER	BIOM	ONITORING F	OR OUTFA	LL 101			
Location HAMILTON COUNTY						TORING				EFFLU	JENT					
ATTN: Brad Love			From	YEAR	09 0 ⁴		<u>YEAR</u> 12	09	30		NO DISCHARO		***	ating this form	_	
PARAMETER		QUAN	TITY OR L	OADING				QUAL	ITY OR CO			uctions belon	NO. EX	FREQUENCY		
		AVERAGE	MAXI	MUM	UNITS	MIN	IMUM	7	VERAGE		MAXIMUM	UNITS		ANALYSIS		_
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	*****	***	***	**		toring equired		*****		*****	23				
TRP3B 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	******	***	****	****	4	3.2 IMUM		*****		****	PERCENT		SEMI ANNUAL	COMF	20°
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	*****	***	***	**	Moni	toring equired	1	*****		*****	23				
TRP6C 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	***	***	***	4	3.2 INUM		*****		*****	PERCENT		SEMI ANNUAL	COMF	208
	SAMPLE MEASUREMENT			<u> </u>												
	PERMIT REQUIREMENT															
	SAMPLE MEASUREMENT								,							
	PERMIT REQUIREMENT															
	SAMPLE MEASUREMENT															
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	SAMPLE MEASUREMENT										•					
	PERMIT REQUIREMENT						/ 1									
NAME OF THE PRINCIPAL PROPERTY OF THE PROPERTY	iorn ligarit	1	<u>-</u>	11					Ma							
John T. Carlin	direction or super properly gather a	malty of law that this do rvision in accordance w nd evaluate the informa nage the system, or thos	th a system d tion submitted	lesigned to a d. Based on	assure that qua my inquiry of t	lified person he.person or	nel (\mathcal{A}	WW.			TELEPH	UNE		DATE	
Sequoyah Site Vice President	information, the in and complete. I a	nformation submitted is m aware that there are sibility of fine and impri	, to the best o significant pe	of my knowle naities for su	dge and belief ubmitting false	, true, accura	SIG		1		XECUTIVE		3-7001		10	10
TYPED OR PRINTED COMMENTS AND EXPLANATION OF ANY						· · · · · · · · · · · · · · · · · · ·		OFFICE			AGENI	CODE	UMBER	YEAR	МО	DAY

EPA Form 3320-1 (REV 3/99)

Toxicity was not sampled in September 2012.

Previous editions may be used

Page 1 of 1

Name TVA - SEQUOYAH NUCLEA		Differenti	DIS		NITORING REPORT		MAJOR (SUBR 01)			orm Approved MB No. 2040		
Address P.O. BOX 2000			TAIC	026450	——— r———	402.0	F - FINAL		-		••••	
(INTEROFFICE OPS-5N-SQN) SODDY - DAISY, TN 37384				T NUMBER	DISCHAR	103 G GE NUMBER	LOW VOL. WASTE	TDEATME	NT DOI	A1D		
Facility TVA - SEQUOYAH NUCLEAR PL	ANT		PERIVI					IKEAINE	NI PUI	עט		
Location HAMILTON COUNTY			YEAR I		TORING PERIOD		EFFLUENT					
ATTN: Beed Lave		•	From 12	MO DA		MO DAY 09 30	*** NO DISCHAF	RGE	***			
ATTN: Brad Love			1 10111 12	_09 0	10 12	09 30	NOTE: Read ins	tructions before	re compl	eting this for	m.	
PARAMETER		QUAN	TITY OR LOADING			QUALITY OR CO	NCENTRATION		NO.	FREQUENCY	SAMPLE	=
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS	EX	OF ANALYSIS	TYPE	
PH	SAMPLE MEASUREMENT	******	****	**	7	*****	9	12	0	19 / 30	GRAB	
00400 1 0	PERMIT	*****	*****	**	6	*****	9	SU SU	25.75	THREE/	GRAB	\dashv
EFFLUENT GROSS	REQUIREMENT				MINIMUM		MAXIMUM	4		WEEK		
SOLIDS, TOTAL SUSPENDED	. SAMPLE MEASUREMENT	*****	*****	**	******	9	14	19	0	2/30	GRAB	
00530 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	******	*****	**	*****	30 MO AVG	100 DAILY MX	MG/L		TWICE/ MONTH	GRAB	
OIL AND GREASE	SAMPLE MEASUREMENT	*****	*****	**	******	<1 <1	<1	19	0	2/30	GRAB	
00556 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	******	*****	**	*********	15 MO AVG	20 DAILY MX	MG/L		TWICE/ MONTH	GRAB	
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	0.948	1.134	03	******	******	*****	**	0	30 / 30	RCORD	R
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	Req. Mon. MO AVG	Req. Mon	MGD	******					SEE PERMIT	RCORD	R
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											
	SAMPLE MEASUREMENT	-										
	PERMIT REQUIREMENT											
	SAMPLE MEASUREMENT	<u></u>				<u> </u>				A salidinate of the control of		
	PERMIT REQUIREMENT											
NAME/TITLE PRINCIPAL EXECUTIVE OFF		enaity of law that this doc					in the conservation is seen	TELEPI	IONE		DATE	
John T. Carlin	properly gather a persons who ma	rvision in accordance wit and evaluate the informat nage the system, or those	ion submitted. Based on e persons directly respor	my inquiry of the sible for gather	ne person or ring the	M	ice President					
Sequoyah Site Vice President	and complete. I a	information submitted is , am aware that there are s asibility of fine and imprise	ignificant penalties for s	ubmitting false i	nformation, SIGN		CIPAL EXECUTIVE		43-7001 UMBER		10 10	
TYPED OR PRINTED								CODE	CINIDEK	YEAR	MO DA	1
COMMENTS AND EXPLANATION OF ANY V	IOLATIONS (Refere	ence all attachments h	ere)									_

PERMITTE	E NAME/ADDRESS (Include Facility Name/Location if Different)
Name	TVA - SEQUOYAH NUCLEAR PLANT
Address	P.O. BOX 2000
	(INTEROFFICE OPS-5N-SQN)
	SODDY - DAISY, TN 37384
Facility	TVA - SEQUOYAH NUCLEAR PLANT
Location	HAMILTON COUNTY
ATTN: Br	ad Love

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

MAJOR (SUBR 01) Form Approved.
OMB No. 2040-0004

TN0026450 110 G
PERMIT NUMBER DISCHARGE NUMBER

MO DAY

01

09

From

MONITORING PERIOD

YEAR MO

DAY

F - FINAL

RECYCLED COOLING WATER

EFFLUENT

*** NO DISCHARGE

XX ***

To 12 09 30 NOTE: Read instructions before completing this form.

PARAMETER		QUAN	TITY OR LOADING		QUALITY OR CONCENTRATION					FREQUENCY OF	SAMPLE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS	EX	ANALYSIS	
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	****	****		04			
00010 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	****	**	*****	*****	REPORT DAILY MX	DEG C		CONTIN	CALCTD
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	*****	****		04			
00010 Z: 0 INSTREAM MONITORING	PERMIT REQUIREMENT	****	*****	**	****	*****	30.5 DAILY MX	DEG C		CONTIN	CALCTD
TEMP. DIFF. BETWEEN SAMP. & UPSTRM DEG.C	SAMPLE MEASUREMENT	****	*****	**	****	****		04			
00016 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	*****	**	*****	*****	5 DAILY MX	DEG C		CONTIN	CALCTD
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	*****		03	****	****	*****	**			
50050 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	Req. Mon. DAILY MX	MGD	******	******	*****	**		CONTIN	RCORDR
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	******	*****	**	****			19			
50060 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	****	*****	. **	*******	0.1 MO AVG	0.1 DAILY MX	MG/L		Five per Week	CALCTD
TEMPERATURE - C, RATE OF CHANGE	SAMPLE MEASUREMENT	****		04	*****	*****	****	**			
82234 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	****	2 DAILY MX	DEG C	*****	*****		**		CONTIN	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT								4.		

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

John T. Carlin

John T. Carlin

Sequoyah 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 personne 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.

TELEPHONE DATE Wah Site Vice President 423 843-7001 12 10 10 SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT **AREA** NUMBER YEAR MO DAY CODE

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

No Discharge this Period

PERMITTEE NAME/ADDRESS (Include Fac Name TVA - SEQUOYAH NUCLEA Address P.O. BOX 2000		Different)			ARGE ELIMINATION SY NITORING REPORT		MAJOR (SUBR 01)			m Approved IB No. 2040	
(INTEROFFICE OPS-5N-SQN) SODDY - DAISY, TN 37384 Facility TVA - SEQUOYAH NUCLEAR PL	ANT	- .		026450 T NUMBER	DISCHAR	110 T GE NUMBER	F - FINAL RECYCLED COOL	ING WATER	₹		
Location HAMILTON COUNTY				MONI	TORING PERIOD		EFFLUENT				
ATTN: Brad Love			From 12		Y YEAR		*** NO DISCHAR			eting this form	п.
PARAMETER		QUAN	TITY OR LOADING		,	QUALITY OR CO	ONCENTRATION		NO. EX	FREQUENCY OF	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS		ANALYSIS	
C25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	*****	*****	**		*****	****	23			
TRP3B 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	****	****	43.2 MINIMUM	******	******	PERCENT		SEMI ANNUAL	COMPOS
C25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	*****	*****	**		******	*****	23			
TRP6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	43.2 MINIMUM	******	******	PERCENT		SEMI ANNUAL	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
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	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
NAME/TITLE PRINCIPAL EXECUTIVE OFF		enalty of law that this doc				MAN	<u> </u>	TELEPH	IONE		DATE
John T. Carlin Sequoyah Site Vice President	properly gather a persons who ma information, the i	ervision in accordance wit and evaluate the informat nage the system, or those information submitted is, am aware that there are s	ion submitted. Based on e persons directly respor to the best of my knowle	my inquiry of the sible for gather dge and belief,	e person or ing the true, accurate,	Sequoyah Site		423 84	13-7001		10 10
	including the pos	ssibility of fine and imprise	onment for knowing viola	tions.	(ICIPAL EXECUTIVE HORIZED AGENT	AREA N	UMBER	YEAR	MO DAY

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

No Discharge this Period

TYPED OR PRINTED

YEAR

AREA CODE

NUMBER

OFFICER OR AUTHORIZED AGENT

DAY

PERMITTE	E NAME/ADDRESS (Include Facility Name/Location if Different)
Name	TVA - SEQUOYAH NUCLEAR PLANT
Address	P.O. BOX 2000
	(INTEROFFICE OPS-5N-SQN)
	SODDY - DAISY, TN 37384
Facility	TVA - SEQUOYAH NUCLEAR PLANT
Location	HAMILTON COUNTY
ATTN: Br	ad Love

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

MONITORING PERIOD

To

MAJOR (SUBR 01) F - FINAL

Form Approved. OMB No. 2040-0004

TN0026450 PERMIT NUMBER

From

12

YEAR MO DAY

09

01

118 G DISCHARGE NUMBER

09

DAY

YEAR MO

12

WASTEWATER & STORM WATER

EFFLUENT

*** NO DISCHARGE XX

30 NOTE: Read instructions before completing this form.

PARAMÈTER		QUAN	TITY OR LOADING		QUALITY OR CONCENTRATION					FREQUENCY	SAMPLE TYPE	
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS	EX	ANALYSIS		
OXYGEN, DISSOLVED (DO)	SAMPLE MEASUREMENT	******	*****	**		*****	*****	19			_	
00300 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	******	****	2 MINIMUM	*****	*****	MG/L		TWICE/ WEEK	GRAB	
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		19				
00530 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	****	****	****	*****	100 DAILY MX	MG/L		TWICE/ WEEK	GRAB	
SOLIDS, SETTLEABLE	SAMPLE MEASUREMENT	****	*****	**	*****	*****		25		-		
00545 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	*****	****	******		1 DAILY MX	ML/L		ONCE/ MONTH	GRAB	
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			03	*****	*****	****	**				
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	Req. Mon. MO AVG	Req. Mon. DAILY MX	MGD	******	******	*****	•		ONCE/ BATCH	ESTIMA	
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT				• .							
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											
	SAMPLE MEASUREMENT		_									
	PERMIT REQUIREMENT							1				

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER | 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 personnal John T. Carlin 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 gethering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, Sequoyah Site Vice President and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. TYPED OR PRINTED

TELEPHONE DATE Site Vice President 423 843-7001 12 10 10 SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT AREA NUMBER YEAR MO DAY CODE

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.

Iame TVA - SEQUOYAH NUCLEA	dress P.O. BOX 2000				DISCHARGE MONITORING REPORT (DMR)					(SUBR 01) Form Approved. OMB No. 2040-0004					
		-	TNC	026450		10	1 T	F - FINAL							
(INTEROFFICE OPS-5N-SQN)															
SODDY - DAISY, TN 37384		-	PERMI	T NUMBER	DISC	CHARGE N	UMBER	BIOMONITORING	FOR OU	IFALL 10	1				
TVA - SEQUOYAH NUCLEAR PLACETOR HAMILTON COUNTY		- <u>-</u>	YEAR		TORING PE	RIOD AR MO	DAY	EFFLUENT	_						
	,		From 12	08 01		2 08		*** NO DISCHA	RGE	***					
ATTN: Brad Love			1 10111 12	00 01	''	2 00	31	NOTE: Read in	etnictions h	efore comp	leting this for	·			
PARAMETER		Olian	NTITY OR LOADING		 -										
PARAMETER		QUAR	TITT OR LOADING			QUA	LITURU	ONCENTRATION		NO.	FREQUENC				
		AVERAGE	MAXIMUM	UNITS	MINIMUN	A	AVERAGE	MAXIMUM	TINU	S EX	ANALYSIS	TYPE			
C25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	*****	*****	**	>100.0)	******	****	23	0	1 / 180	COMPOS			
TRP3B 1 0	PERMIT	*****	*****	***	42.0	3.37	*****	*****	PERCI	NT -	SEMI	COMPOS			
	REQUIREMENT				43.2				FERU	.nı	1				
FFLUENT GROSS		·			MINIMU	JM					ANNUAL	•			
C25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	*****	******	**	>100.0	ס	******	*****	23	0	1 / 180	COMPOS			
TRP6C 1 0	PERMIT	*****	*****	****	43.2		*****	*****	PERC	NT T	SEMI	COMPOS			
•	REQUIREMENT]							•					
FFLUENT GROSS	<u> </u>				MIMINU	JMI		<u> </u>			ANNUAL				
	SAMPLE MEASUREMENT											,			
	PERMIT REQUIREMENT														
	SAMPLE MEASUREMENT														
	PERMIT REQUIREMENT		10.0												
	SAMPLE MEASUREMENT														
·	PERMIT REQUIREMENT														
	SAMPLE MEASUREMENT														
	PERMIT REQUIREMENT														
	SAMPLE MEASUREMENT														
	PERMIT REQUIREMENT														
NAME/TITLE PRINCIPAL EXECUTIVE OFF	ICER Certify under pe	enalty of law that this do	cument and all attachmen	its were prepare	d under my		DAI 1		TEL	EPHONE		DATE			
John T. Carlin			ith a system designed to a tion submitted. Based on				(12			-+				
Sequoyah Site Vice President	persons who mai information, the i	nage the system, or thos nformation submitted is	mon submitted. Dased on se persons directly respor , to the best of my knowle significant penalties for si	nsible for gatheri edge and belief,	ing the true, accurate,		/	Vice President	423	843-700	1 12	10 10			
TVDCD OR SOURCE			sonment for knowing viola					HORIZED AGENT	AREA	NUMBER	YEAR	MO DAY			
TYPED OR PRINTED	1														

Toxicity sampling began on August 12 and ended on August 17. This is the revised August 2012 DMR data set for 101T. The toxicity report is attached.

TENNESSEE VALLEY AUTHORITY TOXICITY TEST REPORT

INTRODUCTION / EXECUTIVE SUMMARY

Report Date: September 17, 2012

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. Design Flow (MGD): <u>1,579</u>

6. Receiving Stream: Tennessee River (TRM 483.6)

7. 1Q10: <u>3,491</u>

8. Outfall Tested: 101

9. Dates Sampled: <u>August 12 – 17, 2012</u>

10. Average Flow on Days Sampled (MGD): 1741.838, 1748.488, 1747.571

11. Pertinent Site Conditions: <u>Production / operation data will be provided upon request.</u>

12. Test Dates: August 14 – 21, 2012

13. Test Type: Short-term Chronic Definitive

14. Test Species: <u>Fathead Minnows (Pimephales promelas)</u>
Daphnids (Ceriodaphnia dubia)

15. Concentrations Tested (%): Outfall 101: 10.8, 21.6, 43.2, 86.4, 100

Intake: 100

Pimephales promelas: UV treated Outfall 101: 10.8, 21.6, 43.2, 86.4, 100

UV treated Intake: 100

16. Permit Limit Endpoint (%): Outfall 101: $IC_{25} = 43.2\%$

17. Test Results: Outfall 101: *Pimephales promelas*: IC₂₅ > 100%

Ceriodaphnia dubia: $IC_{25} > 100\%$

UV treated Outfall 101: *Pimephales promelas*: IC₂₅ > 100%

18. Facility Contact: <u>Brad Love</u> Phone #: (423) 843-6714

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

20. Lab Contact: <u>Jim Sumner</u> Phone #: (828) 350-9364

21. TVA Contact: Donald W. Snodgrass Phone #: (256) 386-2787

22. Notes: Outfall 101 samples collected August 12 – 17, 2012, showed no toxic effects to fathead minnows or daphnids. The resulting IC₂₅ values, for both species, were > 100 percent. Exposure of minnows and daphnids to intake samples resulted in no significant difference from the controls during this study period.

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. At the time this study was conducted, insignificant mortality occurred in minnows exposed to non-treated and UV treated samples.

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	08-12-12 0645 to 08-13-12 0545	08-13-12 1540	$0.8,0.7^{\dagger}$	<0.10	08-14-12 1213 08-15-12 1115
Intake	08-12-12 0705 to 08-13-12 0605	08-13-12 1540	0.9	<0.10	08-14-12 1213 08-15-12 1115
101	08-14-12 0700 to 08-15-12 0600	08-15-12 1553	1.9, 1.9 [†]	<0.10	08-16-12 1114 08-17-12 1115
Intake	08-14-12 0720 to 08-15-12 0620	08-15-12 1553	2.0	<0.10	08-16-12 1114 08-17-12 1115
101	08-16-12 0700 to 08-17-12 0600	08-17-12 1338	$2.2, 2.2^{\dagger}$	<0.10	08-18-12 1127 08-19-12 1115 08-20-12 1114
Intake	08-16-12 0715 to 08-17-12 0615	08-17-12 1338	2.4	<0.10	08-18-12 1127 08-19-12 1115 08-20-12 1114

^{*}TRC = Total Residual Chlorine

4. Sample Manipulation: Samples from Outfall 101 and intake were warmed to test temperature $(25.0 \pm 1.0^{\circ}\text{C})$ 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.

[†]Samples were collected in two 2.5 gallon cubitainers. Temperature was measured in each cubitainer upon arrival.

Pimephales promelas Ceriodaphnia dubia

Test Organisms:

1. Source: <u>Aquatox, Inc.</u> <u>In-house Cultures</u>

2. Age: $\underline{20-20.22 \text{ hours old}}$ < $\underline{< 24\text{-hours old}}$

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: <u>Moderately Hard Synthetic</u> <u>Moderately Hard Synthetic</u>

4. Number of Replicates: 4 10

5. Organisms per Replicate: <u>10</u> <u>1</u>

6. Test Initiation: (Date/Time)

Outfall 101 08-14-12 1200 ET 08-14-12 1148 ET

UV Treated Outfall 101 08-14-12 1213 ET

7. Test Termination: (Date/Time)

Outfall 101 <u>08-21-12 1106 ET</u> <u>08-21-12 1053 ET</u>

UV Treated Outfall 101 08-21-12 1122 ET

8. Test Temperature: Outfall 101: $\underline{\text{Mean} = 24.7^{\circ}\text{C}}$ $\underline{\text{Mean} = 24.9^{\circ}\text{C}}$

 $(24.3 - 25.1^{\circ}C)$ $(24.6 - 25.3^{\circ}C)$

Test Temperature: UV-Treated Outfall 101: $\underline{\text{Mean} = 24.8^{\circ}\text{C}}$

 $(24.2 - 25.1^{\circ}C)$

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 <u>Pimephales promelas</u> <u>Chronic/ 7-day Toxicity Test.</u> (Genus species) (Type / Duration)

Conducted August 14 – 21, 2012 using effluent from Outfall 101.

Test	Percent Surviving								
Solutions	(time interval used – days)								
(% Effluent)	1 2 3 4 5 6								
Control	100	100	100	100	100	100	100		
10.8%	100	100	100	100	100	100	100		
21.6%	100	100	100	100	100	100	100		
43.2%	100	100	100	100	100	100	100		
86.4%	100	100	100	100	100	100	100		
100.0%	100	100	100	100	100	100	100		
Intake	100	100	100	100	100	100	95		

Test Solutions	Mean Dry Weight (mg) (replicate number)								
(% Effluent)	1	2	3	4	Mean				
Control	0.583	0.615	0.592	0.544	0.584				
10.8%	0.535	0.669	0.686	0.649	0.635				
21.6%	0.608	0.559	0.626	0.686	0.620				
43.2%	0.582	0.563	0.487	0.614	0.562				
86.4%	0.614	0.555	0.563	0.690	0.606				
100.0%	0.532	0.673	0.506	0.571	0.571				
Intake	0.537	0.569	0.551	0.687	0.586				

IC₂₅ Value: $\geq 100\%$ Permit Limit: 43.2% Calculated TU Estimates: < 1.0 TUc*

Permit Limit: 2.3 TUc

95% Confidence Limits:

Upper Limit: NA Lower Limit: NA

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

TOXICITY TEST RESULTS (see Appendix C for Bench Sheets)

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

Conducted <u>August 14 – 21, 2012</u> using effluent from <u>Outfall 101</u>.

Test	Percent Surviving									
Solutions (% Effluent)	(time interval used – days) 1 2 3 4 5 6									
Control	100	100	100	100	100	100	100			
10.8%	100	100	100	100	100	100	100			
21.6%	100	100	100	100	100	100	100			
43.2%	100	100	100	100	100	100	100			
86.4%	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)										
(70 Elliacity)	1	2	3	4	5	6	7	8	9	10	Mean
Control	30	33	29	33	31	28	34	32	30	32	31.2
10.8%	36	34	33	33	35	35	34	34	31	32	33.7
21.6%	36	31	33	31	30	37	35	33	32	30	32.8
43.2%	37	34	34	31	31	31	37	34	34	35	33.8
86.4%	34	34	36	34	35	33	34	35	36	37	34.8
100.0%	38	37	37	34	32	38	35	39	37	38	36.5

IC₂₅ Value: > 100%

Calculated TU Estimates: < 1.0 TUc*

Permit Limit: 43.2%

Permit Limit: 2.3 TUc

95% Confidence Limits:

Upper Limit: NA Lower Limit: NA

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

TOXICITY TEST RESULTS (see Appendix C for Bench Sheets)

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

Conducted <u>August 14 – 21, 2012</u> using water from <u>Intake</u>

Test				cent Surviterval us	viving ed – days	s)	
Solutions (% Effluent)	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			Re		ction (•	_		days)	
(% Effluent)	1	2.	3	4	ata (re	6 6	te nui	nber)	9	10	Mean
			5		J	U	,	O	,	10	Wican
Control	30	34	34	31	32	29	32	31	29	31	31.3
Intake	33	29	33	33	33	36	33	32	36	34	33.2
IC ₂₅ Value: > Permit Limit: 1		<u>ó</u>		Cale	culate	d TU	Estim	ates:	< 1.0	TUc*	-
_				Pen	mit Li	mit: <u>l</u>	N/A				
95% Confidence	ce Li	mits:									
Upper L	.imit:	<u>NA</u>									
Lower I	_imit:	: <u>NA</u>									

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

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

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

Conducted August 14 – 21, 2012 using effluent from UV Treated Outfall 101.

Test Solutions				cent Surviterval us	_	s)	
(% Effluent)	1	2	3	4	5	6	7
Control	100	100	100	100	100	100	100
10.8%	100	100	100	100	100	100	100
21.6%	100	100	100	100	100	100	100
43.2%	100	100	100	100	100	100	100
86.4%	100	100	100	100	98	98	98
100.0%	100	100	100	100	100	100	100
Intake	100	100	100	100	100	100	100

Test Solutions		M	lean Dry Weig (replicate nu		
(% Effluent)	1	2	3	4	Mean
Control	0.510	0.488	0.587	0.553	0.535
10.8%	0.673	0.559	0.631	0.594	0.614
21.6%	0.599	0.524	0.547	0.582	0.563
43.2%	0.592	0.516	0.548	0.588	0.561
86.4%	0.509	0.527	0.551	0.448	0.509
100.0%	0.550	0.565	0.526	0.494	0.534
Intake	0.621	0.573	0.647	0.482	0.581
IC ₂₅ Value: >	100%		Calculated T	U Estimates	: <1.0 TUc*
	ce Limits: limit: <u>NA</u> limit: <u>NA</u>				

^{*}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	August 14 – 21, 2012	1225	7 days	KCl	0.81 g/L
Ceriodaphnia dubia	August 07 – 14, 2012	1045	7 days	NaCl	1.08 g/L

PHYSICAL/CHEMICAL SUMMARY

Water Chemistry Mean Values and Ranges for *Pimephales promelas* and *Ceriodaphnia dubia* Tests, Non-treated Sequoyah Nuclear Plant (SQN) Outfall 101 performed August 14-21, 2012.

Test	Sample ID	Temperature (°C)	ture (°C)	Dissolved Oxygen (mg/L)	(ygen (mg/L)	pH (S.U.)	S.U.)	Conductance	Alkalinity	Hardness	Total Residual	
		Initial	Final	Initial	Final	Initial	Final	(mmhos/cm)		(mg/L CaCO ₃) (mg/L CaCO ₃)	Chlorine (mg/L)	
	Control	24.8	24.7	7.7	7.9	7.55	7.50	311	62	68		
		24.7 - 24.9	24.6 - 25.1	7.6 - 7.9	7.8 - 8.0	7.43 - 7.67	7.36 - 7.59	302 - 323	62 - 62	88 - 92		
	10.807	24.8	24.6	7.9	7.8	7.52	7.46	291				
S	10.070	24.7 - 25.0	24.3 - 25.0	7.7 - 8.0	7.6 - 8.0	7.44 - 7.62	7.33 - 7.55	285 - 298				
svjə	21.60/	24.8	24.6	7.9	7.8	7.54	7.44	278				
wo	21.0%	24.7 - 25.0	24.4 - 24.9	7.7 - 8.0	7.6 - 8.0	7.44 - 7.62	7.33 - 7.55	272 - 283				
ıd s	13 20%	24.8	24.6	7.9	7.8	7.53	7.44	252				
าอุเซ	43.67	24.7 - 25.0	24.4 - 24.8	7.7 - 8.0	7.6 - 8.0	7.45 - 7.61	7.34 - 7.52	246 - 259				
yda	707 78	24.8	24.6	7.9	7.8	7.51	7.42	198				
oui,	07 + 70	24.7 - 25.0	24.3 - 24.8	7.6 - 8.0	7.6 - 7.9	7.45 - 7.60	7.31 - 7.52	192 - 205				
d	100 007	24.9	24.6	7.9	7.9	7.51	7.46	182	71	72	< 0.10	
	0/0.001	24.8 - 25.0	24.4 - 24.8	7.7 - 8.1	7.7 - 8.1	7.42 - 7.60	7.32 - 7.57	177 - 186	70 - 72	71 - 74	< 0.10 - < 0.10	
	Intoko	24.9	24.6	8.0	8.0	7.51	7.45	182	69	73	< 0.10	
	HIRANG	24.7 - 25.0	24.4 - 24.7	7.7 - 8.2	7.9 - 8.0	7.43 - 7.61	7.33 - 7.54	176 - 186	02 - 89	72 - 74	< 0.10 - < 0.10	
	Control	24.8	25.1	7.7	8.0	7.55	7.51	311	79	68		
	CONTROL	24.7 - 24.9	25.0 - 25.2	7.6 - 7.9	7.8 - 8.2	7.43 - 7.67	7.28 - 7.59	302 - 323	62 - 62	88 - 92		
	10.8%	24.8	25.0	7.9	8.0	7.52	7.51	291				
	10.0 /0	24.6 - 25.0	24.8 - 25.2	7.7 - 8.0	7.8 - 8.2	7.44 - 7.62	7.29 - 7.59	285 - 298				
тid	71 60/	24.8	25.0	7.9	8.0	7.54	7.52	278				
np	0/0.17	24.7 - 25.0	24.8 - 25.1	7.7 - 8.0	7.8 - 8.2	7.44 - 7.62	7.30 - 7.60	272 - 283				
vịu	13 70/	24.9	24.9	7.9	8.0	7.53	7.52	252				
ydr	13.54	24.7 - 25.0	24.8 - 25.3	7.7 - 8.0	7.9 - 8.2	7.45 - 7.61	7.30 - 7.61	246 - 259				
ppoi	701 78	24.9	25.0	7.9	8.0	7.51	7.51	198				
.1 ∂_	07+.00	24.7 - 25.1	24.8 - 25.2	7.6 - 8.0	7.9 - 8.2	7.45 - 7.60	7.28 - 7.61	192 - 205				
)	100 00%	25.0	24.9	7.9	8.0	7.51	7.52	182	71	72	< 0.10	
	1000 T	24.8 - 25.1	24.8 - 25.2	7.7 - 8.1	7.9 - 8.3	7.42 - 7.60	7.29 - 7.63	177 - 186	70 - 72	71 - 74	< 0.10 - < 0.10	
	Intoleo	25.0	24.9	8.0	8.1	7.51	7.52	182	69	73	< 0.10	
	Шаке	24.8 - 25.1	1 2 2 7 10	77 - 82	28 - 08	743 - 761	730 - 764	176 - 186	02 - 89	NT _ CT	010 - 010	

Maximum	25.1	25.3
Minimum	24.3	24.6
Average	24.7	24.9
Overall temperature (°C)	Pimephales promelas	Ceriodaphnia dubia

PHYSICAL/CHEMICAL SUMMARY

Water Chemistry Mean Values and Ranges for *Pimephales promelas* Test, UV-treated Sequoyah Nuclear Plant (SQN) Outfall 101 performed August 14-21, 2012.

Control 24.8 24.7 7.9 7.8 7.59 7.49 304 61 84 Chlorine (mg/L) Control 24.8 24.7 7.9 7.8 7.59 7.49 304 61 84 84 10.8% 24.9 24.5 24.9 7.8 7.6 7.6 7.4 7.6 7.4 84 84 84 10.8% 24.9 24.5 2.4 7.9 7.6 7.4 7.6 7.4 8.0 84 84 84 10.8% 24.9 24.7 7.9 8.0 7.6 7.4 7.6 7.4 8.0 7.6 7.4 7.6 7.4 7.6 7.4 8.0 7.6 7.4 7.5 7.8 7.6 7.4 7.5 8.0 7.6 7.4 7.5 7.4 7.8 7.7 8.0 7.7 7.9 7.7 7.4 7.8 7.7 8.0 7.6 7.3 7.7 7.4 8.0 <th>Test</th> <th>Sample ID</th> <th></th> <th>Temperature (°C)</th> <th>Dissolved Oxygen (mg/L)</th> <th>ygen (mg/L)</th> <th>('n'S) Hd</th> <th></th> <th>Conductance</th> <th>Alkalinity</th> <th>Hardness</th> <th>Conductance Alkalinity Hardness *Total Residual</th>	Test	Sample ID		Temperature (°C)	Dissolved Oxygen (mg/L)	ygen (mg/L)	('n'S) Hd		Conductance	Alkalinity	Hardness	Conductance Alkalinity Hardness *Total Residual
Control 24.8 24.7 7.9 7.8 7.59 7.49 304 61 61 84 10.8% 24.8 - 24.9 24.5 - 24.9 7.8 - 8.1 7.6 - 7.9 7.50 - 7.65 7.34 - 7.61 298 - 316 61 - 62 84 - 84 10.8% 24.9 24.5 - 24.9 7.8 - 8.1 7.6 - 7.8 7.50 - 7.66 7.34 - 7.57 291 61 - 62 84 - 84 84 - 84 21.6% 24.8 - 25.0 24.5 - 25.0 7.9 - 8.0 7.6 - 7.8 7.50 - 7.66 7.34 - 7.57 282 - 298 84 - 84 84 - 84 21.6% 24.8 - 25.1 24.6 - 24.8 7.9 - 8.0 7.7 - 7.9 7.50 - 7.66 7.34 - 7.58 271 - 284 87 - 254 43.2% 24.8 - 25.1 24.6 - 24.8 7.9 - 8.0 7.7 - 7.9 7.49 - 7.66 7.34 - 7.58 246 - 258 8.0 7.8 - 7.9 7.49 - 7.66 7.48 - 7.58 246 - 258 8.0 8.0 7.8 - 7.9 7.48 - 7.68 7.45 - 7.8 7.45 - 278 8.0 7.8 - 7.9 7.48 - 7.63 7.45 - 7.8 7.46 - 7.6 </th <th></th> <th></th> <th>Initial</th> <th>Final</th> <th>Initial</th> <th>Final</th> <th>Initial</th> <th>Final</th> <th>(mmyos/cm)</th> <th>(mg/L CaCO₃)</th> <th>(mg/L CaCO₃)</th> <th>Chlorine (mg/L)</th>			Initial	Final	Initial	Final	Initial	Final	(mmyos/cm)	(mg/L CaCO ₃)	(mg/L CaCO ₃)	Chlorine (mg/L)
10.8% 24.9 24.5 7.8 7.8 7.6 7.6 7.6 7.6 7.6 7.6 7.6 7.8 7.6 7.6 7.8 7.6 7.6 7.8 7.6 7.6 7.8 7.6 7.6 7.8 7.6 7.6 7.8 7.6 7.6 7.8 7.6 7.6 7.8 7.6 7.8 7.5 7.6 7.8 7.5 7.8 7.7 22.2 2.98 7.7 8.2 9		Control	24.8	24.7	7.9	7.8	7.59	7.49	304	61	84	
10.8% 24.9 7.8 7.60 7.48 291 Problem (10.8%) 24.9 7.8 7.60 7.48 291 Problem (2.4.8) 7.6 7.8 7.50 7.6 7.34 7.57 282 298 Problem (2.4.8) 7.6 7.8 7.50 7.6 7.34 7.57 282 2.98 Problem (2.4.8) 7.7 7.9 7.8 7.5 7.6 7.6 7.34 7.5 274 279 7.7 7.9 7.7 7.9 7.7 7.9 7.6 7.8 7.4 2.54 7.7 7.9 7.7 7.9 7.6 7.8 7.4 2.54 7.4 2.54 7.7 7.9 7.7 7.9 7.7 7.9 7.7 7.9 7.7 7.9 7.7 7.9 7.7 7.9 7.7 7.9 7.7 7.9 7.7 7.8 7.7 7.4 7.2 7.4 7.9 7.4 7.9 7.4 7.8 7.4 7.8 7.4 7.9			24.8 - 24.9		7.8 - 8.1	7.6 - 7.9	7.50 - 7.65	7.34 - 7.61		61 - 62		
21.6% 24.8 - 25.0 24.5 - 25.0 7.9 - 8.0 7.6 - 7.8 7.50 - 7.66 7.34 - 7.57 282 - 298 7.8 7.9 7.8 7.59 - 7.68 7.48 - 279 7.9 7.8 7.59 - 7.66 7.34 - 7.58 279 - 279 7.8 7.50 - 7.66 7.34 - 7.58 271 - 284 7.7 7.9 7.50 - 7.66 7.34 - 7.58 271 - 284 7.7 7.50 - 7.66 7.34 - 7.58 274 - 254 7.50 - 2.49 7.60 - 7.66 7.34 - 7.58 246 - 2.58 7.47 - 7.9 7.46 - 7.66 7.34 - 7.57 7.46 - 2.03 7.46 - 2.03 7.46 - 2.03 7.46 - 2.03 7.46 - 2.03 7.46 - 2.03 7.46 - 2.03 7.46 - 7.63 7.46 - 7.63 7.46 - 2.03 7.46 - 2.03 7.46 - 2.03 7.46 - 2.03 7.46 - 7.63 7.47 - 7.62 7.45 - 7.9 7.47 - 7.62 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9 7.45 - 7.9		10.807	24.9	24.7	7.9			7.48	291			
21.6% 24.9 24.9 7.8 7.59 7.48 279 7.8 7.59 7.48 279 7.8 7.59 7.48 279 7.8 7.59 7.8 7.59 7.8 7.59 7.8 7.59 7.6 7.59 7.44 7.58 271 284 7.7 7.9 7.58 7.56 7.34 7.58 246 2.58 7.7 7.8 7.8 7.56 7.46 203 8.7 7.8 8.0 7.8 7.56 7.46 203 8.0 7.8 7.56 7.46 203 8.0 7.8 7.56 7.46 203 8.0 7.8 7.56 7.46 1.84 7.0 7.2 7.2 100.0% 25.0 25.1 24.5 28.3 7.5 7.9 7.45 7.45 184 7.0 7.2 7.2 100.0% 25.0 25.0 24.6 8.3 7.5 7.4 7.45 184 7.0 7.2 7.2<	S	10.0 /0	24.8 - 25.0		7.9 - 8.0	7.6 - 7.8	7.50 - 7.66	7.34 - 7.57	282 - 298			
43.2% 24.8 - 25.1 24.6 - 24.8 7.9 - 8.0 7.7 - 7.9 7.50 - 7.66 7.34 - 7.58 271 - 284 7 43.2% 24.9 - 25.1 24.6 - 24.8 7.9 - 8.0 7.7 - 7.9 7.50 - 7.66 7.33 - 7.58 271 - 284 7 7 86.4% 25.0 24.7 - 24.7 8.0 7.7 - 7.9 7.49 - 7.66 7.33 - 7.57 197 - 207 7 7 100.0% 25.1 24.5 - 24.7 8.0 7.8 - 7.9 7.48 - 7.63 7.33 - 7.57 197 - 207 7 7 100.0% 25.1 24.5 - 24.7 7.8 - 8.3 7.5 - 7.9 7.47 - 7.62 7.31 - 7.55 178 - 188 70 - 70 72 - 72 Intake 25.0 24.6 8.1 7.9 - 8.2 7.7 - 8.0 7.46 - 7.61 7.32 - 7.58 70 - 70 72 - 72	այթ	21 60/	24.9	24.7	7.9	7.8	7.59		279			
43.2% 24.9 24.5 7.8 7.58 7.47 254 8 7 8 7.7 7.9 7.8 7.47 254 25.0 24.6 24.8 25.0 24.7 8.0 7.7 7.9 7.66 7.36 7.46 203 8 7 7 7 7.56 7.48 7.57 197 203 7	wo	0/0.17	24.8 - 25.1		7.9 - 8.0	9.7 - 7.7	7.50 - 7.66	7.34 - 7.58	271 - 284			
86.4% 25.0 24.8 - 25.1 24.6 - 24.8 7.9 - 8.0 7.7 - 7.9 7.49 - 7.66 7.33 - 7.58 246 - 258 246 - 258 246 - 258 24.0 - 25.1 24.0 - 24.7 8.0 7.7 - 7.9 7.48 - 7.63 7.36 - 7.57 7.45 - 203 203 7.8 - 7.9 7.5 - 7.9 7.48 - 7.63 7.33 - 7.57 197 - 207 7.7 7.2 7.2 7.55 7.45 - 7.9 7.45 - 7.9 7.45 - 7.63 7.33 - 7.57 184 70 - 70 7.2	ud s	43.30/	24.9	24.7					254			
86.4% 25.0 24.7 8.0 7.8 7.56 7.46 203 9.0 7.8 7.5 7.48 7.56 7.46 203 9.0 7.2 7.2 7.3 7.3 7.57 197 207 7.2 7.2 7.2 7.3 7.3 7.57 197 207 7.2	อุเอ	0/ 7:St	24.8 - 25.1	24.6 - 24.8		P. 7.7 - 7.9	7.49 - 7.66	7.33 - 7.58	246 - 258			
100.0% 25.1 24.9 - 25.1 24.6 8.0 7.8 7.7 7.45 17.7 17.5 7.45 17.5 17.5 17.5 17.45 17.6 17.6 17.6 7.7 17.7	yda	701 98	25.0	24.7	8.0	7.8	7.56	7.46	203			
100.0% 25.1 24.6 8.0 7.8 7.55 7.45 184 70 72 Intake 25.0 25.1 24.2 24.6 8.1 7.5 7.7 7.54 7.46 7.46 184 70 72 72 Intake 25.0 24.6 8.1 7.9 8.2 7.7 8.0 7.46 7.46 178 184 70 72 72 24.8 25.0 24.5 24.5 24.5 24.5 7.7 8.0 7.46 7.61 7.32 7.38 178 70 70 71 72	nui'	0/ + .00	24.9 - 25.1	24.3 - 24.8	7.9 - 8.1	7.5 - 7.9	7.48 - 7.63	7.33 - 7.57	197 - 207			
25.0 - 25.1 24.2 - 24.7 7.8 - 8.3 7.5 - 7.9 7.47 - 7.62 7.31 - 7.55 178 - 188 70 - 70 70 - 70 72 - 72 25.0 24.6 8.1 7.9 7.54 7.46 184 70 72 72 24.8 - 25.1 24.5 - 24.9 7.9 - 8.2 7.7 - 8.0 7.46 - 7.61 7.32 - 7.58 178 - 191 70 - 70 71 - 72	d	100 007	25.1	24.6	8.0			7.45	184	70	72	< 0.10
25.0 24.6 8.1 7.9 7.54 7.54 7.46 184 70 24.8 - 25.1 24.5 - 24.9 7.9 - 8.2 7.7 - 8.0 7.46 - 7.61 7.32 - 7.58 178 - 191 70 - 70		100.0 /0	25.0 - 25.1	24.2 - 24.7		7.5 - 7.9	7.47 - 7.62	7.31 - 7.55	178 - 188	70 - 70	72 - 72	< 0.10 - < 0.10
24.8 - 25.1 24.5 - 24.9 7.9 - 8.2 7.7 - 8.0 7.46 - 7.61 7.32 - 7.58 178 - 191 70 - 70		Intake	25.0	24.6	8.1	7.9		7.46	184	70	72	< 0.10
		IIIIahe	24.8 - 25.1	24.5 - 24.9	7.9 - 8.2	7.7 - 8.0	7.46 - 7.61	7.32 - 7.58		70 - 70	71 - 72	< 0.10 - < 0.10

*Note: Total residual chlorine was performed on non-treated Outfall 101 and Intake samples.

Minimum 24.2 Average 24.8 Overall temperature (°C)
Pimephales promelas

Maximum

SUMMARY / CONCLUSIONS

Outfall 101 samples collected August 12 - 17, 2012, showed no toxic effects to fathead minnows or daphnids. The resulting IC₂₅ values, for both species, were > 100 percent. Exposure of minnows and daphnids to intake samples resulted in no significant difference from the controls during this study period.

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. At the time this study was conducted, insignificant mortality occurred in minnows exposed to non-treated and UV treated samples.

Appendix A

ADDITIONAL TOXICITY TEST INFORMATION

SUMMARY OF METHODS

1. Pimephales promelas

Tests were conducted according to EPA-821-R-02-013 (October 2002) 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 (October 2002) 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. <u>Pimephales promelas</u>

None

2. Ceriodaphnia dubia

None

<u>DEVIATIONS / MODIFICATIONS TO PRETEST CULTURE OR HOLDING OF TEST ORGANISMS</u>

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 SM 2550 B.
- 4. Dissolved oxygen was measured by SM 4500 O G.
- 5. The pH was measured by SM 4500 H+ B.
- 6. Conductance was measured by SM 2510 B.
- 7. Alkalinity was measured by SM 2320 B.
- 8. Total hardness was measured by SM 2340 C.
- 9. Total residual chlorine was measured by ORION Electrode Method 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 IC₂₅ 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. <u>Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms</u>, EPA-821-R-02-013 (October 2002).
- 3. Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005.
- 4. <u>Quality Assurance Program: Standard Operating Procedures</u>, Environmental Testing Solutions, Inc (most current version).

Sequoyah Nuclear Plant Biomonitoring August 14 – 21, 2012

Appendix B

Diffuser Discharge Concentrations of Total Residual Chlorine,
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 Microbiologically Induced Corrosion Mollusks, During Toxicity Test Sampling, March 12, 1998 – August 17, 2012

Date	Sodium	Towerbrom	PCL-222	PCL-401	CL-363	Cuprostat-	H-130M
	Hypochlorite	mg/L	mg/L	mg/L	mg/L	PF	mg/L
	mg/L	TRC	Phosphate	Copolymer	DMAD	mg/L	Quat
	TRC		•	2 0		Azole	
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. Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Microbiologically Induced Corrosion Mollusks, During

Toxicity Test Sampling,

Date	Sodium	Towerbrom	PCL-222	PCL-401	CL-363	Cuprostat-	H-130M
	Hypochlorite	mg/L	mg/L	mg/L	mg/L	PF	mg/L
	mg/L	TRC	Phosphate	Copolymer	DMAD	mg/L	Quat
	TRC					Azole	
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. Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Microbiologically Induced Corrosion Mollusks, During Toxicity Test Sampling,

Date	Sodium	Towerbrom	PCL-222	PCL-401	CL-363	Cuprostat-	H-130M
	Hypochlorite	mg/L	mg/L	mg/L	mg/L	PF	mg/L
	mg/L	TRC	Phosphate	Copolymer	DMAD	mg/L	Quat
	TRC		•	2 0		Azole	
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 – August 17, 2012

Date	Sodium	Towerbrom	PCL-222	PCL-401	CL-363	Cuprostat-	H-130M
	Hypochlorite	mg/L	mg/L	mg/L	mg/L	PF	mg/L
	mg/L	TRC	Phosphate	Copolymer	DMAD	mg/L	Quat
	TRC					Azole	
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	-	-
						l	

Table B-1. Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Microbiologically Induced Corrosion Mollusks, During Toxicity Test Sampling,
March 12, 1998 – August 17, 2012

Date	Sodium Hypochlorit e 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 11/08/2004 11/09/2004 11/10/2004 11/11/2004 11/12/2004	- - - - -	<0.0187 <0.0192 <0.0233 <0.0149 <0.0149 <0.0253	0.000 0.047 0.048 0.047 0.049 0.048	0.014 0.030 0.016 0.016 0.017 0.017	- - - - -	- - - - -	0.041 0.041 0.043 0.042	- - - - -	- - - -
02/06/2005 02/07/2005 02/08/2005 02/09/2005 02/10/2005 02/11/2005	- - - -	<0.0042 <0.0116 <0.0080 0.0199 <0.0042 0.0155	0.028 0.028 0.028 0.028 0.028 0.028	0.010 0.010 0.010 0.010 0.010 0.010				- 0.007 - - - - 0.007	- - - - -
06/05/2005 06/06/2005 06/07/2005 06/08/2005 06/09/2005 06/10/2005	- - - - -	0.0063 0.0043 0.0103 0.0295 0.0129 0.0184							0.037 0.037 0.037 -
07/17/2005 07/18/2005 07/19/2005 07/20/2005 07/21/2005 07/22/2005	- - - - -	0.0109 0.0150 0.0163 0.0209 0.0242 0.0238	0.026 0.026 0.026 0.026 0.026 0.054	0.009 0.009 0.009 0.009 0.009 0.018	- - - -	- - - -	- - - -	- - 0.014 - 0.014	- 0.036 0.036 0.036 - -
10/30/2005 10/31/2005 11/01/2005 11/02/2005 11/03/2005 11/04/2005	- - - - -	0.0068 0.0112 0.0104 0.0104 0.0117 0.0165							- 0.035 0.036 0.036 0.035
11/14/2005 11/15/2005 11/16/2005 11/17/2005 11/18/2005 11/19/2005	- - - - -	0.0274 0.0256 0.0234 0.0231 0.0200 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 – August 17, 2012

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	MSW 101 mg/L Phosphate
11/12/2006 11/13/2006 11/14/2006 11/15/2006 11/16/2006	- - - -	0.0055 0.0068 0.0143 0.0068 0.0267			- - - -	- - - -			0.037 0.037 0.037 0.037	
11/17/2006 11/26/2006 11/27/2006	-	0.0222 0.0188 0.0138	-	-	-	-	-	-	-	-
11/28/2006 11/28/2006 11/29/2006 11/30/2006	- - -	0.0138 0.0120 0.0288 0.0376	- - -	- - -	- - -	- - -	-	- - -	- - -	- - -
12/01/2006	-	0.0370	-	-	-	-	-	-	-	0.015
05/29/07 05/30/07 05/31/07	- - -	0.0084 0.0103	- - -	- - -	- - -	- - -	-	0.017	0.036 0.036 0.036	0.015 0.015 0.015
06/01/07 06/02/07 12/02/07	-	0.0164 0.0305 0.0241	-	- -	-	- -	-	0.017	0.036	0.015 0.015
12/03/07 12/04/07 12/05/07	- - -	0.0128 0.0238 0.0158	- - -	- - -	- - -	- - -	-	- - -	- - -	- - -
12/06/07 12/07/07 04/13/08	-	0.0162 0.0175 0.0039	-	- -	-	-	-	-	-	-
04/13/08 04/14/08 04/15/08 04/16/08	- - -	0.0039 0.0124 0.0229 0.0143	-	- - -	- - -	- - -	-	- - -	-	- - -
04/17/08 04/18/08	-	0.0120 0.0149	-	-	-	-	-	-	- -	-
10/26/08 10/27/08 10/28/08 10/29/08	- - -	0.0260 0.0151 0.0172 0.0154	-	- - -	- - -	- - -	- - -	0.017	- 0.041 0.041	- - - 0.030
10/29/08 10/30/08 10/31/08	- - -	0.0134	- - -	- - -	- - -	- - -	- -	0.018 - -	0.041 0.041 0.041	0.030 0.030 0.030

Table B-1. Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Microbiologically Induced Corrosion Mollusks, During Toxicity Test Sampling,

Date	Sodium	Towerbrom		PCL-401	CL-363	Cuprostat		Nalco	Spectrus	H-150M	MSW
	Hypochlorite	mg/L	222	mg/L	mg/L	-PF mg/L	mg/L	73551	CT1300	mg/L	101
	mg/L	TRC	mg/L	Copolymer	DMAD	Azole	Quat	mg/L	mg/L	Quat	mg/L
	TRC		Phosph					EO/PO	Quat		Phosphate
			ate								
02/08/09	-	0.0197	-	-	-	-	-	0.017	-	-	-
02/09/09	-	0.0237	-	-	-	-	-	0.017	-	-	-
02/10/09	-	0.0104	-	-	-	-	-	0.021	-	-	-
02/11/09	-	0.0155	-	-	-	-	-	0.017	-	-	-
02/12/09	-	0.0106	-	-	-	-	-	0.017	-	-	-
02/13/09	-	-	-	-	-	-	-	-	-	-	-
05/10/09	-	0.0129	-	-	-	-	-	-	-	-	-
05/11/09	-	0.0415	-	-	-	-	-	-	-	0.0446	-
05/12/09	-	0.0053	-	-	-	-	-	-	-	0.0396	-
05/13/09	-	0.0049	-	-	-	-	-	-	-	0.0396	-
05/14/09	-	< 0.0141	-	-	-	-	-	-	-	0.0397	-
05/15/09	-	< 0.0160	-	-	-	-	-	-	-	-	-
11/15/09	-	0.025	-	-	-	-	-	-	-	-	-
11/16/09	-	0.0152	-	-	-	-	-	-	-	-	-
11/17/09	-	0.0255	-	-	-	-	-	-	-	-	-
11/18/09	-	0.0306	-	-	-	-	-	-	-	-	-
11/19/09	-	0.0204	-	-		-	-	-	-	-	-
11/20/09	-	0.0093	-	-	-	-	-	-	-	-	-
05/09/10	-	0.0192	-	-	-	-	-	-	-	-	-
05/10/10	-	0.0055	-	-	-	-	-	-	-	-	-
05/11/10	-	0.0100	-	-	-	-	-	-	0.039	-	-
05/12/10	-	0.0171	-	-	-	-	-	-	0.039	-	-
05/13/10	-	0.0041	-	-		-	-	-	0.039	-	-
05/14/10	-	0.0099	-	=	ı	-	-	=	0.039	-	-

Table B-1. Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Microbiologically Induced Corrosion Mollusks, During Toxicity Test Sampling,

Date	Sodium Hypo- chlorite mg/L TRC	Towerbrom mg/L TRC	PCL- 222 mg/L Phos- phate	PCL-401 mg/L Copoly- mer	CL-363 mg/L DMAD	Cuprostat -PF mg/L Azole	H-130M mg/L Quat	Nalco 73551 mg/L EO/PO	Spectrus CT1300 mg/L Quat	H-150M mg/L Quat	MSW 101 mg/L Phos- phate	Floguard MS6236 mg/L Phosphate
10/31/10 11/01/10 11/02/10 11/03/10 11/04/10 11/05/10	- - - -	0.0122 0.0112 0.0163 0.0107 0.0132	- - - - -	- - - -	- - - -	- - - -			- - - -		- - - -	
05/01/2011 05/02/2011 05/03/2011 05/04/2011 05/05/2011 05/06/2011	- - - - -	- - 0.0155 0.0179 0.0089	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - -	0.04 0.04 0.04 0.04	- - - -	- - - -	- - - - -
11/06/2011 11/07/2011 11/08/2011 11/09/2011 11/10/2011 11/11/2011	-	0.0168 0.0225 0.0141 0.0239 0.0242 0.0231	- - - - -	- - - -	- - - -	- - - -	- - - -		- - - -	- - - -	- - - -	- - - -
05/06/2012 05/07/2012 05/08/2012 05/09/2012 05/10/2012 05/11/2012		- - 0.0145 0.0298 0.0174	- - - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- 0.041 0.041 0.041 -	- - - -	- - - -	- - - -
08/12/2012 08/13/2012 08/14/2012 08/15/2012 08/16/2012 08/17/2012	-	0.0256 0.0209 0.0279 0.0076 0.0446	- - - - -	- - - -	- - - -	- - - - -	- - - -	0.028 - 0.028 - -	- 0.037 0.037 - -		- - - -	0.029 0.029 0.029 0.029 0.029 0.032

Sequoyah Nuclear Plant Biomonitoring August 14-21, 2012

Appendix C

Chain of Custody Records and Toxicity Test Bench Sheets

				BIOMONI	TORING (CHAIN	OF C	USTOE	Y RE	CORI)	Pag	ge1	of_	_1
Gient: TVA Regiect Name: Sequoyah	NP Toxicity			Environme	ental Tes 351 Depo Ashevil	ot Street		, Inc.	Delivered By (Circle One): FedEx UPS Bus Client Other (specify):						
Facility Sampled: Sequo NPDES Number: TN002 Collected By: Pustin	26450	i fin		Ger						General Comments: Took Simples at outfill at 0600, and Simples from Intike 9+0630.					
Field Identification / Sample Description	Grab/Comp.	C	Collection	Date/Time	Container Number & Volume Collected	Flow (MGD)	(1)	Rain F Mark as A		te)	luneci	& Zo \ Laborato	ory Use		
		Sta	art	End Yes If Yes, No Trace				ETS Log Number	Arrival Temp.	Ву	Time	Appear- ance			
SQN-101-TOX	Comp	8-12-	1	8-13-12 0545 ET	2(2.5gal)	1741.838	>		X		120813.01	0.8/0.7	الار	1540	*
SQN-INT-TOX	Comp	8-12-	12 - ET	8-13-12 0665 ET	1(2.5 gal)						120813.02	0.9.0	χ	1540	*
				Samp	le Custody –	- Fill In Fro	тор Тор	Down	<u> </u>			SOALS INTA			
Relinquished I	By (Signature):		,	Date/Time		Receive	ed By (Signature	e):		(4) COOD (Date/	Time ;	NBSENT SAMPLES	. Hune
Quin Bry	TVA	4	8-11-	12 0800 ET	BR	Spi	les	S	ONIC		08-13-	12	08	00	73
BR Skil	les Soni	c	08-13	3-12 1540 E	T Jum	/m		ET	S		08-13-1	2 15	40 1	ET	
		-	•			1									
y															

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.

Date

Received

08-13-12

08-13-12

Time

Received

1540

1540

Received

by

J. Sumner

J. Sumner



	Whole Effluer ample Receipt Log
A decided to the second to the	

Received

from

Sonic Delivery

Sonic Delivery

*Sample

Temp. (°C)

0.8, 0.7

0.9

Project

number

8207

8207

	*Sample temperature performed us -	ing Samp	le Receiving Thermometer: SN 6338
Sample number	Sample name and description	State	Comments
120813 .01	TVA / SQN Outfall 101	TN	

number	Sample name and description	State	Comments
120813 .01	TVA / SQN Outfall 101	TN	
120813 .02	TVA / SQN Intake	TN	

				BIOMONI	TORING	CHAIN (OF CU	JSTOD	Y RE	CORI	•	Pag	șe1	1 of _	_1
wient: TVA	1 NP Toxicity			Environm	ental Tes 351 Depo	•	,	Inc.	Deliv FedE	•	y (Circle One): PS Bus	Client			
Number: N/A					Ashevil	le, NC			Othe	r (speci	fy):				
Sampled: Sequo	yah NP				288	01			Gene	eral Con	nments: Moles off	at out	11 9	+ 600	
NPDES Number: TN002	26450			Phone:	828-350)-9364	**				take at			, ,	
Collected By: Ditia	Bineyer v fin			Fax:	828-350)-9368									
Field Identification / Sample Description	Grab/Comp.	Co	ollection	Date/Time	Container Number & Volume Collected	Flow (MGD)	(M	Rain E		te)	projet	Laborate	ıry Use		
		Sta	rt	End	- 15 (1) - 17 (1)		Yes	If Yes, Inches	No	Trace	race ETS Log Arrival Temp. By Time Number (°C) ET				Appear- ance
SQN-101-TOX	Comp	8-14-17 8-0010		8-15-12 0600 ET	2(2.5gal)	1748,488 MGD			Χ		120815.10	1.9, 1.9.0	8	1553	*
SQN-INT-TOX	Comp	8-14-1		8-15-12 0620 ET	1(2.5 gal)				X		120815.11	2.0°C	Ŋ	K53	*
				Samp	ole Custody –	Fill In Fro	m Top]	Down			* CUSTODY				
•	By (Signature):			Date/Time		Receive	d By (S	Signature)):		111 6-00	Date/	J. T	ac abse ac same	nt in ices.
BR Ski	Ban T	VA	8-15-	12 103DET	BR	80	ile	1	SONI	<u> </u>	08-15	-/2	/(9.30 ET	-
BR Ski	la SON	رد	8-/s	-12 5:53	ET)"	m/u		<u> </u>	73		08-15-1	2 155	3 ET	·	
						/	,					·			
			•				- <u>.</u>								
															

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.

*Sample temperature performed using Sample Receiving Thermometer: SN 6338

Date	Time	Received	Received	*Sample	Project	Sample	Sample name and description	State	Comments
Received	Received	by	from	Temp. (°C)	number	number			
08-15-12	0945	K. Keenan	Fed - Ex	1.3	8215	120815 .01	CORR ERI - AAF McQuay International	NC	
08-15-12	0945	K. Keenan	Fed - Ex	0.7	8216	120815 .02	Statesville Analytical - Cleveland WWTP	NC	
08-15-12	0945	K. Keenan	Fed - Ex	5.5	8217	120815 .03	United Water - Enfield WWTP	NC NC	
08-15-12	0945	K. Keenan	Fed - Ex	5.5	8218	120815 .04	United Water - Scotland Neck WWTP	NC	
08-15-12	0945	K. Keenan	Fed - Ex	0.3	8219	120815 .05	Craven County Wood Energy	NC	
08-15-12	0945	K. Keenan	Fed - Ex	0.7	8220	120815 .06	Duke Energy - McGuire NS - Outfall 002	NC	
08-15-12	0945	K. Keenan	Fed - Ex	0.6	8221	120815 .07	Progress Energy - Shearon Harris E & E	NC	
08-15-12	0945	K. Keenan	Fed - Ex	0.5	8222	120815 .08	Carolina Beach WWTP	NC	
08-15-12	0945	K. Keenan	UPS	2.0	8223	120815 .09	Morehead City WWTP	NC	
08-15-12	1553	J. Sumner	TVA Courier	1.9/1.9	8207	120815 .10	TVA - SQN - 101	TN	
08-15-12	1553	J. Sumner	TVA Courier	2.0	8207	120815 .11	TVA - SQN - Intake	TN	

			BIOMONI	TORING	CHAIN	OF CU	USTOD	Y RE	CORI)	Pa	ge1	l of _	_1
Grent: TVA	NP Toxicity		Environm	ental Tes	•	•	, Inc.	Deliv FedE		(Circle One): PS Bus	Client			
QO. Number: N/A				Ashevil	le, NC			Other	r (speci	fy):				
Facility Sampled: Sequo	yah NP			288	01			Gene	ral Con	nments:	m outfil	1 2+	0660	End
NPDES Number: TN002	26450		Phone:	828-350	0-9364			fro	内里	nments: mplis from ntskiat	0630	, -,	,	•
Collected By: Austra	Bineger		Fax:	828-350	0-9368	·			_					
Field Identification / Sample Description	Grab/Comp.	Colle	ction Date/Time	Container Number & Volume Collected	Flow (MGD)	4)	Rain Ev Mark as App		e)	ρλύ	ut 8205 Laborato			
		Start	End			Yes	If Yes, Inches	No	Trace				Time	Appear- ance
SQN-101-TOX	Comp	8-16-12 0700 Et	8-17-12 000 ET	2(2.5gal)	1747.57 MGD	X	,11			19081700	Z.2 Z2°C	Ŋ	1338	*
SQN-INT-TOX	Comp	8-16-12 6715€		1(2.5 gal)		X	-11			(20817.B	2.y°C	Ŋ	1338	*
			Samp	ole Custody –	- Fill In Fro	om Top	Down		* C1	STODY SEALS				
Relinquished I	-		Date/Time		Receiv	ed By (S	Signature)):		6008	CONDITION. Date/	Time	-1/~	AMPLES
Quin fin	TVP	8-	17-12 5930 ET	BR	Skil	20		5011	<u></u>	08-17	-12	0	7:30	ĘΤ
BK Skile	Dilin Bin 8-17-12 5930 OK Spile SONIC 08-17-12 13				mp			ETS		08-M-1	2 133	8 ET	<u> </u>	
·					,			÷						
								-						
														: i
			<u> </u>										-	

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.



*Sample temperature performed using Sample Receiving Thermometer: SN 6338

Date	Time	Received	Received	*Sample	Project	Sample	Sample name and description		Comments
Received	Received	by	from	Temp. (°C)	number	number		State	Comments
08-17-12	0950	K. Keenan	Fed - Ex	0.6	821 5	120817 .01	CORR ERI - AAF McQuay International	NC	
08-17-12	0950	K. Keenan	Fed - Ex	0.6	8216	120817 .02	Statesville Analytical - Cleveland WWTP	NC	
08-17-12	0950	K. Keenan	Fed - Ex	2.0	8217	120817 .03	United Water - Enfield WWTP	NC	
08-17-12	0950	K. Keenan	Fed - Ex	2.0	8218	120817 .04	United Water - Scotland Neck WWTP	NC	
08-17-12	0950	K. Keenan	Fed - Ex	0.7	8219	120817 .05	Craven County Wood Energy	NC	
08-17-12	1130	J. Sumner	Murphy Courier	0.8	8226	120817 .06	Duke Energy - McGuire NS - Upper Composite	NC	
08-17-12	1130	J. Sumner	Murphy Courier	0.8	8226	120817 .07	Duke Energy - McGuire NS - Lower Composite	NC	
08-17-12	1338	J. Sumner	TVA Courier	2.2/2.2	8207	120817 .08	TVA - SQN - Outfall 101	TN	
08-17-12	1338	J. Sumner	TVA Courier	2.4	8207	120817 .09	TVA - SQN - Intake	TN	



Chronic Whole Effluent Toxicity Test (EPA-821-R-02-013 Method 1000.0) Species: <u>Pimephales promelas</u>

Client: Tennessee Valley Authority
Facility: Sequoyah Nuclear Plant

County: Rhea
Outfall: 101

NPDES #: TN0020168
Project #: \$2.07

Dilution prepara	tion info	Comments:					
Dilution prep (%)	10.8	21.6	43.2	86.4	100		
Effluent volume (mL)	270	540	1080	2160	2500		
Diluent volume (mL)	2230	1960	1420	340	0		
Total volume (mL)	2500	2500	2500	2500	2500		

Test organism information	on:	Test information:	
Organism age:	20 Hours OLD	Randomizing template:	Yellow
Date and times organisms were born between:	08.13.12 1600	Incubator number and shelf location:	36
Organism source:	ATOX BATCH PP 08-13-12	Artemia CHM number:	CHH 652
		Drying information fo determination:	r weight
Transfer bowl information:	pH = 7.60 S.U.	Date / Time in oven:	08-21-12
	Temperature = 25.\ °C	Initial oven temperature:	60.C
Average transfer volume:		Date / Time out of oven:	08-22-12
	0.1209.00	Final oven temperature:	60,C
		Total drying time:	24-HOURS

Daily feeding and renewal information:

Day	Date	Morning	feeding	Afternoo	n feeding	Test initiation, renewal, or termination		Sample nu	mbers used	MHSW batch used
		Time	Analyst	Time	Analyst	Time	Analyst	Outfall 101	Intake	
0	08.14.12			1500	K	1500	K	120813.01	120813.02	08-12-12
1	08.15.12	5700	xl	1300	X	1100	للا	1,20813.01	120813.02	08-12-17
2	08.1612	0715	X	1315	X	1100	X	120815.10	150812.11	08-14-17
3	08.17.12	0100	1	1300	Я	1100	7	120815.10	120815.11	08-14-12
4	08-18-12	0915	97	1515	X	1115	الإ	120817.08	120817.09	08-16-12
5	08-19-12	0815	J.	1415	A.	1103		120817.08	120817.09	08-16-12
6	08-20-12	0700	X	1300	Ä	1100	N.	120117.08	120817-09	08-16-12
7	08-21-17_					1106	, k			

Control information:		Acceptance criteria	Summary of t	est endpoints:
% Mortality:	07.	≤20%	7-day LC ₅₀	> 1007.
Average weight per initial larvae:	0.584		NOEC	1007.
Average weight per surviving larvae:	0.584	≥ 0.25mg/larvae	LOEC	> 1007.
		;	ChV	>1007.
			IC ₂₅	>1007.



Client: TVA / Sequoyah Nuclear Plant, Outfall 101, Non-treated Date: 08.14.12.

					Surviv	al and	Growt	h Data				
Day		CON	TROL			10.	8%			21.	6%	
	A	В	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	70	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	Õ	10	10	10	10
7	10	10	10	10	10	10	10	10	10	10	10	10
A = Pan weight (mg) Tray color code:: Light Pink Analyst: Mtf Date: 08-06-12	4.47	13.58	14.24	13.24	14.10	13.86	13,68	13.38	14.25	12.95	15.67	14.97
B = Pan + Larvae weight (mg) Analyst: JUB Date: 08.27.12	20.30	19.73	Zo.16	18.68	19.45	20.55	20.54	19.87	2033	1854	21.43	Z1.83
C = Larvae weight (mg) = B - A Hand calculated. Analyst:	\$.83	6.15	5.92	ડ.પપ	5.3%	6.69	b.8b	6.49	80,ي	5. \$9	6.26	6.86
Average weight per Percent reduction			265.0	. S. J. J.								
initial number of from control (%) larvae (mg)	0.5	84			ه. ٥	22	- &.	87.	o.	620	~ b	.27.

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.

Comments:	:



Client: TVA / Sequoyah Nuclear Plant, Outfall 101, Non-treated Date: O&-14-12

Survival and Growth Data

<u>-</u>					Survi	val and	Growi	n Data				
Day		43.	2%		86.4%				100%			
	M	N	0	P	. Q	R	S	Т	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	10	25M	10	10	10	10	10	10	10	10	10
A = Pan weight (mg) Tray color code:: Light Pink Analyst: Mult Date: 08-06-12	13.50	13.60	14.75	14.31	12.64	13.87	13.79	14.52	13.50	13.70	13,37	14.50
B = Pan + Larvae weight (mg) Analyst: UB Date: 08.27.12	19.32	19.23	19.62	Za45	18.78	19.42	19.42	21.42	15,82	Z0.43	18.43	20, 21
C = Larvae weight (mg) = B - A Hand calculated. Analyst:	5.82	5.63	4.87	6.14	6.14	5.55	5.63	6.90	5.32	6.73	5.06	5.71
Weight per initial number of larvae (mg) = C / Initial number of larvae Hand calculated. Analyst: Average weight per Percent reduction			18'0' Y'0'	3/98	0.64			039.0			30.0	51
initial number of larvae (mg)	٥.	562	3.	87.	0.1	-0b	-3.	£7.	0.4	571	٧.٦	2.7.

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.

Comments:	
·	





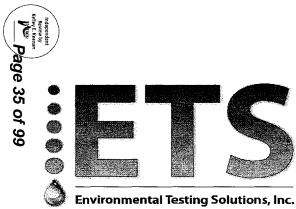
Client: TVA / Sequoyah Nuclear Plant, Outfall 101, Non-treated Date: 08-14-12

				· · · · ·	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	82454	10	10	10	
A = Pan weight (mg) Tray color code:: Link Pink Analyst: MAF Date: 03.06.12	13.84	14.78	14.71	14.24	
B = Pan + Larvae weight (mg) Analyst:	19.21	20.47	20.22	21.11	
C = Larvae weight (mg) = B - A Hand calculated. Analyst:	5.37	5,69	5.51	6.87	
Weight per initial number of larvae (mg) = C / Initial number of larvae Hand calculated. Analyst:	o. S	635.	9.	₹095 6	
Average weight per initial number of larvae (mg) Percent reduction from control (%)	0.9	386	-0	.47.	

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.

Comments:			





TVA / Sequoyah Nuclear Plant, Outfall 101 Non-treated August 14-21, 2012

Pimephales promelas Chronic Whole Effluent Toxicity Test EPA-821-R-02-013, Method 1000.0

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

							Not for Complian	nce Assessment, Inter	nal Laboratory QC					
Concentration (%)	Replicate	Initial number of larvae	Final number of larvae	A = Pan weight (mg)	B = Pau + 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 (Mean weight per initial number of larvae)	Percent reduction from control (%)
													(%)	
	A	10	10	14.47	20.30	5.83	0.583			0.583				
Control	В	10	10	13.58	19.73	6.15	0.615	0.584	5.1	0.615	100.0	0.584	5.1	Not applicable
	U,	10	10	14.24	20.16	5.92	0.592			0.592				
	_D	10	10	13.24	18.68	5.44	0.544			0.544		ļ		
	<u>E</u>	10	10	14.10	19.45	5,35	0.535			0,535				
10.8%	F	10	10	13.86	20.55	6.69	0.669	0.635	10.7	0.669	100.0	0.635	10.7	-8.8
	G H	10	10	13.68 13.38	20.54	6.86	0.686			0.686				
	<u>H</u>	10	10		19.87	6.49	0.649			0.649				
	<u>1</u>	10	10	14,25 12,95	20.33	6.08	0.608			0.608		•		
21.6%	K	10	10	15.67	18.54 21.93	5.59 6.26	0.559 0.626	0,620	8.5	0.559	100.0	0.620	8,5	-6.2
		10	10	14.97	21.93	6.86	0.686			0.626 0.686				
	M													
	N	10	10	13.50 13.60	19.32 19.23	5.82	0,582 0,563			0.582 0.563		l		
43.2%	0	10	10	14.75	19.23	4,87	0.487	0.562	9.6	0.363	100.0	0.562	9.6	3.8
	P	10	10	14.73	20.45	6.14	0.614			0.487				
	Ô	10	10	12.64	18.78	6.14	0.614			0.614				
	R	10	10	13.87	19.42	5,55	0.555			0.555				
86.4%	S	10	10	13.79	19.42	5,63	0.563	0.606	10.3	0.563	100.0	0.606	10.3	-3.8
	r	10	10	14.52	21,42	6,90	0,690			0.690				}
	Û	10	10	13.50	18.82	5.32	0.532			0.532		 	· · · · · · · · · · · · · · · · · · ·	
	v	10	10	13.70	20,43	6,73	0.673			0.532				
100%	w	10	10	13.37	18.43	5.06	0.506	0.571	12.9	0.506	100.0	0,571	12.9	2.2
	X	10	10	14,50	20,21	5.71	0.571			0.571				
	Ÿ	10	8	13.84	19.21	5,37	0.671			0.537		1		
	ż	10	10	14.78	20.47	5.69	0,569			0,569				Į.
100% Intake	AA	10	10	14.71	20,22	5.51	0,551	0.620	11.2	0.551	95.0	0.586	11.7	-0.4
	BB	10	10	14.24	21,11	6.87	0.687			0.687				1

Outfall 101:

Dunnett's MSD value: PMSD:

Dunnett's MSD value:

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.

Intake: PMSD:

Lower PMSD bound determined by USEPA (10th percentile) = 12%. Upper PMSD bound determined by USEPA (90th percentile) = 30%.

Lower and upper PMSD bounds were determined from the 10th and 90th percentile, respectively, of PMSD data from EPA's WET Interlaboratory Variability Study (USEPA, 2001a; USEPA, 2001b).

USEPA. 2001a, 2001b. Final Report: Interlaboratory Variability Study of EPA Short-term Chronic and Acute Whole Effluent Toxicity Test Methods, Volumes 1 and 2-Appendix. EPA-821-B-01-005. US Environmental Protection Agency, Cincinnati, OH.

8207

Project number:

TVA / Sequoyah Nuclear Plant, Outfall 101 Non-treated August 14-21, 2012



Statistical Analyses

	-						
			La	rval Fish C	Frowth and Survi	val Test-7 Day G	rowth
Start Date:	8/14/2012		Test ID:	PpFRCR		Sample ID:	TVA / SQN 101
End Date:	8/21/2012		Lab ID:	ETS-Envir.	. Testing Sol.	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	August 20	12	Protocol:	FWCHR-E	PA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	Non-treat	ed					
Conc-%	1	2	3	4			
D-Control	0.5830	0.6150	0.5920	0.5440			
10.8	0.5350	0.6690	0.6860	0.6490			
21.6	0.6080	0.5590	0.6260	0.6860			
43.2	0.5820	0.5630	0.4870	0.6140			
86.4	0.6140	0.5550	0.5630	0.6900			
100	0.5320	0.6730	0.5060	0.5710			
Intake	0.5370	0.5690	0.5510	0.6870			

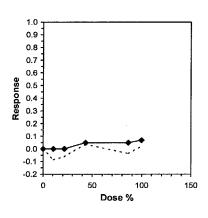
				Transforr	n: Untran	sformed			1-Tailed		Isot	onic
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	0.5835	1.0000	0.5835	0.5440	0.6150	5.069	4				0.6127	1.0000
10.8	0.6348	1.0878	0.6348	0.5350	0.6860	10.744	4	-1.242	2.410	0.0994	0.6127	1.0000
21.6	0.6198	1.0621	0.6198	0.5590	0.6860	8.465	4	-0.879	2.410	0.0994	0.6127	1.0000
43.2	0.5615	0.9623	0.5615	0.4870	0.6140	9.607	4	0,533	2.410	0.0994	0.5835	0.9524
86.4	0.6055	1.0377	0.6055	0.5550	0.6900	10.256	4	-0.533	2.410	0.0994	0.5835	0.9524
100	0.5705	0.9777	0.5705	0.5060	0.6730	12.860	4	0.315	2.410	0.0994	0.5705	0.9312
Intoko	0.5860	1.0043	0.5860	0.5370	0.6870	11 706	4					

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor		0.98195		0.884		0.03805	-0.4693			
Bartlett's Test indicates equal var	Bartlett's Test indicates equal variances (p = 0.82)						15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	0.09943	0.17041	0.00332	0.0034	0.4589	5, 18

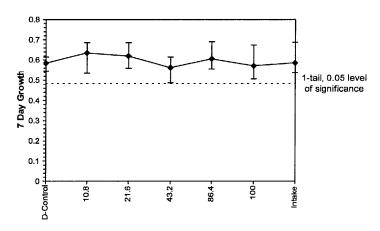
Treatments vs D-Control

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	87.934			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Dose-Response Plot





File: sqn101_081412data.xlsx
Entered by: J. Sumner
Reviewed by:

TVA / Sequoyah Nuclear Plant, Intake Non-treated August 14-21, 2012



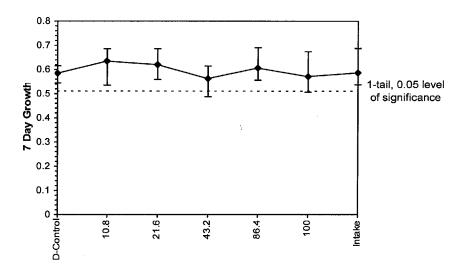
Statistical Analyses

			La	rval Fish G	rowth and Survi	val Test-7 Day G	rowth
Start Date:	8/14/2012		Test ID:	PpFRCR		Sample ID:	TVA / SQN 101 - Intake
End Date:	8/21/2012		Lab ID:	ETS-Envir.	Testing Sol.	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	August 20	12	Protocol:	FWCHR-E	PA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	Non-treat	ed					
Conc-%	1	2	3	4			
D-Control	0.5830	0.6150	0.5920	0.5440			
10.8	0.5350	0.6690	0.6860	0.6490			
21.6	0.6080	0.5590	0.6260	0.6860			
43.2	0.5820	0.5630	0.4870	0.6140			
86.4	0.6140	0.5550	0.5630	0.6900			
100	0.5320	0.6730	0.5060	0.5710			
Intake	0.5370	0.5690	0.5510	0.6870			

				Transform	n: Untran	sformed			1-Tailed	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.5835	1.0000	0.5835	0.5440	0.6150	5.069	4			
10.8	0.6348	1.0878	0.6348	0.5350	0.6860	10.744	4			
21.6	0.6198	1.0621	0.6198	0.5590	0.6860	8.465	4			
43.2	0.5615	0.9623	0.5615	0.4870	0.6140	9.607	4			
86.4	0.6055	1.0377	0.6055	0.5550	0.6900	10.256	4			
100	0.5705	0.9777	0.5705	0.5060	0.6730	12.860	4			
Intake	0.5860	1.0043	0.5860	0.5370	0.6870	11.706	4	-0.067	1.943	0.0726

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.88547		0.749		1.36005	1.98359
F-Test indicates equal variances (p = 0.20)	5.37752		47.4683			
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.07258	0.12439	1.2E-05	0.00279	0.94881	1, 6
Treatments vs D-Control						

Dose-Response Plot





File: sqn101_081412data.xlsx Entered by: J. Sumner Reviewed by: _____



Date:

08.14.12

Client: TVA / Sequoyah Nuclear Plant, Outfall 101, Non-treated

	/:			D	ay		
		(Analyst ider	ntified for each da			ductivity measu	rements only.)
	Analyst		0		1		2
		JB	3TB	JUB	হয়	JU	1900
Concentration	Parameter	tu taku u u t				,	
	pH (S.U.)	7.66	7.49	7.43	7.59	7.55	4.54
	DO (mg/L) Conductivity	7.7	7.9	7.7	7.8	7.9	79
CONTROL	(μmhos/cm)	306		313		310	
Non-treated	*Alkalinity	62		J. M. M.		62	
11011 ti tuttu	(mg CaCO ₃ /L) *Hardness			- 13			
•	(mg CaCO ₃ /L)	92				8&	
·····	*Temperature (°C)	24.7	24.6	74.9	24.7	24.8	24.7
	pH (S.U.)	7.62	7.44	7.44	7.52	7.45	7.52
10 80/	DO (mg/L)	7.7	7.9	8,0	7.8	7.9	તુવા
10.8%	Conductivity (µmhos/cm)	297		294		294	
	*Temperature (°C)	24.7	24.4	75.0	અ.૧	24.8	14.6
	pH (S.U.)	7.62	7.44	7.44	7.47	7.51	7.50
	DO (mg/L)	7.7	7.9	8,0	7.8	7.9	3.8
21.6%	Conductivity (µmhos/cm)	280		283		280	
	*Temperature (°C)	24.7	24.4	25.0	24.6	24.8	24.6
	pH (S.U.)	7.61	7.42	7.45	7.50	7.51	
	DO (mg/L)	7.7	7.8	8.0	7.9	8.0	7.50 7.0
43.2%	Conductivity	254		255		255	
	(μmhos/cm) *Temperature (°C)	24.1	24.4	35.0	24.6	54.8	24.8
	pH (S.U.)	7.60	7.39	7.45	7.51	7.51	7.48
	DO (mg/L)	7.6	7.8	8.0	7.9	8.0	7.0
86.4%	Conductivity	203		203		194	
	(µmhos/cm) *Temperature (°C)	24.7	24.3	75.6	74.6	24.8	24.6
	pH (S.U.)	7.60	7.42	7.42	7.54	7.53	
	DO (mg/L)	7.7	7.8	8.0	8.1	8.1	7,49 7,9
	Conductivity				V/ (- B
	(µmhos/cm)	183		183		186	
100%	*Alkalinity (mg CaCO ₃ /L)	72				70	
	*Hardness	72				או	
	(mg CaCO ₃ /L)						
	*TR chlorine (mg/L) *Temperature (°C)	74.8	24.4	25.0	ш.т	40.10	건.6
	pH (S.U.)				7.50	75.0	
·	DO (mg/L)	7.61	7.42	7.44 8.0	7.50 8.0	7.5Z 8.2	3.50
	Conductivity			186	-,-		
1000/	(µmhos/cm)	183		1.00		185	
100% Intake	*Alkalinity (mg CaCO ₃ /L)	68				68	
AHIANG	*Hardness	12.				74	
	(mg CaCO ₃ /L)						
	*TR chlorine (mg/L) *Temperature (°C)	< 0. (D	U U	74 4	ک ط۰٦	20.10	7,11.
	"1 emperature (°C)	ZS.O Initial	てく、イ Final	ટપ.9 Initial	Final	ZS · O Initial	Z4.6 Final

^{*}Temperatures performed at the time of test initiation, renewal or termination by the analyst identified in the Daily Renewal Information table located on Page 1.

Alkalinity, hardness and total residual chlorine performed by the analyst identified on the bench sheet specific for each analysis and transcribed to this bench sheet

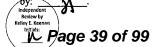




Client: TVA / Sequoyah Nuclear Plant, Outfall 101, Non-treated 08-14-12 Date: Day (Analyst identified for each day, performed pH, D.O. and conductivity measurements only.) 3 5 6 Analyst W MW **I** ঠ্য JB W JJB JB **Parameter** Concentration 6. 7301 1941 7.49 7.45 pH (S.U.) 7.60 7.57 7.44 236 DO (mg/L) 7.6 7.8 7.6 7.8 7.6 5.0 Conductivity 302 315 310 323 (µmhos/cm) CONTROL *Alkalinity Non-treated 62 (mg CaCO₃/L) *Hardness 88 (mg CaCO₃/L) 24.7 4.6 *Temperature (°C) ખ. ક 24.8 24. 74.1 24.6 75.1 4.57 8.0 pH (S.U.) 7.43 7.45 7.51 7.55 7.55 7.33 DO (mg/L) 7.6 7.8 8.0 7.8 8,0 7.8 10.8% Conductivity 2*8*S 285 285 298 (umhos/cm) *Temperature (°C) 24.9 24.9 74.*E* 24.6 24.7 24.8 24.3 75 · O 4.59 4.9 7.52 **pH** (S.U.) 7.43 7.33 7.52 1.55 7.55 7.33 DO (mg/L) 7.5 7.6 8,0 7.8 7.8 8.0 21.6% Conductivity 273 273 7 82 272 (µmhos/cm) 24.8 *Temperature (°C) 74.-૧મજ M.9 24.5 24.8 24.4 **74.**4 pH (S.U.) 7.37 7.42 7.51 7.51 7.52 7.56 7.34 2830(9) DO (mg/L) 7.6 8.0 7.8 7.8 8.0 43.2% Conductivity **a49** 259 246 248 (µmhos/cm) 24.9 24.6 <u> 24.5</u> *Temperature (°C) 24.8 74.7 24.8 24.4 24.4 pH (S.U.) }.50 7.42 7.45 7.34 7.45 7.52 7.3 7.53 DO (mg/L) 8.0 76 7.8 7.7 7.8 7.8 7.4 86.4% Conductivity 192 196 196 205 (umhos/cm) *Temperature (°C) 24.9 24.8 74.8 <u> અ: -</u> 24.9 24.5 24-7 24.6 7.57 pH (S.U.) 7.49 7.44 7.38 7.44 7.54 7.57 732 8.0 7.7 DO (mg/L) 7.7 7.8 7.8 8.0 8.0 7.9 Conductivity 181 177 183 179 (µmhos/cm) *Alkalinity 100% 72 (mg CaCO₃/L) *Hardness 74 (mg CaCO₃/L) 40.10 *TR chlorine (mg/L) 25.0 24.8 *Temperature (°C) 24.7 24.9 25.D 24·6 24.7 24.5 7.50 7.48 **pH** (S.U.) 7.43 7.54 7.43 7.39 7.54 7.33 9.1 80 DO (mg/L) 7.9 8.0 7.9 7.9 7.8 8.0 Conductivity 182 181 176 184 (µmhos/cm) 100% *Alkalinity 70 (mg CaCO₃/L) Intake *Hardness 72 (mg CaCO₃/L) *TR chlorine (mg/L) < 0.10 25.0 24.7 24.7 24.7 24.7 24.9 24.7 *Temperature (°C) 75. O Final Initial Final Initial Final Initial Initial Final

^{*}Temperatures performed at the time of test initiation, renewal or termination by the analyst identified in the Daily Renewal Information table located on Page 1.

Alkalinity, hardness and total residual chlorine performed by the analyst identified on the bench sheet specific for each analysis and transcribed to this bench sheet



TVA / Sequoyah Nuclear Plant, Outfall 101 - Non-treated August 14-21, 2012



Pimephales promelas Chronic Whole Effluent Toxicity Test EPA-821-R-02-013, Method 1000.0

Daily Chemical Analyses

Project number: 820

Concentration	Parameter	Da	y 0	Da	y 1	Da	y 2	Da	y 3	Day	14	Da	y 5	Day	y 6
		Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
	pH (SU)	7.66	7.49	7.43	7.59	7.55	7.54	7.49	7.49	7.60	7.45	7.67	7.57	7.44	7.36
	DO (mg/L)	7.7	7.9	7.7	7.8	7.9	7.9	7.6	7.8	7.6	7.8	7.6	7.8	7.6	8.0
	Conductivity (µmhos/cm)	306	1945	313		310		302		315		310		323	
Control	Alkalinity (mg/L CaCO ₃)	_62		建制建		62				62		(F-40)		2000	
	Hardness (mg/L CaCO ₃)	92				. 88	12.0			88				100	
	Temperature (°C)	24.7	24.6	24.9	24.7	24.8	24.7	24.8	24.7	24.8	24.6	24.7	25.1	24.7	24.6
	pH (SU)	7.62	7.44	7.44	7.52	7.45	7.52	7.57	7.43	7.52	7.45	7.51	7.55	7.55	7.33
10.00/	DO (mg/L)	7.7	7.9	8.0	7.8	7.9		8.0		7.9	7.8	8.0	7.8	7.8	8.0
10.8%	Conductivity (µmhos/cm)	297		294	100 400	294		285	APPENDIT	285		285		298	(10) and (1) 10) 100 (1) 40 (1)
	Temperature (°C)	24.7	24.4	25.0	24.7	24.8	24.6	24.9	24.9	24.8	24.6	24.7	25.0	24.8	24.3
	pH (SU)	7.62	7.44	7.44	7.47	7.51	7.50	7.59		7.52	7.33	7.52	7.55	7.55	7.33
21.6%	DO (mg/L)	7.7	7.9	8.0	7.8	7.9		7.9		7.9	7.6	8.0	7.8	7.8	8.0
21.076	Conductivity (µmhos/cm)	280		283	15,415,13,41	280		273	COLORED ALCOHOLOGIC	272		273	4 15 T	282	
	Temperature (°C)	24.7	24.4	25.0	24.6	24.8	24.6	24.9	24.9	24.8	24.5	24.7	24.8	24.9	24.4
	pH (SU)	7.61	7.42	7.45	7.50	7.51	7.50	7.59		7.51	7.37	7.51	7.52	7.56	7.34
43.2%	DO (mg/L)	7.7	7.8	8.0	7.9	8.0		7.9		7.9	7.6	8.0	7.8		8.0
43.270	Conductivity (µmhos/cm)	254		255		255	1	249		248		246		259	Sec.
	Temperature (°C)	24.7		25.0	24.6	24.8		24.9		24.8	24.5	24.7	24.8		24.4
-	pH (SU)	7.60		7.45		7.51		7.58		7.45	7.34	7.45	7.52	7.53	7.31
86.4%	DO (mg/L)	7.6	7.8	8.0	7.9	8.0		8.0		7.8	7.7	8.0	7.8		7.9
30.4 /0	Conductivity (µmhos/cm)	203		203		194		192	Takili ik	196	SECTION SECTION	196		205	
	Temperature (°C)	24.7		25.0	24.6	24.8		24.9		24.8	24.7	24.7	24.6		24.5
	pH (SU)	7.60		7.42	7.54	7.53		7.57		7.44	7.38	7.44	7.57		7.32
	DO (mg/L)	7.7	7.8	8.0	8.1	8.1	7.9	8.0		7.8	7.7	8.0	8.0		7.9
	Conductivity (µmhos/cm)	183		183		186	att wands to ever that or in all recent	181	ar in the second	179		177		183	
100%	Alkalinity (mg/L CaCO ₃)	72				70	Close Said - Said Transletonic	syfit oddi		72					
	Hardness (mg/L CaCO ₃)	72			201	71	page in the constraint of the constraint			74	1707.01		er i deski		
	Total Residual Chlorine (mg/L)	< 0.10				<0.10	SCIONIA PARAMETRIS CONTRACTOR CON			<0.10					der til
	Temperature (°C)	24.8	24.4	25.0		25.0		25.0		25.0	24.7		24.7	24.9	24.5
	pH (SU)	7.61	7.42	7.44		7.52		7.58		7.43	7.39		7.54		
	DO (mg/L)	7.7	7.9	8.0	8.0	8.2		8.1		7.9	7.9				
	Conductivity (µmhos/cm)	183		186		185	150000 00000000000000000000000000000000	182		181		176		184	
100% Intake	Alkalinity (mg/L CaCO ₃)	68				68	Carried Britain The Control of Co			70					
	Hardness (mg/L CaCO ₃)	72				74	P. Harris St. P. Branch and D. C.		14 34 4 34	72					THE CHIEF PROPERTY.
1	Total Residual Chlorine (mg/L)	<0.10				<0.10				<0.10					
	Temperature (°C)	25.0	24.4	24.9	24.7	25.0	24.6	25.0	24.7	25.0	24.7	24.7	24.7	24.9	24.7

File: sqn101_081412chem.xls Entered by: J. Sumner Reviewed by: _____



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

Client: Tennessee Valley Authority Facility: Sequoyah Nuclear Plant

County: Hamilton Outfall: 101

NPDES #: TN0026450 Project #: 8201

Dilution prepara	tion info	Comments:					
Dilution prep (%)	10.8	21.6	43.2	86.4	100		
Effluent volume (mL)	270	540	1080	2160	2500		
Diluent volume (mL)	2230	1960	1420	340	0		
Total volume (mL)	2500	2500	2500	2500	2500		

Test organism sourc	Test organism source information:								Test information:				
Organism age: Date and times organisms were born between:				< 24-hours old						Randomizing template color:	GOUD		
			0	8-14-	12	065	7 0.	, 0	130	modelator number and short	282		
Culture board:	08	•01-	17_	A	A						location:		
Replicate number:	1	2	3	4 5 6 7 8 9 10		YWT batch:							
Culture board cup number: 12 13 24		20	51	12	28	31	33	24	35	I WI DAICH:	08-08-15		
Transfer vessel information:			11	S.U. Temperature = 24.9 °C					°C	Selenastrum batch:	43.13		
Average transfer volume (mL	Average transfer volume (mL): 0.032			7-	4						Setenastrum batch:	07.31-12	

Daily renewal information:

Day	Date	Test initiation and feeding,	MHSW	Sample nu	mbers used	Analyst
		renewal and feeding, or termination time	batch used	Outfall 101	Intake	-
0	08-14-13	1148	08-12-12	120813.01	120813.02	H
1	08-15-12	1050	08-12-12	120613.01	120813.02	_X
2	08.16.12	1049	08-14-12	120815.10	120815.11	_X_
3	08.17.12	1050	08-14-12	120815.10	120815.11	-X
4	08-18-12	1052	08-16-12	120817.08	120817.09	_¥
5	08-19-12	1049	04.16.12	120817.05	120817.09	1
6	08-2012	1048	08.16.12	120817.08	120817.09	<u>_ K</u>
7	Of. 51-12	1053				λ

Control information:				Summary of test endpoints:			
	Control-1	Control-2	Acceptance criteria				
% of Male Adults:	07.	07.	≤20%	7-day LC ₅₀	>1007.		
% Adults having 3 rd Broods:	1007.	/007.	≥ 80%	NOEC	1007.		
% Mortality:	07.	07.	≤20%	LOEC	>1007.		
Mean Offspring/Female:	31.2	31.3	≥ 15.0 offspring/female	ChV	>1007.		
% CV:	6.27.	5.67.	< 40.0 %	IC ₂₅	71007.		



Species: Ceriodaphnia dubia

Client: TVA / Sequoyah Nuclear Plant, Outfall 101
CONTROL-1 | 101 Date: ______ O וו 101 Date: ______ O וו 101 Date

CONTROL-1		Survival and Reproduction Data										
		Replicate number										
Day		1	2	3	4	5	6	7	8	9	10	
1	Young produced	0	0	0	Ó	0	0	Q	0	0	0	
	Adult mortality		L		C	L	L		L	L	J	
2	Young produced	0	D	0	0		0	0	0	0	0	
	Adult mortality	L	C	L	C	C	L	C	L	L	L	
3	Young produced	0	0	0	0	0	0	0	0	0	0	
	Adult mortality	L	J	L	-	L	L	C	C	C	J.	
4	Young produced	~	4	પ	5	5	S	S	6	P	L	
	Adult mortality	U	<u> </u>	<u></u>	_	<u> </u>		L	<u> </u>	_	J	
- 5	Young produced	11	11	10	12	10	9	12	11	11	11	
	Adult mortality	L	ر	L	<u> </u>	<u>_</u>	L	· L	L	L	J	
6	Young produced	0	Ó	0	0	0	0	0	0	0	0	
	Adult mortality	J	<u></u>				L		L	L		
7	Young produced	14	-18 	15	16	16	14	17	15	15	15	
Total young produced		30	93¢	~29	33	31	28	34	32	3 0	37	
Final Adult Mortality		<u></u>	7	Ç			L	_	C		J	
X for 3 rd Broods Note: Adult mortality (L=live, D=dead).		L X	<u> </u>		人			<u> </u>	× .	乂	<u> ~</u>	

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	31.2

CONC: 10.8%

Survival and Reproduction Data

		Replicate number									
Day		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	U	L	L	L	L	L	L	L	L	C
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality		し	<u>_</u>	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	O	0	0	0
	Adult mortality	L	L	L	L	ر	L	L	L	L	~
4	Young produced	S	L	4	4	6	6	प	b	S	5
	Adult mortality	U	し		<u></u>	L	L	L	C	L	L
5	Young produced	13	12	11	12	12	10	13	12	12	12
	Adult mortality	し)	L	<u></u>	L		L	L	L	
6	Young produced	0	0	0	0	0	0	0	0	0	
	Adult mortality	C	Ú	را		١	L	l	U	U	
7	Young produced	18	16	18	17	17	19	17	16	14	15
Total you	Total young produced		34	33	33	35	35	34	34	31	37
Final Adult Mortality		U	L.	L		L	J	L	J	Ĺ	J

Note: Adult mortality (L = live, D = dead), SB = split broad (single broad split between two days), CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	33.7
% Reduction from Control-1:	-8.01.





CONC: 21.6% Survival and Reproduction Data

001101	41.0 /0	237.1.1.11 220p. 0311001012 2111										
		Replicate number										
Day		1	2	3	4	5	6	7	8	9	10	
1 .	Young produced	0	0	0	O	0	0	0	Ö	O	0	
	Adult mortality	ر	L	J	J		L	L	J	J	J	
2	Young produced	0	0	0	0	0	0	0	0	0	0	
	Adult mortality			J	ر	ر	L	J	J	ر	ر	
3	Young produced	0	0	0	9	0	0	0	0	0	0	
	Adult mortality	J		L	J			J	ر	J	<u> </u>	
4	Young produced	5	5	S	S	L L	S	S	प	P	Ч	
	Adult mortality	J	L	J	ر	L	L	١	ر	J		
5	Young produced	13	11	12	10	10	13	13	13	11	13	
	Adult mortality	J	7		<u> </u>	<u>_</u>	ر	ر	ر	J	J	
6	Young produced	0	0	0	0	0	0	0	O	0	0	
	Adult mortality	ر	7	し				J	J			
7	Young produced	18	15	16	ماد	14	19	17	16	17	13	
Total you	ing produced	dE	16	33	31	30	<u>چ</u>	35	33	32	30	
Final Adı	ult Mortality	٦		J				_ _	_	J	J	

Note: Adult mortality (L = live, D = dead), SB = split brood (single brood split between two days), CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	32.8
% Reduction from Control-1:	-5.17.

CONC: 43.2%

Survival and Reproduction Data

CONC:	43.270	Survival and Reproduction Data										
		Replicate number										
Day		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		C	L	C	し		L	L	L		
2	Young produced	0	0	0	0	0	0	0	0	0	ပ	
	Adult mortality	ر	L	L	J	U	J	ر	J	L		
3	Young produced	0	2	0	0	0	0	.0	0	0	0	
	Adult mortality		J	_	L	L	L	ر	L	J	را	
4	Young produced	6	S	S	Y	5	S	6	S	प	S	
	Adult mortality	し	ل	L	L	L	L	ر	١	ر	J	
5	Young produced	13	12	12	12	11	11	12	14	12	12	
	Adult mortality	١	ر	J	Ĺ	L	J	ر	J	ر	ر	
6	Young produced	0	0	0	0	0	0	0	0	0	0	
	Adult mortality	J	ر		J	ت	L	Ĺ	Į)	J	
7	Young produced	18	17	17	15	15	15	19	15	18	18	
Total you	ing produced	ঙৌ	34	34	31	31	31	31	34	34	35	
Final Ad	ult Mortality				L	L	L	L	L		C	

Note: Adult mortality (L = live, D = dead), SB = split brood (single brood split between two days), CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	33.8
% Reduction from Control-1:	-8.37.





Client: TVA / Sequoyah Nuclear Plant, Outfall 101 Date: 08:14-12

CONC: 86.4% Survival and Reproduction Data

CONC:	80.4%	Survival and Reproduction Data										
		Replicate number										
Day		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	J	ر	L	し	L	L			L	L	
2	Young produced	0	0	0	0	0	0	0	0	0	0	
	Adult mortality	J	J	L	Ü	J	L	ر	ر	J	L	
3	Young produced	0	0	0	0	0	0	0	0	0	0	
	Adult mortality	ر	_	L	J	<u>_</u>	L	J	ر	ر	J	
4	Young produced	S	٦	S	S	P	S	6	5	6	6	
	Adult mortality	١	Ú		J	L	J	J	J	J	٠ ر	
5	Young produced	13	12	12	11	12	12	14	12	13	13	
	Adult mortality	ر	ر	J	ل	J	L	J		J		
6	Young produced	0	0	0	0	0	0	0	0	0	0	
	Adult mortality	U	ĺ		ر	ر	L	ر	را	Ĺ	J	
7	Young produced	16	15	19	18	19	16	प्प	18	17	16	
Total you	ing produced	34	34	36	34	35	33	34	35	ვ ხ	31	
Final Ad	ult Mortality	L	<u> </u>	L	<u></u>	L	J	C.			J	

Note: Adult mortality (L = live, D = dead), SB = split brood (single brood split between two days), CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	△7.
Mean Offspring/Female:	34.8
% Reduction from Control-1:	-11.57.

CONC: 100%

Survival and Reproduction Data

							<u> </u>				
						Replicate	e number				
Day	,	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	ر	ر		L		L	L	J	L	
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	ر	J	L	J	L	L	J	<u> </u>	J
3	Young produced	0	0	٥	0	0	0	0	0	\circ	0
	Adult mortality	J	し	J	L	L	L	~	J	U	L
4.	Young produced	ی	٦	5	6	S	S	5	6	6	6
	Adult mortality	L	L	ل	L	J	L	L	١	L	L
5	Young produced	14	12	13	12	12	14	13	13	13	13
	Adult mortality	ر		C	L	L	L	U		C	L
6	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	J	L	ſ	L	L	L	J	J	C	L
7	Young produced	18	18	19	16	15	19	17	20	18	19
Total you	ing produced	૩૪	37	31	34	32	38	35	39	31	38
Final Ad	ult Mortality	L	L		ر	L	ر	J	ſ	J	J

Note: Adult mortality (L = live, D = dead), SB = split brood (single brood split between two days), CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	36.5
% Reduction from Control-1:	-17.07.



Client: TVA / Sequoyah Nuclear Plant, Outfall 101 Date: O&-14-17

CONTROL-2 Survival and Reproduction Data

COIT	Survival and Reproduction Data											
		Replicate number										
Day		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	J	U	U	L	し	L	L	L	L	_	
2	Young produced	0	0	0	0	0	0	0	0	0	0	
	Adult mortality	J	ر	L	L	L		L				
3	Young produced	O	0	0	0	0	0	0	0	0	O	
	Adult mortality			J	し	J		L	L		J	
4	Young produced	प	S	5	5	l _o	4	प	7	Ч	प	
	Adult mortality	J	J	_		<u>_</u>	L	J	J	J	J	
5	Young produced	10	12	13	12	10	10	10	13	11	12	
	Adult mortality	ر	J	L	J	J	L	ر	C	Ĺ	J	
6	Young produced	0	0	0	0	0	0	0	0	0	0	
	Adult mortality		C	U	て	L	J	J	ر		U	
7	Young produced	16	17	16	14	16	15	18	14	14	15	
Total young produced		350	74	34	34	32	29	32	31	29	3\	
	ult Mortality	L	し	J	L	U	J	C	L	_		
X for 3 rd Broods		X	X	X	X	×	×	*	×	×	\times	

Note: Adult mortality (L = live, D = dead), SB = split brood (single brood split between two days), CO = carry over (offspring carried over with adult during transfer)

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	31.3

CONC: 100% Intake

Survival and Reproduction Data

	10070 IIItuike						<u> </u>					
	•	Replicate number										
Day		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	J	ر	L	L	L	L	ر	L	L		
2	Young produced	0	0	0	0	0	0	0	0	0	6	
	Adult mortality	J	ر	L	L	J	ر	J	L		ر	
3	Young produced	Q	0	D	0	0	0	0	O	0	0	
	Adult mortality		ر	し	L	L	J	J	ر	Ļ	J	
4	Young produced	و	4	6	5	S	7	5	5	Ч	د	
	Adult mortality	L	J	_		C	J	J	C	<u> </u>	U	
5	Young produced	11	12	. 12	13	10	14	12	12	13	11	
	Adult mortality	J	J	_		ر	Ĺ		J		Ĺ	
6	Young produced	0	0	0	0	0	0	0	0	0	0	
	Adult mortality			را		ر	Ĺ	L	J	Ų	Ĺ	
7	Young produced	16	13	15	15	18	15	16	15	19	17	
Total you	ung produced	33	29	33	33	33	36	33	32	36	34	
Final Ad	ult Mortality	U	_		j	J	L		ſ	Ú	Ĺ	

Note: Adult mortality (L = live, D = dead), SB = split brood (single brood split between two days), CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	33.2
% Reduction from Control-2:	-6.17.

TVA / Sequoyah Nuclear Plant, Outfall 101 - Non-treated August 14-21, 2012



Verification of Ceriodaphnia Reproduction Totals

Control-1

Day				Re	plicate	e num	ber				Total
Day	1	2	3	4	5	6	7	8	9_	10	Total
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	4	4	5	5	5	5	6	4	6	49
5	_11	11	10	12	10	9	12	11	11	11	108
6	0	0	0	0	_ 0	0	0	0	0	0	0
7	14	18	15	16	16	14	17	15	15	15	155
Total	30	33	29	33	31	28	34	32	30_	32	312

86.4%

00.770											
Davi				Re	plicate	e numi	ber				Total
Day	1	2	3	4	5	6	7	8	9	10	Total
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	7	5	5	4	5	6	5	6	6	54
5	13	12	12	11	12	12	14	12	13	13	124
6	0	0	0	0	0	0	0	0	0	0	0
7	16	15	19	18	19	16	14	18	_17	18	170
Total	34	34	36	34	35	33	34	35	36	37	348

10.8%

Day				Re	plicate	e num	ber				Total
Day	1	2	3	4	5	6	7	8	9	10	10121
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	6	4	4	6	6	4	6	5	5	51
5	13	12	11	12	12	10	13	12	12	12	119
6	0	0	0	0	0	0	0	0	0_	0	0
7	18	16	18	17	17	19	17	16	14	15	167
Total	36	34	33	33	35	35	34	34	31	32	337

100%

Davi	L			Re	plicate	e num	ber				Total
Day	1	2	3	4	5	6	7	8	9	10	Totai
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	7	5	6	5	_5	5	6	6	6	57
5	14	12	13	12	12	14	13	13	13	13	129
6	0	0	0	0	0	0	0	0	0	0_	0
7	18	18	19	16	15	19	17	20	18	19	179
Total	38	37	37	34	32	38	35	39	37	38	365

21.6%

Davi				Re	plicate	num	ber		_		Total
Day	1	2	3	4	5	6	7	8	9	10	1 otai
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	5_	6	_5	5	4	4	4	48
5	13	11	12	10	10	13	13	_13	11_	13	119
6	0	0	0	0	0	0	0	0	0	0	0
7	18	15	16	16	14	19	17	16	17_	13	161
Total	36	31	33	31	30	37	35	33	32	30	328

Control-2

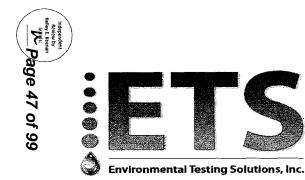
Day				Re	plicate	e num)	per				Total
Day	1	2	3	4	5	6	7	8	9	10	Total
1	0	0	0	0	0	0	0	0	Ö	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0_	0	0	0	0	0_	0
4	4	5	5	5	6	4	4	4	4	4	45
5	10	12	13	12	10	10	10	13	11	12	113
6	0	0	0	0	0	0	0	0	0	0	0
7	16	17	16	14	16	15	18	14	14	15	155
Total_	30	34	34	31	32	29	32	31	29	31	313

43.2%

Day				Re	plicate	e num	ber				Total
Day	1	2	3	4_	5	6	7	8	9	10	I Otal
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	4	5	5	6	5	4	5	50
5	13	12	12	12	11	11_	12	14	12	12	121
6	0	0	0	0	0	0	0	0	0	0	0
7	18	17	17	15	_15	15	19	15	18	18	167
Total	37	34	34	31	31	31	37	34	34	35	338

100% Intake

Day				Re	plicat	e num	ber				Total
Day	1	2	3	4	5	6	7	8	9	10	Total
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	6	5	5_	7	_5	5	4	6	53
5	11	12	12	13	10	14	12	12	13	11	120
6	0	_0	0	0	0	0	0	0	0	0	0
7	16	13	15	15	18	15	16	15	19	17	159
Total	33	29	33	33	33	36	33	32	36	34	332



TVA / Sequoyah Nuclear Plant, Outfall 101 Non-treated August 14-21, 2012

Ceriodaphnia dubia Chronic Whole Effluent Toxicity Test EPA-821-R-02-013, Method 1002.0

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

Project number:

8207

Concentration					Replicate	number					Survival	Average reproduction	Coefficient of	Percent reduction from
(%)	1	2	3	4	5	6	7	8	9	10	(%)	(offspring/female)	variation (%)	control (%)
Control - 1	30	33	29	33	31	28	34	32	30	32	100	31.2	6.2	Not applicable
10.8%	36	34	33	33	35	35	34	34	31	32	100	33.7	4.4	-8.0
21.6%	36	31	33	31	30	37	35	33	32	30	100	32.8	7.6	-5.1
43.2%	37	34	34	31	31	31	37	34	34	35	100	33.8	6.7	-8.3
86.4%	34	34	36	34	35	33	34	35	36	37	100	34.8	3.5	-11.5
100%	38	37	37	34	32	38	35	39	37	38	100	36.5	6.0	-17.0
Control - 2	30	34	34	31	32	29	32	31	29	31	100	31.3	5.6	Not applicable
100% Intake	33	29	33	33	33	36	33	32	36	34	100	33.2	6.0	-6.1

Outfall 101:

Dunnett's MSD value:

2.021

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.

Intake: Dunnet PMSD:

PMSD:

Dunnett's MSD value:

1.459

Lower PMSD bound determined by USEPA (10th percentile) = 13%.

Upper PMSD bound determined by USEPA (90th percentile) = 47%.

Lower and upper PMSD bounds were determined from the 10th and 90th percentile, respectively, of PMSD data from EPA's WET Interlaboratory

Variability Study (USEPA, 2001a; USEPA, 2001b).

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.

USEPA. 2001a, 2001b. Final Report: Interlaboratory Variability Study of EPA Short-term Chronic and Acute Whole Effluent Toxicity Test Methods, Volumes 1 and 2-Appendix. EPA-821-B-01-004 and EPA-821-B-01-005. US Environmental Protection Agency, Cincinnati, OH.

TVA / Sequoyah Nuclear Plant, Outfall 101 Non-treated August 14-21, 2012

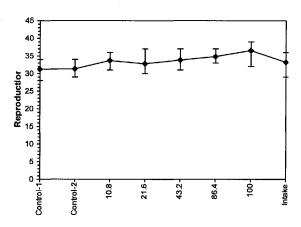


Statistical Analyses

Environmental Tes	ting Solutions, Inc											
			Ceriod	aphnia Sı	ırvival and	Reprod	luction Tes	st-Repro	duction			
Start Date:	8/14/2012		Test ID:	CdFRCR			Sample ID);	TVA / SQI	N 101		
End Date:	8/21/2012		Lab ID:	ETS-Envi	r. Testing	Sol.	Sample Ty	ype:	DMR-Disc	harge Mo	nitoring R	eport
Sample Date:	August 20	12	Protocol:	FWCHR-I	EPA-821-F	R-02-013	Test Spec	ies:	CD-Cerioo	daphnia di	ubia	
Comments:	Non-treat											
Conc-%	1	2	3	4	5	6	7	8	9	10		
Control-1	30.000	33.000	29.000	33.000	31.000	28.000	34.000	32.000	30.000	32.000		
Control-2	30.000	34.000	34.000	31.000	32.000	29.000	32.000	31.000	29.000	31.000		
10.8	36.000	34.000	33.000	33.000	35.000	35.000	34.000	34.000	31.000	32,000		
21.6	36.000	31.000	33.000	31.000	30.000	37.000	35.000	33.000	32.000	30.000		
43.2		34.000		31.000	31.000	31.000		34.000		35.000		
86.4		34.000		34.000	35.000	33.000		35.000		37.000		
100		37.000		34.000	32.000	38.000		39.000		38.000		
Intake	33,000	29.000	33,000	33.000	33.000	36.000	33.000	32.000	36,000	34.000		
				T	11-4			D!:	4 T-!!- J		14	
Conc-%	Mean	N-Mean	Mean	Min	m: Untran Max	CV%		Rank Sum	1-Tailed Critical		Isote Mean	N-Mean
Control-1		0.9968		28.000	34.000	6.193		<u> </u>	OHLICAI		33.800	1.0000
Control-2		1.0000		29.000	34.000	5.645	10				33.000	1.0000
10.8		1.0767		31.000	36.000	4.435	10	140.00	75.00		33.800	1.0000
21.6		1.0479		30.000	37.000	7.578	10	122.00	75.00		33,800	1.0000
43.2		1.0799		31.000	37.000	6,660	10	136.50	75.00		33.800	1.0000
86.4		1.1118		33.000	37,000	3.532	10	151.00	75.00		33.800	1.0000
100		1.1661	36.500	32.000	39.000	5.954	10	150.50	75.00		33.800	1.0000
Intake		1.0607	33.200	29.000	36.000	5.991	10	100.00	70.00		50.000	1.0000
mano	00.200		00,200	20.000	00.000	0.001						
Auxiliary Test	ts						Statistic		Critical		Skew	Kurt
Kolmogorov D	Test indica	ates non-	normal dis	tribution (p	<= 0.05)		0.98421		0.895		-0.0927	-0.4597
Bartlett's Test							5.58769		15.0863			
The control me							0.12078		2.10092			
Hypothesis T			NOEC	LOEC	ChV	TU						
Steel's Many-0		Test	100	>100		1						
Treatments vs	Control-1											
Point	%	SD	0.59/	Linea CL	ır interpol Skew	ation (20	0 Resamp	ies)				
IC05	>100	30	3576	CL	Skew				,			
IC10	>100											
IC15	>100						1.0 T					
IC20	>100						0.9					
IC25	>100						- 4					
IC40	>100						0.8				i	
IC50	>100						0.7					
					_		0.6				ı	
							Response 1 0.5 1 0.5 1 0.2 1 0.2 1 0.2 1				- 1	
							5 0.4]					
							2 0.3 −					
							0.2 }				1	
							0.1				1	
							0.0		•	→		
							-0.1					
							-0.2			-		
							-0.3 🖡		,	.,		
							0		50	100	150	

Dose-Response Plot

Dose %





TVA / Sequoyah Nuclear Plant, Outfall 101 Non-treated August 14-21, 2012



Statistical Analyses

Analysis use	d for PM	SD calcu	ılation or	ıly.								
			Ceriod	aphnia Su	rvival and	Reprod	uction Te	st-Repro	duction			
Start Date:	8/14/2012	2	Test ID:	CdFRCR			Sample II	D:	TVA / SQ	N 101		
End Date:	8/21/2012	2	Lab ID:	ETS-Envir	. Testing S	Sol.	Sample T	ype:	DMR-Dis	charge Mo	onitoring F	Report
Sample Date:	August 20	012	Protocol:	FWCHR-E	PA-821-F	-02-013	Test Spe	cies:	CD-Cerio	daphnia d	lubia	·
Comments:	Non-trea						_					
Conc-%	1	2	3	4	5	6	7	8	9	10		
Control-1	30.000	33.000	29.000	33.000	31.000	28.000	34.000	32.000	30.000	32.000		
Control-2	30.000	34.000		31.000	32.000	29.000	32.000	31.000	29.000	31.000		
10.8		34.000		33.000	35.000	35.000	34.000	34.000	31.000	32.000		
21.6	36.000	31.000		31.000	30.000	37.000	35.000	33.000	32.000	30.000		
43.2		34.000		31.000	31.000	31.000	37.000	34.000	34.000	35.000		
86.4		34.000		34.000	35.000	33.000	34.000	35.000	36.000	37.000		
100	38.000	37.000	37.000	34.000	32.000	38.000	35.000	39.000	37.000	38.000		
Intake	33.000	29.000	33.000	33.000	33.000	36.000	33.000	32.000	36.000	34.000		
				Transform	n: Untrans	sformed			1-Tailed			
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD		
Control-1	31.200	0.9968		28.000	34.000	6.193	10	*				
Control-2	31.300	1.0000	31.300	29.000	34.000	5.645	10					
10.8	33.700	1.0767	33.700	31.000	36.000	4.435	10	-2.828	2.287	2.021		
21.6	32.800	1.0479	32.800	30.000	37.000	7.578	10	-1.810	2.287	2.021		
43.2	33.800	1.0799	33.800	31.000	37.000	6.660	10	-2.941	2.287	2.021		
86.4	34.800	1.1118	34.800	33.000	37.000	3.532	10	-4.072	2.287	2.021		
86.4 100	34.800 36.500	1.1118 1.1661	34.800 36.500	33.000 32.000	37.000 39.000	3.532 5.954				2.021 2.021		
							10	-4.072	2.287			
100 Intake	36.500 33.200	1.1661 1.0607	36.500 33.200	32.000 29.000	39.000 36.000	5.954	10 10	-4.072	2.287		Skew	Kurt
100 Intake	36.500 33.200	1.1661 1.0607	36.500 33.200	32.000 29.000	39.000 36.000	5.954	10 10 10	-4.072	2.287 2.287		Skew -0.0927	Kurt -0.4597
100 Intake	36.500 33.200 is Test indic	1.1661 1.0607 ates non-	36.500 33.200 normal dis	32.000 29.000 stribution (p	39.000 36.000	5.954	10 10 10 Statistic	-4.072	2.287 2.287 Critical			
Auxiliary Test Kolmogorov D Bartlett's Test The control me	36.500 33.200 ts Test indic indicates e	1.1661 1.0607 ates non- equal variont signific	36.500 33.200 normal dis ances (p = antly differ	32.000 29.000 etribution (p 0.35) ent (p = 0.9	39.000 36.000 <= 0.05)	5.954 5.991	10 10 10 Statistic 0.98421 5.58769 0.12078	-4.072 -5.995	2.287 2.287 Critical 0.895 15.0863 2.10092	2.021	-0.0927	-0.4597
Auxiliary Test Kolmogorov D Bartlett's Test The control me Hypothesis Te	36.500 33.200 Test indic indicates e eans are n est (1-tail,	1.1661 1.0607 ates non- equal variont signific	36.500 33.200 normal disances (p = antly differ	32.000 29.000 etribution (p 0.35) ent (p = 0.9	39.000 36.000 <= 0.05)	5.954 5.991	10 10 10 Statistic 0.98421 5.58769 0.12078 MSDu	-4.072 -5.995 MSDp	2.287 2.287 Critical 0.895 15.0863 2.10092 MSB	2.021 MSE	-0.0927 F-Prob	-0.4597 df
Auxiliary Test Kolmogorov D Bartlett's Test The control me	36.500 33.200 Test indic indicates e eans are n est (1-tail,	1.1661 1.0607 ates non- equal variont signific	36.500 33.200 normal dis ances (p = antly differ	32.000 29.000 etribution (p 0.35) ent (p = 0.9	39.000 36.000 <= 0.05)	5.954 5.991	10 10 10 Statistic 0.98421 5.58769 0.12078	-4.072 -5.995	2.287 2.287 Critical 0.895 15.0863 2.10092	2.021	-0.0927	-0.4597



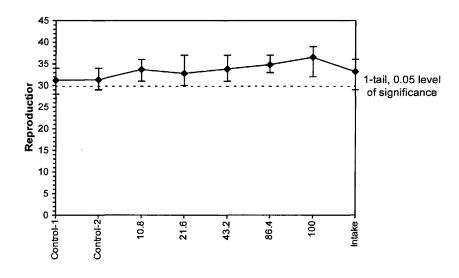
TVA / Sequoyah Nuclear Plant, Intake Non-treated August 14-21, 2012



Statistical Analyses

			Cariod	aphnia Su	ncival and	1 Penrod	luction Te	et-Penro	duction			
Start Date:	8/14/2012		Test ID:	CdFRCR	I VI Vai aiic	reprod	Sample I			N 101 - In	take	
End Date:	8/21/2012		Lab ID:	ETS-Envir.	Testing S	Sol	Sample 1			charge Mo		Report
Sample Date:				FWCHR-E	•		•			daphnia d		
Comments:	Non-trea					. 02 0 10	. 00. 000	0.00.	02 00.10	uupu		
Conc-%	1	2	3	4	5	6	7	8	9	10		
Control-1	30,000	33.000		33.000	31.000	28.000	34.000	32.000	30.000	32,000		
Control-2		34.000		31,000	32,000	29.000		31.000	29.000	31.000		
10.8	36,000	34.000	33.000	33.000	35.000	35.000	34.000	34.000	31.000	32.000		
21.6	36.000	31.000	33.000	31.000	30.000	37.000	35.000	33.000	32.000	30.000		
43.2		34.000		31.000	31.000	31.000	37.000	34.000	34.000	35.000		
86.4	34.000	34.000	36.000	34.000	35.000	33.000	34.000	35.000	36.000	37.000		
100	38.000	37.000	37.000	34.000	32.000	38.000	35.000	39.000	37.000	38.000		
Intake	33.000	29.000	33.000	33.000	33.000	36.000	33.000	32.000	36.000	34.000		
	· ·			Transform	n: Untran	sformed	_		1-Tailed			
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD		
Control-1	31.200	0.9968	31.200	28.000	34.000	6.193	10					
Control-2	31.300	1.0000	31.300	29.000	34.000	5.645	10	*				
10.8	33.700	1.0767	33.700	31.000	36.000	4.435	10					
21.6	32.800	1.0479	32.800	30.000	37.000	7.578	10					
43.2	33.800	1.0799	33.800	31.000	37.000	6.660	10					
86.4	34.800	1.1118	34.800	33.000	37.000	3.532	10					
100	36.500	1.1661	36.500	32.000	39.000	5.954	10					
Intake	33.200	1.0607	33.200	29.000	36.000	5.991	10	-2.258	1.734	1.459		
Auxiliary Tes	ts				· · ·		Statistic		Critical		Skew	Kurt
Shapiro-Wilk's	Test indic	ates norn	nal distribu	ition (p > 0.		0.91798		0.905		-0.1715	0.33113	
F-Test indicate	es equal va	ariances (p = 0.73	••	•		1.2669		6.54109			
The control me	eans are n	ot signific	antly differ	rent ($p = 0.9$		0.12078		2.10092				
Hypothesis T							MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedasti	c t Test ind	dicates no	significar	nt difference		1.45886	0.04661	18.05	3.53889	0.03657	1, 18	
Treatments vs	Control-2		-									

Dose-Response Plot





File: sqn101_081412data.xlsx Entered by: J. Sumner Reviewed by:



Species: <u>Ceriodaphnia dubia</u> Client: <u>TVA / Sequoyah Nuclear Plant, Outfall 101</u>

Date: 08.14.17

Daily Chemistry:									
		(Amplicatides	ntified for each da	Da v. parformed pl		Inotivity mas	romanta auto		
			timed for each da	y, periorinea pr	1, D.O. and cond	idenvity measu	2		
	Analyst	TB	JUS	JJB	UU	J33	1900		
Concentration	Parameter								
	pH (S.U.)	7.66	7.45	7.43	7.59	7.55	7.59		
	DO (mg/L)	7.7	7,8	7.7	8.0	7.9	8.1		
ı	Conductivity	306		313		310			
CONTROL	(µmhos/cm) *Alkalinity								
CONTRIOL	(mg CaCO ₃ /L)	62		M. W.W.		62			
	*Hardness	92				88			
	(mg CaCO ₃ /L) *Temperature (°C)	24.7	25.1	24.9	วร.0	24.9	շչ. Ն		
- i	pH (S.U.)		7.44	7.44	7.58	7.45	4.59		
	DO (mg/L)	7.7	7.8	8.0	8.0	7.9	9.1		
10.8%	Conductivity		178	2.94	0.0				
	(µmhos/cm)	297				294			
	*Temperature (°C)	24.7	24.9	24.9	<u>15.2</u>	24.9	25.0		
	pH (S.U.)	7.62	7.43	7.44	7.59	7.51	7.39		
21.6%	DO (mg/L) Conductivity	. 7.7	7.8	8.0	8.1	7.9	9.0		
21.070	(µmhos/cm)	280		283		280			
	*Temperature (°C)	24.1	24.9	24.9	15.0	24.9	25.0		
	pH (S.U.)	7.61	7,44	7.45	7.61	7.51	7.59		
	DO (mg/L)	7.7	7.9 -	8.0	8.	8.0	8.0		
43.2%	Conductivity (µmhos/cm)	254		255		2.55			
	*Temperature (°C)	24-7	24.8	25.0	24.9	25.0	25.0		
· ·· · · · · · · · · · · · · · · · ·	pH (S.U.)	7.60	7,43	7.45	7.6	7.51	4.50		
	DO (mg/L)	7.6	7.9	8.0	2.8	8.0	0.0		
86.4%	Conductivity (µmhos/cm)	203		Z03		194			
	*Temperature (°C)	24.8	75.0	25.0	24.9	25.0	રક.(
	pH (S.U.)	7.60	7.44	7.42	7.63	7.53	4,57		
	DO (mg/L)	7.7	7.9	8.0	8.7	8,1	49		
	Conductivity	183		183		186			
	(µmhos/cm) *Alkalinity			.~					
100%	(mg CaCO ₃ /L)	72				סר			
	*Hardness	72				71			
	(mg CaCO ₃ /L) *TR chlorine (mg/L)	< 0.10				40.10			
	*Temperature (°C)	24.9	হৈ . ০	75.0	24.9	25.0	ે પ્યુ. ૧		
	pH (S.U.)	7.61	7.45	7,44	7.64	7.52	4.57		
	DO (mg/L)	7.7	8,1	8,0	8.2	82	8.0		
	Conductivity			186		185			
1000/	(µmhos/cm)	183		106					
100% Intake	*Alkalinity (mg CaCO ₃ /L)	68				68			
AMMIN	*Hardness	72				74			
	(mg CaCO ₃ /L)								
	*TR chlorine (mg/L)	₹0.10	711 4	75 ^	76 1	<0.10	746		
	*Temperature (°C)	25. O	24.4 Final	ている。 Initial	ZS-1	ZS.]	24.9 Final		
		Initial	Final	Initial	Final	Initial	Final		

^{*}Temperatures performed at the time of test initiation, renewal or termination by the analyst identified in the Daily Renewal Information table located on Page 1. Alkalinity, hardness and total residual chlorine performed by the analyst identified on the bench sheet specific for each analysis and transcribed to this bench sheet by:

Page 51 of 99

SOP AT11 - Exhibit AT11.2, revision 07-01-12



Inserting Inse	ye."	Client: TVA / Seque	yah Nuclea	r Plant, Out	fall 101		Date:	1-41-30	<u> </u>	
Analyst Parameter Parame				(Analyst ident	ified for each d			ductivity meas	rements only)	
Concentration							i, D.O. and con	5		6
Concentration	V.	Analyst			<u> </u>		5\B	JUB	<u> </u>	
DH (SU) Que	Concen-		100				3.00			34
DO (mg/L)	tration	<u> </u>								
CONTROL Conductivity Conductivi							7.67	7.57		
CONTROL Cambos/cm) OUL Sib				8.0	7,6	8.0	7.6	7.8	7.6	8.2
Alkalinity			302		315		310		323	
***Plarduses	CONTROL	*Alkalinity	10.10.12		62		MANIE		Prair.	
Temperature (°C)		*Hardness	9/		83		- 3/		84	
DH (S.U)	١.		74 9	75.7	24.8	76.0	24.7	75.0	74.7	75.1
DO (mg/L)										
10.8%							1			
*Temperature (°C) 25.0 25.1 24.8 25.1 24.6 24.8 24.8 25.5 2	10.8%	Conductivity								
PH (S.U)				34						
DO (mg/L))	ш					25.0
21.6% Conductivity (umhos/cm) 273 272 273 282										
Conductivity (unhos/cm) 19-2 19-6 19	21 60/		38	7.9	7.9	8.	8.0	7.9	78	8,2
*Temperature (°C) 75.0 75.1 73.6 75.0 73.1 73.6 73.5 73.6 73.5 73.6 73.5 73.6 73.5 73.6 73.5 73.6 73.5 73.6 73.5 73.6 73.5 73.6 73.6 73.6 73.5 73.6 7	21.076		872		272		273		282	
PH (S.U.) Pi SP				75.]	24.8	75.0	7.4.1	₹4.8	74.6	25.0
DO (mg/L)			7.59							7.30
Conductivity (umhos/cm)			79						7.8	
#Temperature (°C)	43.2%						246		259	
PH (S.U.) P.50 7.61 7.45 7.53 7.45 7.55 7.53 7.28				24.8	24.8	24.6	24.7	741.8	24.6	25.3
Bo (mg/L)				7.61						
196 196 2.05 2.										
*Temperature (°C)	86.4%						196		205	20140
PH (S.U.) Ph (75.1		3.45	24.7	74.5	74.8	25.7
DO (mg/L)	<i>,</i>									
100% Conductivity										
*Alkalinity (mg CaCO ₃ /L) *Hardness (mg CaCO ₃ /L) *Tr chlorine (mg/L) *Co.10 *Temperature (°C) *Co.10 *To.										
100% Hardness (mg CaCO ₃ /L) *TR chlorine (mg/L) *TR chlorine (mg/L) *Temperature (°C) Z5.) Z4.8 Z5.0 Z4.8 Z5.0 Z4.9 Z5.2			181		179		177		183	
*Hardness (mg CaCO ₃ /L) *TR chlorine (mg/L) *Z\$. 1 *Z\$. 2 *Z\$.					72					
*TR chlorine (mg/L) *TR chlorine (mg/L) *TR chlorine (mg/L) *TR chlorine (mg/L) *TR chlorine (mg/L) *TR chlorine (mg/L) *TR chlorine (mg/L) *TR chlorine (mg/L) *TR chlorine (mg/L) *TR chlorine (mg/L) *TR chlorine (mg/L) *Temperature (°C) *To	١.				74					
*Temperature (°C)							the second			
PH (S.U.) 7.50 7.58 7.43 7.56 7.54 7.30 DO (mg/L) 0.1 8.0 7.9 8.2 8.0 7.8 8.2 100% Intake			76.1	74.0		2U F	าน 🕫	25.D	249	75.1
DO (mg/L) B.) 8.0 7.9 8.2 8.0 8.0 7.8 8.2 8.0 100 100% 164 176 184 176 184 176 184 176 184 176 184 176 184 176 184 176 184 176 184 176 184 176 184 176 184 176 184 176 184 176 184 176 184 176 184 176 184 18	·									
Conductivity (\(\mu\text{hmhos/cm}\) 181 176 184 100%			8.1							
(µmhos/cm)				34U		4.		5.0		
Intake		(µmhos/cm)	101		181		176		184	
*Hardness (mg CaCO ₃ /L) *TR chlorine (mg/L) *Temperature (°C) 25.0 24.7 24.9 24.7 24.8 24.7 24.9 25.1					70					
(mg CaCO3/L) *TR chlorine (mg/L) *Temperature (°C) な。 24.7 24.9 24.7 24.8 24.7 24.9 25.1		*Hardness								
*Temperature (°C) 25.0 24.7 24.9 24.7 24.8 24.7 24.9 25.1										
المنظم المراجع المساب المساب المنطقي المنطقة المنطقة المنطقة المناطقة المنا			75 1	7u "		74 7	746	294	24 4	7< 1
		Temperature (C)	Initial	Final	Lq. ¬	Final	Initial	Final	Initial	Final

^{*}Temperatures performed at the time of test initiation, renewal or termination by the analyst identified in the Daily Renewal Information table located on Page 1. Alkalinity, hardness and total residual chlorine performed by the analyst identified on the bench sheet specific for each analysis and transcribed to this bench sheet by:

SOP AT11 – Exhibit AT11.2, revision 07-01-12

Independent Review by Clear Experiment Page 52 of 99

Independent Review by Page 53 of 99 Environmental Testing Solutions, Inc.

TVA / Sequoyah Nuclear Plant, Outfall 101 - Non-treated August 14-21, 2012

Ceriodaphnia dubia Chronic Whole Effluent Toxicity Test EPA-821-R-02-013, Method 1002.0

Daily Chemical Analyses

Project number: 8207

Concentration	Parameter	Da	y 0	Da	y 1	Da	y 2	Da	y 3	Day	y 4	Day	7.5	Day	y 6
		Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
	pH (SU)	7.66	7.45	7.43	7.59	7.55	7.59	7.49	7.58	7.60	7.53	7.67	7.57	7.44	7.28
,	DO (mg/L)	7.7	7.8	7.7	8.0	7.9	8.1	7.6	8.0	7.6	8.0	7.6	7.8	7.6	8.2
	Conductivity (µmhos/cm)	306		313		310		302		315		310		323	
Control	Alkalinity (mg/L CaCO ₃)	62				62				62	70.00			Sign (45)	Plants
	Hardness (mg/L CaCO ₃)	92	195			88				88	THE RE				
	Temperature (°C)	24.7	25.1	24.9	25.0	24.9	25.2	24.9	25.2	24.8	25.0	24.7	25.0	24.7	25.1
	pH (SU)	7.62	7.44	7.44	7.58	7.45	7.59	7.57	7.58	7.52	7 <u>.54</u>	7.51	7.56	7.55	7.29
10.8%	DO (mg/L)	7.7	7.8	8.0	8.0	7.9	8.1	8.0	7.9	7.9	8.0	8.0	7.8	7.8	8.2
10.070	Conductivity (µmhos/cm)	297		294		294		285		285		285		298	
	Temperature (°C)	24.7	24.9	24.9	25.2	24.9	25.0	25.0	25.1	24.8	2 <u>5.1</u>	24.6	24.8	24.8	25.0
	pH (SU)	7.62	7.43	7.44		7.51	7.59	7.59	7.60		7.54	7.52	7.56	7.55	7.30
21.6%	DO (mg/L)	7.7	7.8	8.0		7.9	8.0	7.9	7.9		8.1	8.0	7.9	7.8	8.2
21.0 /0	Conductivity (µmhos/cm)	280	liga for a series	283		280		273		272		273		282	Mark Striff
	Temperature (°C)	24.7	24.9	24.9		24.9	25.0	25.0	25.1	24.8	25.0	24.7	24.8	24.8	25.0
	pH (SU)	7.61	7.44	7.45		7.51	7.59	7.59			7.54	7.51	7.56	7.56	7.30
43,2%	DO (mg/L)	7.7	7.9	8.0	8.1	8.0	8.0	7.9	7.9		8.1	8.0	7.9	7.8	8.2
73,2 /0	Conductivity (µmhos/cm)	254		255		255		249		248		246		259	
	Temperature (°C)	24.7	24.8	25.0		25.0		25.0		24.8	24.8		24.8	24.8	25.3
	pH (SU)	7.60	7.43	7.45		7.51	7.58	7.58	7.61	7.45	7.53	7.45	7.55	7.53	7.28
86.4%	DO (mg/L)	7.6	7.9	8.0	8.2	8.0		8.0	7.9	7.8	8.1	8.0	7.9	7.8	8.2
00.470	Conductivity (µmhos/cm)	203		203		194		192	1.7	196		196	SETTING SANGLES	205	6 5 A 4 4 4
	Temperature (°C)	24.8	25.0	25.0		25.0		25.1	25.1	24.8	24.8		24.9	24.8	25.2
	pH (SU)	7.60		7.42		7.53	7.57	7.57	7.61	7.44	7.54	7.44	7.55	7.54	7.29
	DO (mg/L)	7.7	7.9	8.0	8.2	8.1	7.9	8.0	7.9	7.8	8.1	8.0	7.9	7.8	8.3
	Conductivity (µmhos/cm)	183		183		186	Constitution of the constitution of	181	No. 219, 309, 649	179		177	S. 6, 4, 15, 15, 15	183	raging and the
100%	Alkalinity (mg/L CaCO ₃)	72	7.			70				72	7 - 162			* 10	
	Hardness (mg/L CaCO ₃)	72				71				74					
	Total Residual Chlorine (mg/L)	<0.10				<0.10	XIII II			< 0.10			and the second		
	Temperature (°C)	24.9	25.0	25.0		25.0		25.1	24.8	25.0	24.8		25.0	24.9	25.2
	pH (SU)	7.61 7.7	7.45	7.44		7.52		7.58		7.43	7.56		7.56	7.54	7.30
	DO (mg/L) Conductivity (µmhos/cm)	183	8.1	8.0 186		8.2 185		8.1 182	8.0	7.9 181	8.2	8.0 176	8.0	7.8 184	8.2
1000/ T-4-5-	Alkalinity (mg/L CaCO ₃)	68		180	2021.4. U.S.	68	NAME OF THE OWNER OF THE PARTY.	182		70	the second secon	1/0		184	
100% Intake	Hardness (mg/L CaCO ₃)	72		na filosofia (BAC) Calabara a composit		74				70	entra de la composición dela composición de la composición de la composición dela composición de la composición de la composición dela composición dela composición de la composición dela composición de la composición dela composición de				ostovika 1999. S Od postovi
	Total Residual Chlorine (mg/L)	< 0.10	aparosanti della			< 0.10			estation of the second of the	<0.10					
	Temperature (°C)	25.0	24.9	25.0	25.1	25.1	24.9	25.0	24.7	24.9	24.7	24.8	24.7	24.9	25.1
	Temperature (C)	23.0	24.9	25.0	23.1	23.1	24.9	∠3.0	24.7	24.9	24.7	24.8	24./	24.9	25.1

File: sqn101_081412chem.xls Entered by: J. Sumner Reviewed by: _____



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

Client: Tennessee Valley Authority
Facility: Sequoyah Nuclear Plant

County: Rhea
Outfall: 101

NPDES #: TN0020168
Project #: \$257

Dilution prepara	tion info	Comments:				
Dilution prep (%)	10.8	21.6	43.2	86.4	100	Each concentration was UV-treated
Effluent volume (mL)	270	540	1080	2160	2500	for 2 minutes to remove pathogenic
Diluent volume (mL)	2230	1960	1420	340	0	Interferences.
Total volume (mL)	2500	2500	2500	2500	2500	

Test organism information	on:	Test information:		
Organism age:	ZO.ZZ HOURS OLD	Randomizing template:	Bue.	
Date and times organisms were born between:	01-13-12 1600	Incubator number and shelf location:	38	
Organism source:	ATOX BATCH & 08-13-12	Artemia CHM number:	CHM652	
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Drying information for determination:	r weight	
Transfer bowl information:	pH = 7.60 S.U.	Date / Time in oven:	06.21.12	120
· ·	Temperature = 25.1 °C	Initial oven temperature:	60.C	
Average transfer volume:		Date / Time out of oven:	08.22.12	120
	0.1209ml	Final oven temperature:	60.0	
		Total drying time:	74.HOMS	ł

Daily feeding and renewal information:

Day	Date	Morning	feeding	Afternoon feeding		Test ini renew termir	al, or	Sample nu	mbers used	MHSW batch used
,		Time	Analyst	Time	Analyst	Time	Analyst	Outfall 101	Intake'	
0	08.14-12			1500	Al.	1213	لد	120413.01	120813.02	08-12-12
1	06.15.12	0700	X	1300	H	1115	\\ \dot{V}.	120413.01	120813.02	08-12-12
2	08.16.12	otis	X	1315	X	1114	الأ	120815.10	120815.11	08-14-12
3	08-17-12	0100	X	1300	Å.	1115	LX.	120815.10	120815.11	08-14-12
4	08.18.12	0915	الم	1515	Ä	1127	Ŋ.	120617.08	120817.09	08-16-12
5	08-19-12	0615	X	1415	3Î	1115	81	120817.08	120817:09	08.16.12
6	08.20.12	0100	Ä	1300	X	1114	H	120817.08	120817.09	08.16.12
7	08-21-12					1122	N.			¢.

Control information:		Acceptance criteria	Summary of t	est endpoints:
% Mortality:	07.	≤ 20%	7-day LC ₅₀	> 1007.
Average weight per initial larvae:	0.535		NOEC	1007.
Average weight per surviving larvae:	0.535	≥ 0.25mg/larvae	LOEC	> 1007.
			ChV	>1007.
			IC ₂₅	>1007.



Client: TVA / Sequoyah Nuclear Plant, Outfall 101, UV-treated Date: 08.14.12

					Survi	al and	Growt	h Data	!			
Day		CON	TROL				8%		<u> </u>		6%	
	Α	В	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	1.0	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	10	10	10	10	10	10	10	10
A = Pan weight (mg) Tray color code:: Light Blue Analyst: MHC Date: 08.00.12	12.88	14.40	15.49	14.63	13.33	14.62	14.26	12.84	14.35	13,19	14.06	13.11
B = Pan + Larvae weight (mg) Analyst: JQ Date: 05.27-12	17.98	19.28	21.36	20.16	20.06	20.21	Za57	16.78	2034	18.43	19.53	18.93
C = Larvae weight (mg) = B - A Hand calculated. Analyst:	\$,10	વ. ક&	s.\$7	5.53	6.73	5.59	6.31	5.94	s.99	ક.રન	5.41	5.82
			<35.0	. S.	6,63	وي.	· 83.0	765.0	845.0	. S.	र्थं.	. so.
Average weight per initial number of larvae (mg) Percent reduction from control (%)	ع.ه	35			ا، ن	44	- 14	.47.	٥٠٤	63	-5	.37.

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.

Comments:		
	·	





Date: 08.14-12 Client: TVA / Sequoyah Nuclear Plant, Outfall 101, UV-treated

·							Survival and Growth Data					
Day		43.	2%			86.	4%			10	0%	
	M	N	0	P	Q	R	S	T	U	V	W	X
0	10	Ø	10	ıο	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	/0	10	10	10	10	9.0	10	10	10	10
6	10	10	10	10	10	10	10	9	10	10	10	10
7	10	10	10	10	10	10	10	9 9	16	10	70	1SM
A = Pan weight (mg) Tray color code:: Light Blue Analyst: Mrf Date: 03:06-12	14.08	13.47	13.63	13.17	13.27	13.69	13,96	14.82	14.33	12.73	13.24	12.76
B = Pan + Larvae weight (mg) Analyst: 518 Date: 68.27.12	20.00	18.63	19.61	19,05	18.36	18.96	14.47	19.30	19.83	18, 38	18.50	17.70
C = Larvae weight (mg) = B - A Hand calculated. Analyst:	5.42	5.16	5.48	s. & &	s.o4	s.27	5.51	4.48	5.50	5.65	5.26	4.94
Weight per initial number of larvae (mg) = C / Initial number of larvae Hand calculated. Analyst: Average weight per Percent reduction								1			0.326	0. 18.7
initial number of larvae (mg)	0.9	s61	۲۵.	07.	۰.۰	509	۷.,	87.	٥,	534	0.	17.

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.

Comments:	1		



Client: TVA / Sequoyah Nuclear Plant, Outfall 101, UV-treated Date: 08.14-12_

					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	10	10	10	
A = Pan weight (mg) Tray color code:: Light Blue Analyst: Mix Date: 03.06.12	15.22	14.61	14.37		
B = Pan + Larvae weight (mg) Analyst:	21.43	Za.34	2.0.84	19.21	
C = Larvae weight (mg) = B - A Hand calculated. Analyst:	6,21	5.73	6.47	4.82.	
Weight per initial number of larvae (mg) = C / Initial number of larvae Hand calculated. Analyst:	249.0	0.55	339.	0. 2.	
Average weight per initial number of larvae (mg) Percent reduction from control (%)	0.	S&1	-8.	77.	

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.

Comments:	





TVA / Sequoyah Nuclear Plant, Outfall 101 **UV-treated** August 14-21, 2012

Pimephales promelas Chronic Whole Effluent Toxicity Test EPA-821-R-02-013, Method 1000.0

Quality Control

Verification of Data Entry, Calculations, and Statistical Analyses

LITTIO		_	•			i	Mar Car Car II	X 7 /		1		Project number:		82					
			r					nce Assessment, Inter											
Concentration (%)	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 (Mean weight per initial number of larvae) (%)	Percent reduction fro control (%)					
	A	10	10	12.88	17.98	5.10	0.510	· · -		0.510									
Control	В	10	10	14.40	19.28	4.88	0.488	0.535	8.3	0.488	100.0	0.535	8.3	N-4 P b.)					
Control	C	10	10	15.49	21.36	5.87	0.587	0,333	8.3	0.587	100.0	0,555	8.3	Not applicable					
	D	10	10	14.63	20.16	5.53	0.553			0.553									
	E	10	10	13.33	20.06	6.73	0.673	. –		0.673									
10.8%	F	10	10	14.62	20.21	5.59	0.559	0.614	8.0	0.559		0.614	8.0	-14.9					
10.676	G	10	10	14.26	20.57	6,31	0.631	0.014	8.0	0.631	100.0	0.614	8.0	-14.9					
	H	10	10	12.84	18.78	5.94	0.594			0.594									
	I	10	10	14.35	20.34	5.99	0.599			0.599									
21.6%	J	10	10	13.19	18.43	5.24	0.524	0.563	6.0	0.524	100.0	0.563							
21.070	K	10	10	14.06	19.53	5.47	0.547	0.363	6,0	0.547	100.0	0.503	6,0	-5.3					
	L	10	10	13.11	18.93	5.82	0.582			0.582									
	M	10	10	14.08	20.00	5.92	0.592			0.592			·						
43,2%	N	10	10	13.47	18.63	5.16	0.516	0,561	6,4	0.516	100.0	0.561	6.4	-5.0					
43.270	0	10	10	13.53	19.01	5.48	0.548	0,361	0,501	0,361	0.501	8	0,4	0.548	100.0	0.301	0,4	-5.0	
	P	10	10	13.17	19.05	5.88	0.588			0.588									
	Q	10	10	13.27	18.36	5.09	0.509			0.509									
86.4%	R	10	10	13.69	18.96	5,27	0.527	0.521	4.5	0.527	97.5	0.509	8.6	4.8					
00.476	S	10	10	13.96	19.47	5.51	0,551	0.321	4.5	0.551	97.5	0.309	0.0	4.0					
	Т	10	9	14.82	19.30	4.48	0.498			0.448									
	U	10	10	14.33	19.83	5.50	0.550			0.550									
100%	V	10	10	12.73	18.38	5.65	0.565	0,534	5.8	0.565	100.0	0.534	5.8	0.1					
10070	W	10	10	13.24	18.50	5,26	0,526	0.334	3.8	0.526	100.0	0.554	3.0	0.1					
	X	10	10	12.76	17.70	4.94	0.494]		0,494									
	Y	10	10	15.22	21.43	6.21	0.621			0,621									
100% Intake	Z	10	10	14.61	20.34	5.73	0.573	0.501	12.5	0.573	100.0	0.581	12.5	-8.7					
10070 Intake	AA	10	10	14.37	20.84	6.47	0.647	0.581	0.581	0.581	0.581	0.581		12.3	0.647	100.0	0.581	12.5	-0./
	BB	10	10	14.39	19.21	4.82	0.482	1		0.482				1					

Outfall 101:

Dunnett's MSD value:

MSD =

Minimum Significant Difference

PMSD:

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.

Intake:

Dunnett's MSD value:

PMSD:

Lower PMSD bound determined by USEPA (10th percentile) = 12%. Upper PMSD bound determined by USEPA (90th percentile) = 30%.

Lower and upper PMSD bounds were determined from the 10th and 90th percentile, respectively, of PMSD data from EPA's WET Interlaboratory Variability Study (USEPA, 2001a; USEPA, 2001b).

USEPA. 2001a, 2001b. Final Report: Interlaboratory Variability Study of EPA Short-term Chronic and Acute Whole Effluent Toxicity Test Methods, Volumes 1 and 2-Appendix. EPA-821-B-01-004 and EPA-821-B-01-005. US Environmental Protection Agency, Cincinnati, OH.

TVA / Sequoyah Nuclear Plant, Outfall 101 UV-treated August 14-21, 2012



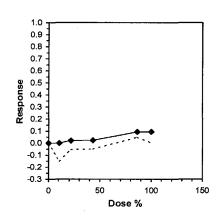
Statistical Analyses

			La	rval Fish G	rowth and Survi	val Test-7 Day G	rowth
Start Date:	8/14/2012		Test ID:	PpFRCR		Sample ID:	TVA / SQN 101
End Date:	8/21/2012		Lab ID:	ETS-Envir.	Testing Sol.	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	August 20	12	Protocol:	FWCHR-E	PA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	UV-treated	1				· · · · · · · · · · · · · · · · · · ·	
Conc-%	1	2	3	4			
D-Control	0.5100	0.4880	0.5870	0.5530		<u></u>	
10.8	0.6730	0.5590	0.6310	0.5940			
21.6	0.5990	0.5240	0.5470	0.5820			
43.2	0.5920	0.5160	0.5480	0.5880			
86.4	0.5090	0.5270	0.5510	0.4480			
100	0.5500	0.5650	0.5260	0.4940			
Intake	0.6210	0.5730	0.6470	0.4820			

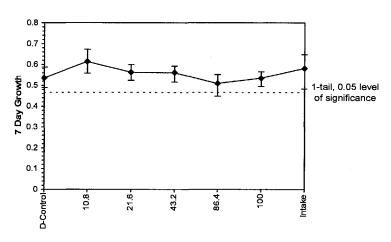
				Transforr	n: Untran	sformed		1-Tailed			onic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	0.5345	1.0000	0.5345	0.4880	0.5870	8.269	4			,	0.5744	1.0000
10.8	0.6143	1.1492	0.6143	0.5590	0.6730	7.973	4	-2.807	2.410	0.0685	0.5744	1.0000
21.6	0.5630	1.0533	0.5630	0.5240	0.5990	6.009	4	-1.003	2.410	0.0685	0.5630	0.9802
43.2	0.5610	1.0496	0.5610	0.5160	0.5920	6.414	4	-0.933	2.410	0.0685	0.5610	0.9767
86.4	0.5088	0.9518	0.5088	0.4480	0.5510	8.649	4	0.906	2.410	0.0685	0.5213	0.9075
100	0.5338	0.9986	0.5338	0.4940	0.5650	5.806	4	0.026	2.410	0.0685	0.5213	0.9075
Intake	0.5808	1.0865	0.5808	0.4820	0.6470	12.504	4					

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates nor	Shapiro-Wilk's Test indicates normal distribution (p > 0.01)						0.884		-0.1675	-1.1562
Bartlett's Test indicates equal var	iances (p =	0.97)			0.84084		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	0.06848	0.12811	0.00527	0.00161	0.02854	5, 18
Transferente un D. Control										

Treatments vs D-Control



Dose-Response Plot



File: sqn101_081412data-uv.xlsx Entered by: J. Sumner Reviewed by: _____

Independent Review by Page 59 of 99

TVA / Sequoyah Nuclear Plant, Intake UV-treated August 14-21, 2012



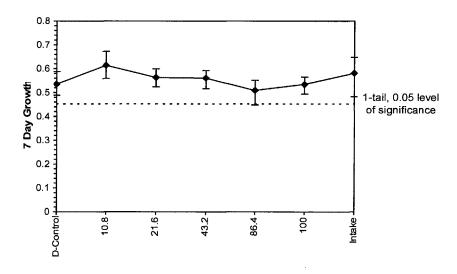
Statistical Analyses

			La	rval Fish G	Frowth and Survi	val Test-7 Day G	rowth
Start Date:	8/14/2012		Test ID:	PpFRCR		Sample ID:	TVA / SQN 101 - Intake
End Date:	8/21/2012		Lab ID:	ETS-Envir	. Testing Sol.	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	August 20	12	Protocol:	FWCHR-E	PA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	UV-treate	d _					
Conc-%	1	2	3	4			
D-Control	0.5100	0.4880	0.5870	0.5530			
10.8	0.6730	0.5590	0.6310	0.5940			
21.6	0.5990	0.5240	0.5470	0.5820			
43.2	0.5920	0.5160	0.5480	0.5880			
86.4	0.5090	0.5270	0.5510	0.4480			
100	0.5500	0.5650	0.5260	0.4940			
Intake	0.6210	0.5730	0.6470	0.4820			

		•		Transform	n: Untran	sformed		1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	_ t-Stat	Critical	MSD
D-Control	0.5345	1.0000	0.5345	0.4880	0.5870	8.269	4			
10.8	0.6143	1.1492	0.6143	0.5590	0.6730	7.973	4			
21.6	0.5630	1.0533	0.5630	0.5240	0.5990	6.009	4			
43.2	0.5610	1.0496	0.5610	0.5160	0.5920	6.414	4			
86.4	0.5088	0.9518	0.5088	0.4480	0.5510	8.649	4			
100	0.5338	0.9986	0.5338	0.4940	0.5650	5.806	4			
Intake	0.5808	1.0865	0.5808	0.4820	0.6470	12.504	4	-1.088	1.943	0.0826

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.95559		0.749		-0.6317	-0.2636
F-Test indicates equal variances (p = 0.44)	2.69933		47.4683			
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.0826	0.15453	0.00428	0.00361	0.31833	1, 6
Treatments vs D-Control						

Dose-Response Plot



File: sqn101_081412data-uv.xlsx
Entered by: J. Sumner
Reviewed by: _____

Independent Review by Kelley E. Keenan Injight: Page 60 of 99



Date: ____

08.14.12

Client: TVA / Sequoyah Nuclear Plant, Outfall 101, UV-treated

		,, ,			ay		
		(Analyst ider	tified for each da	ay, performed pl	H, D.O. and con	ductivity measu	rements only
	Analyst	TIS	JB	JIB	5535	202	Ken
Concentration	Parameter						
	pH (S.U.)	7.65	7.49	7.50	7,59	7.62	2.53
	DO (mg/L)	7.8	7.8	7.9	7.8	7.9	7.53 7.9
	Conductivity	302		309		302	
CONTROL	(µmhos/cm) *Alkalinity				-		-
UV-treated	(mg CaCO ₃ /L)	62		101.15 PL		61	
	*Hardness (mg CaCO ₃ /L)	84		8/		84	
	*Temperature (°C)	24.8	24.7	24.8	24.7	24.8	24.9
	pH (S.U.)	7.66	7.48	7.50	7.54	7.63	7.53
	DO (mg/L)	7.9	7.8	7,9	7.8	7.9	7.6
10.8%	Conductivity				:	293	
	(µmhos/cm)	294		Z48	1		
	*Temperature (°C)	24.9	24.5	24.8	24.7	24.9	75.0
	pH (S.U.)	7.66	7.47	7.50	7.52	7.62	2.52
21.6%	DO (mg/L) . Conductivity	7.9	7.7	7.9	7.9	7.9	7.0
21.070	(µmhos/cm)	28)		Z84		280	
	*Temperature (°C)	24.9	ટ પ. ક	24.8	24.7	24.9	24.8
43.2%	pH (S.U.)	7.66	7.45	7.49	7.54	7.02	7.52
	DO (mg/L)	7.9	7.7	7.9	7.9	8,0	3.9
	Conductivity	2.55		Z 58		257	
	(μmhos/cm) *Temperature (°C)	24.9	247	24.8	24.7	24.9	24.6
· · · · · · · · · · · · · · · · · · ·	pH (S.U.)	7.63	7.43	7.48	1.56	7.59	2.57
	DO (mg/L)	7.9	7.7	7.9	7,9	8.1	39
86.4%	Conductivity						
	(µmhos/cm)	204		207		207	
	*Temperature (°C)	24.9	24.7	24.9	ખ. 7	74.9	24.
	pH (S.U.)	7.6Z	7.43	7.48	7.54	7.59	7.49
	DO (mg/L) Conductivity	8.0	7.7	7.8	7.9	8,3	7.9
	(μmhos/cm)	186		188		186	
100%	*Alkalinity	with 10				70	
100 /6	(mg CaCO ₃ /L)	- 740				•0	
	*Hardness (mg CaCO ₃ /L)	72				72	
	*TR chlorine (mg/L)	<0.10				40.10	
	*Temperature (°C)	25.0	24.6	15.0	74.6	25.1	24.7
	pH (S.U.)	7.60	7.42	7.48	7.55	7.57	4.53
	DO (mg/L)	8.1	7.7	8.0	7.9	8.2	3.0
	Conductivity	186					
1000/	(µmhos/cm)			191		184	
100% Intake	*Alkalinity (mg CaCO ₃ /L)	70				70	
	*Hardness	71				72	
	(mg CaCO ₃ /L) *TR chlorine (mg/L)	40.10				<0.10	
	*Temperature (°C)	25.1	24.6	75.0	יולי	25.0	24.9
	remperature (C)	ے۔ ۱ Initial	Final	Initial	24.6	Initial	Final

^{*}Temperatures performed at the time of test initiation, renewal or termination by the analyst identified in the Daily Renewal Information table located on Page 1. Alkalinity, hardness and total residual chlorine performed by the analyst identified on the bench sheet specific for each analysis and transcribed to this bench sheet by:

Total residual chlorine was performed on non-treated Outfall 101 and Intake samples.

08.14.12

Date:

24.8

7.57

8.0

274

7.54

8.0

249

7.49

7.9

198

7.47

8.0

181

25.0

74.8

7.46

8.0

178

24.9

24.9

24.9

24.7

W.7

7.58

7.8

7.58

7.8

24.8

W.8

7.57

7.8

7.55

7.8

24.7

24.7

7.58

7.9

24.9

7.61

7.9

283

7.0

7.9

256

7.59

7.9

207

7.59

8.0

187

75.

7.59

7.9

189

25.1

75.0

25.0

25.0

24. S

24.6

24.6

W.3

24.2

7.32

80

54.2

7.34

78

7:33

7.9

7.33

7.9

7.3

7,9



Species: Pimephales promelas

*Temperature (°C)

*Temperature (°C)

pH (S.U.)

DO (mg/L)

Conductivity

(µmhos/cm)

pH (S.U.)

DO (mg/L)

Conductivity

(μmhos/cm)
*Temperature (°C)

pH (S.U.)

DO (mg/L)

Conductivity

(µmhos/cm)

pH (S.U.)

DO (mg/L)

Conductivity

(µmhos/cm)
*Alkalinity

(mg CaCO₃/L)
*Hardness

(mg CaCO₃/L)
*TR chlorine (mg/L)

pH (S.U.)

DO (mg/L)

Conductivity

(µmhos/cm)

*Alkalinity

*Hardness

(mg CaCO₃/L)

(mg CaCO₃/L)
*TR chlorine (mg/L)

*Temperature (°C)

*Temperature (°C)

*Temperature (°C)

21.6%

43.2%

86.4%

100%

100%

Intake

Client: TVA / Sequoyah Nuclear Plant, Outfall 101, UV-treated

Day (Analyst identified for each day, performed pH, D.O. and conductivity measurements only.) 3 4 6 Analyst 功多 J-B KW ರಡ J TU TJ 3VD Concen-**Parameter** tration 2.59 7.47 7.56 **pH** (S.U.) 7.40 7.59 7.01 7.62 7.34 DO (mg/L) **6.0** 8.0 7.8 7.6 6.1 7.9 7.9 7.8 Conductivity 303 299 298 316 (µmhos/cm) CONTROL *Alkalinity **UV-treated** 61 (mg CaCO₃/L) *Hardness 84 (mg CaCO₃/L) <u> 24.7</u> 74.8 24.6 *Temperature (°C) 24.9 24.9 24.8 24.9 24.5 7.62 pH (S.U.) 7.58 7.41 7.57 7.61 7.45 7.57 7.34 7.9 DO (mg/L) 7.6 7.9 0.0 7.8 8.0 7.8 7.8 10.8% Conductivity 282 291 292 285 (µmhos/cm)

25.D

25. D

7.56

7.9

271

7.55

7.9

7.50

8.0

197

7.50

8.1

178

72

7.47

8.1

178

70

72

20.10 24.9

40.10

25.1

246

25.0

15.0

24.8

24.6

24.6

7.38

24.7

7.41

75

24.7

24.5

7.42

7.7

7.5

7.46

7.8

7.41

7.8

24.7

24.8

24.8

24.6

7.45

7.7

7.42

7.8

24.6

24.6

7.43

7.8

7.45

7.8

7.45

7.8

25.0

4.63

8.0

277

25.1

7.62

0.0

255

7.101 8.1

204

25.1

4.01 8.1

182

25.1

182

25.1

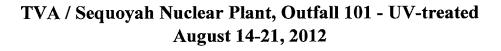
7.61 9.1

25.1

*Temperatures performed at the time of test initiation, renewal or termination by the analyst identified in the Daily Renewal Information table located on Page 1.

Alkalinity, hardness and total residual chlorine performed by the analyst identified on the bench sheet specific for each analysis and transcribed to this bench sheet by:

A. Total residual chlorine was performed on non-treated Outfall 101 and Intake samples.





Pimephales promelas Chronic Whole Effluent Toxicity Test EPA-821-R-02-013, Method 1000.0

Daily Chemical Analyses

Project number:

8207

Concentration	Parameter	Da		Da		Da	V	Da		Da		Day 5		Day 6	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
	pH (SU)	7.65	7.49	7.50	7.59	7.62	7.53	7.59	7.47	7.56	7.40	7.59	7.61	7.62	
	DO (mg/L)	7.8	7.8	7.9	7.8	7.9	7.9	8.0	7.8	8.0	7.6	8.1	7.9	7.9	
Gt1	Conductivity (µmhos/cm)	302		309	2005 F-13	302		303		299		298		316	
Control	Alkalinity (mg/L CaCO ₃)	62		5.00		61				61					
	Hardness (mg/L CaCO ₃)	84		State 1		84				84					
	Temperature (°C)	24.8	24.7	24.8	24.7	24.8	24.9	24.9	24.7	24.9	24.8	24.8	24.6	24.9	24
	pH (SU)	7.66	7.48	7.50	7.56	7.63	7.52	7.62	7.45	7.58	7.41	7.57	7.57	7.61	7.
10.00/	DO (mg/L)	7.9	7.8	7.9	7.8	7.9	7.8	8.0	7.8	8.0	7.6	7.9	7.8	7.9	
10.8%	Conductivity (µmhos/cm)	294		298		293		291		285	246	282		292	
	Temperature (°C)	24.9	24.5	24.8	24.7	24.9	25.0	25.0	24.7	25.0	24.8	24.8	24.7	24.9	. 2
	pH (SU)	7.66	7.47	7.50	7.52	7.62	7.52	7.63	7.45	7.56	7.46	7.57	7.58	7.61	7.
21 (0/	DO (mg/L)	7.9	7.7	7.9	7.9	7.9	7.8			7.9	7.8	8.0	7.8	7.9	
21.6%	Conductivity (µmhos/cm)	281	学生。 连是	284		280	7.734	277	1000	271		274		283	
	Temperature (°C)	24.9	24.8	24.8	24.7	24.9	24.8	25.1	24.8	25.0	24.8	24.9	24.7	25.0	2
43.29/	pH (SU)	7.66	7.45	7.49	7.54	7.62	7.52	7.62	7.45	7.55	7.41	7.54	7.58	7.61	7
	DO (mg/L)	7.9	7.7	7.9	7.9	8.0	7.9	8.0	7.8	7.9	7.8	8.0	7.8	7.9	
	Conductivity (µmhos/cm)	255		258		257		255		246		249	-144	256	
	Temperature (°C)	24.9	24.7	24.8	24.7	24.9	24.8	25.1	24.8	25.0	24.6	24.9	24.8	25.0	2
	pH (SU)	7.63	7.43	7.48	7.56	7.59	7.50	7.61	7.45	7.50	7.38	7.49	7.57	7.59	7
06.407	DO (mg/L)	7.9	7.7	7.9	7.9	8.1	7.9	8.1	7.7	8.0	7.5		7.8	7.9	
86.4%	Conductivity (µmhos/cm)	204		207		207		204		197		198		207	111
	Temperature (°C)	24.9	24.7	24.9	24.7	24.9	24.8	25.1	24.6	25.0	24.7	24.9	24.8	25.0	2
	pH (SU)	7.62	7.43	7.48	7.54	7.59	7.49	7.61	7.42	7.50	7.41	7.47	7.55	7.59	
	DO (mg/L)	8.0	7.7	7.8		8.3	7.9		7.8	8.1	7.5	8.0	7.8	8.0	
	Conductivity (µmhos/cm)	186		188	194	186		1 <u>8</u> 2		178		181	2.00	187	
100%	Alkalinity (mg/L CaCO ₃)	70				70				70					
	Hardness (mg/L CaCO ₃)	72	Charles and Charles were for the first			72		The strain of the state of the	704240	72			100 miles (150 100 miles (150 miles)		FEBRUARY Benefit Street
	*Total Residual Chlorine (mg/L)	<0.10		(*************************************		<0.10			i Kis	<0.10					Sept.
	Temperature (°C)	25.0	24.6	25.0	24.6	25.1	24.7	25.1	24.6	25.1	24.7	25.0	24.7	25.1	
	pH (SU)	7.60		7.48		7.57	7.53	7.61	7.43	7.47	7.42	7.46	7.58	7.59	
	DO (mg/L)	8.1	7.7	8.0	7.9	8.2	8.0			8.1	7.7	8.0	7.9	7.9	
	Conductivity (µmhos/cm)	186	THE PARTY OF THE P	191	1.00	184		182		178		178		189	5
100% Intake	Alkalinity (mg/L CaCO ₃)	70		7月10日		70	e de jarren			70					da verris a la ma cama ca
	Hardness (mg/L CaCO ₃)	71		"操业 ,并否。		72				72					- 4.5
	*Total Residual Chlorine (mg/L)	<0.10	granefi			<0.10		841.27 July		<0.10					1.建模型
	Temperature (°C)	25.1	24.6	25.0	24.6	25.0	24.9	25.1	24.6	24.9	24,5	24.8	24.7	25.1	

*Note: Total residual chlorine was performed on non-treated Outfall 101 and Intake samples.

File: sqn101_081412chem-UV.xls Entered by: J. Sumner Reviewed by: _____

		Page	76	
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Alkalinity (SM 2320 B)

Matrix: Water, $RL = 1.0 \text{ mg } CaCO_3/L$

Analyst	তত্ত	
Date analyzed	08.18.12	

Time initiated
Titrate samples to
pH = 4.5 S.U.

Time completed

Time initiated 1503
Time completed 1644

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 ₂ CO ₃ x 0.05)/E = 0.25/E (acceptable range = 0.0180 - 0.0220)	pH Factor or Multiplier = (N x 50000)/ 100 ml sample = N x 500
5.)	INR 484	Inss ioib	0.0	12.1	12.1	0.0207	10.3

Blk coir: 0.0- 0.0:0.0

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%)
INSS 1037	100	100	12.1	21.7	9.6	10.3	99	99.0%

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%)
00.4.12	WHRM	100	21.7	27.7	6.0	10.3	S 62	
ν	Duplicate (B)	7	27.7	33.7	6.0	7	D 62	

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)
INSS 1037	50	اعها	27.7	38.5	10.8	(0.3	110

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%)
62	48	96.0%

Sample measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg CaCO ₃ /L)
200100	MHSW	100	38.5	44.5	6.0	10.3	62
UB.12.n	l		0.0	6.0	6.0		62
00.13.12 4	Saet sw		6.0	17.3	11.3		120
00.13.RB			17.3	28.3	11.0		lio
08.17.12	1	1	28.3	39.2	10.9		110
	lakeline	50	39.2	45.7	<i>C.</i> 5	(2)	130
08-12-12	mHS W I	100	0.0	6,0	6,0		62
21-14-80	1 2		6.0	11.9	5.9		61
04-16-12	J 3	1	11.9	17.8	5.9		61

Reviewed by:	ed by:	Review
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Date reviewed: 00.19.12

Page	2	of 3	



Alkalinity (SM 2320 B) Matrix: Water, $RL = 1.0 \text{ mg } CaCO_3/L$

Titrate samples to pH = 4.5 S.U.

Analyst	JUS
Date analyzed	08.18.12

Time initiated Time completed

Titrant normality and multiplier determination:

pH of Deionized water	Titrant- reference	Normality check standard	Begin ml	End ml	Total	Normality (N) of H ₂ SO ₄ = (5 ml Na ₂ CO ₃ x 0.05)/E = 0.25/E	pH Factor or Multiplier = (N x 50000)/ 100 ml sample = N x 500
= 4.5 S.U.	number	number			(E)	(acceptable range - 0.0180 - 0.0220)	ZB 08:18.1S

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%)
INSS 1037	100	100	17.8	27.3	9.5	10.3	98	98.0%

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%)
120813.01	TVASQN 101 1	50	27.3	30.8	3.5	(z) 10.3	S 72	
1	Duplicate (B)	1	30.8	34.3	3.5	1 1	D 7Z	

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)
INSS 1037	100	B	30.8	39.0	8.2	@ 10.3	170

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%)
72	98 '	98.0%

Sample number	Sample ID	<u> </u>	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg CaCO3/L)
120815.10	TVASQU 101	2	6 0	39.0	42.4	3.4	(z) 10.3	76
120817.08	1	3		42.4	45.9	3.5		72
120815.02	TVA SQN INT	l.		0.0	3.3	3.3		68
1208 15.11	1	2		3.3	6.6	3.3		68
120819.09	1	3		6.6	10,0	3.4		70
120813.01	TVASQNOIU	υı		10.0	13.4	3.4		70
120815.10		2		13.4	16.8	3.4		70
120817.08	T	3		16.8	20.2	3,4		70
120813.02	TVA SOW INTU	UI	1	20.2	23.6	3.4	A A	70

Reviewed by:

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Date reviewed: 08.19.12

Page	72	

Page	_3	of	3
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Alkalinity (SM 2320 B)

Matrix: Water, $RL = 1.0 \text{ mg } CaCO_3/L$

Analyst	
Date analyzed	08.15.17

Time initiated Time completed Titrate samples to pH = 4.5 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 $Na_2CO_3 \times 0.05$)/E = 0.25/E (acceptable range = 0.0180 - 0.0220)	pH Factor or Multiplier = (N x 50000)/ 100 ml sample = N x 500
							TI 08:18:12

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%)
TNSS 1037	100	100	Z.3.C	33.1	9.5	10.3	98	98.0%

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%)
120815-10	San intol 2	90	33.1	36.5	3.4	(z) 10.3	S 70	
T was	Duplicate (B)	න	36.5	39.9	3.4	1 1	D 70	

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)
INSS 1037	100	み	36.5	44.7	8.2	(2) 10.3	170

Sample alkalinity (B) (mg CaCO ₃ /L)	Measured spike value (MV) MV = A - B	% R = MV / SV x 100 (acceptable range = 75 to 125%)
<u> </u>	(mg CaCO ₃ /L)	
70	100	100.0%

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg CaCO ₃ /L)
120817,000	TVA SQNIDTUV 3	60	44.7	48.1	3.4	(2) 10.3	76
120814.01	FUHLOWO 1	100	0.6	1.0	6.4		4.(
120816.01	2	4	1.0	4.4	3.4		35
120818.01	3	1	4,4	7.9	3,5	1	36
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Page 36 _	

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Total Hardness (SM 2340 C) $RL = 1.0 \text{ mg } CaCO_3/L$

Analyst TT Date analyzed 08.18.12

Time initiated	1220
Time completed	1335

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 = 0.0180 - 0.0220)	pH Factor or Multiplier = (N x 50000)/ 50 ml sample = N x 1000
INR 488	INSS 1033	٥.٥	10.2	10.2	0.0196	19. 6

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%)
INSS 1048	40	50	10.2	12.7	2.0	19.6	39	97.5%

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
21.14.80	MHSW	ை	12.2	16.7	4.5	19.6	S 88	
V	Duplicate (B)	ಟ	16.7	21.2	ų́.s	レ	D 86	27.81.80

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)
INSS 1048	40	9 0	16.7	z3.2	6.5	19.6	130

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%)
88	42	105.0%

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)	න	0.0	0.0	0,0	19.6	ND
UB-16-12	MHSW		23.2	27.7	4.5		ଷ୍ଟ
08.12.n	J J		27.7	32.4	4.7		92
	Sprue Pine		32.4	33.5	1.1		22
08-12-12	MHSUU 1		33.5	37.8	4.3		84
08-14-12	1 2		37,8	42.1	4.3		४५
51-91-80	↓ 3		42.1	46.4	4.3		84
120813.01	TVA 50N 101 1		0.0	3.7	3.7		72
120815.10	Z		3.7	7.3	3.6		71 .
1208 17.08	V 3	4	7.3	11.1	3.8	4	74

NRage 1671 of 1292 is used, sample must be diluted. Reviewed by:

Date reviewed

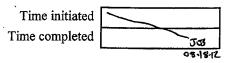
Page	39
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Page		_of	3
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Total Hardness (SM 2340 C) $RL = 1.0 \text{ mg } CaCO_3/L$

Analyst	JIB .
Date analyzed	08.18.17



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 = 0.0180 - 0.0220)	pH Factor or Multiplier = (N x 50000)/ 50 ml sample = N x 1000
						J. 02 08-18-15

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%)
INSS 1048	40	50	11.1	13.0	1.9	19.6	37	92.5%

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
12081302	TVASQNINT 1	න	13.0	16.7	3.7	19.6	S 72	
7	Duplicate (B)	1	16.7	70.4	3.7	4	D 72	

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)
INSS 1048	40	ණ	16.7	22.4	5.7	19.0	110

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%)
72	38	95.0%

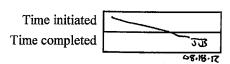
Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Hardness (mg CaCO ₃ /L)
TV = ND	Blank (should be = 0 mg CaCO ₃ /L)		<u> </u>				73 08.18.12
120815.11	TVA SON INT 2	50	22.4	26.2	3.8	19.6	74
120817.09	<i>y</i> 3	1	26.2	29.9	3.7		72
120813.01	TVA SON 1010U 1		29.9	33.6	3.7		72
120815.10	1 2		33.6	37.3	3.7		72
80.F18051	↓ 3		37.3	41.0	3.7		72
120813.02	TVA SON WITH I		41.0	44.6	3.6		71
120815.11	2		44.6	48.3	3.7		72
120817.09	√ 3	1	0.0	3,7	3.7		72
120814.01	Fixwood 1	4	3.7	5,8	2.1	1	41

Note: If > 5 ml of titrant is used, sample must be diluted.	Reviewed by:	Min	Date reviewed	081912
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Page	3	of_	3	_

Total Hardness (SM 2340 C) $RL = 1.0 \text{ mg CaCO}_3/L$

Analyst	<i>হ</i> স্ত
Date analyzed	08.18.12



Titrant normality and multiplier determination:

Titrant	Normality check	Begin ml	End ml	Total ml	Normality (N) of EDTA = 0.2/E	pH Factor or Multiplier = (N x 50000)/ 50 ml sample
number	number			(E)	(acceptable range = 0.0180 - 0.0220)	$= N \times 1000$
						JJ308-18-12

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%)
INSS 1048	40	50	5.8	7.7	1.9	19.6	37	92,5%

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
							S	40
	Duplicate (B)				٠. م	Ĺ	D ·	

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)
	,			·			

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%)	
	(mg cacoyr)	75	

Sampie measurei	ments:							- 5.512
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 Ca	ıCO₃/L)						₩ 51.8130 W
12.08 16.01	Formood	2	a)	7.7	11.0	3.3	19.6	65
10.819051	1 .	3	1	11.0	15.5	4.5	1	88
—								
•								
								213 OS:18-12

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Total Residual Chlorine (Orion Electrode Method, Orion 97-70)

Matrix: Water, RL = 0.10 mg/L

Meter: Accumet Model AR25 pH/Ion Meter

Analyst JJ Date analyzed 08.14.12 Iodide reagent: INR SIG Acid reagent: INR 517

Calibration:

	0.10 mg/L	1.00 mg/L	Slope
Reference standard number	INSS 1064	THES 1064	-46.3%

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

Laboratory control standard:

Reference standard	True value (TV)	Measured value (MV)	% RS = MV / TV x 100
number	(mg/L)	(mg/L)	(acceptable range = 90 to 110%)
INSS 1064	0.50	0.529	105.8%

Duplicate sample precision:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)	$%RPD = {(S - D) / [(S+D)/2]} \times 100$ (acceptable range = ± 10%)
120814.02	Engelhard	yellow, clear	S 10.00 Z 7Z	
7	Duplicate		D co.00159	

Sample measurements:

Sample Number			Residual chlorine (mg/L)	
	Reagent Blank		60.00786	
120814-01	Foxwood	pale yellow, cleanparticles	Lo.00181	
1208 13.01	TVA SQN 101	no color, clear	40.00372	
120813.02	1 INTAKE	no color, clear	Co.00285	
1				
4			TB 08.14.12	

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

Laboratory control standard:

Reference	True value (TV)	Measured value (MV)	% RS = MV / TV x 100
nun	(mg/L)	(mg/L)	(acceptable range = 90 to 110%)
INSS 1064	0.50	0.471	94.2%

Reviewed by Date reviewed

	Page	95
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Total Residual Chlorine (Orion Electrode Method, Orion 97-70)

Matrix: Water, RL = 0.10 mg/L

Meter: Accumet Model AR25 pH/Ion Meter

Analyst S

Date analyzed 08.16.72

Iodide reagent: INC 516
Acid reagent: INC 517

Calibration:

	0.10 mg/L	1.00 mg/L	Slope
Reference standard number	INSS 1064	INSS 1004	-46.6%

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

Laboratory control standard:

Reference standard	True value (TV)	Measured value (MV)	% RS = MV / TV x 100
	(mg/L)	(mg/L)	(acceptable range = 90 to 110%)
INSS 1064	0.50	0.532	106.4%

Duplicate sample precision:

2 in product 5 arrived productions				
Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)	$%RPD = {(S - D) / [(S+D)/2]} \times 100$ (acceptable range = ± 10%)
120816.02	ENECLHARD	gellow, clear	S co.00128	
\ \L	Duplicate		D. Co.0017 5	JU 08-16-12

Sample measurements:

Sample number			Residual chlorine (mg/L)
	Reagent Blank		(0.00766
120816.03	PASQUOTANK	no color, clear	ده.٥٥٦61
120816.04	McGuire 001	no colonchar	0.0143
12016.01	FOXWOOD	pale yellow, clear	८०.००४१५
120815.10	TVA SQN 101	no obriclear	ده.٥٥١٦٤
120812.11	1 INTAKE	no color, clear, particles	co.oo 153
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			-33 08.161S

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

Laboratory control standard:

Reference standard	True value (TV)	Measured value (MV)	% RS = MV / TV x 100
number	(mg/L)	(mg/L)	(acceptable range = 90 to 110%)
INSS 1664	0.50	0.468_	93.0%

Reviewed by	X	
Date reviewed	0 8-	6-12

Page _	97
Page of _	



Total Residual Chlorine (Orion Electrode Method, Orion 97-70)

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

Analyst of 18.12

Iodide reagent: INR SIC
Acid reagent: INR SI7

Calibration:

	0.10 mg/L	1.00 mg/L	Slope
Reference standard number	INSS 1064	INSS 1064	-46.2%

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

Laboratory control standard:

Zasoratory control standa	2 008		
Reference standard	True value (TV)	Measured value (MV)	% RS = MV / TV x 100
number	(mg/L)	(mg/L)	(acceptable range = 90 to 110%)
INSS 1064	0.50	0.520	104.0%

Duplicate sample precision:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)	$%RPD = {(S - D) / [(S+D)/2]} \times 100$ (acceptable range = ± 10%)
120018.02	ENGELHARD	yellow, clear	S (0.00138	
)	Duplicate		D_c0.00178	

Sample measurements:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)
	Reagent Blank		40.00671
120018.03	PASQUOTANK	no color, clear	Co.00339
120818.01	Foxwood	pale yellow, clear	۲٥.00434
120817.00	TVA SQNIOI	no color, clear	L0.00385
120817.09	1 INTAKE	no color, clear, particles	۲۰°۰0328
			SI-81-80 EUC

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

Laboratory control standard:

Reference standard	True value (TV)	Measured value (MV)	% RS = MV / TV x 100
number	(mg/L)	(mg/L)	(acceptable range = 90 to 110%)
INSS 1064	0.50	0.459	91.8%

Reviewed by	Him
Date reviewed	0818-12

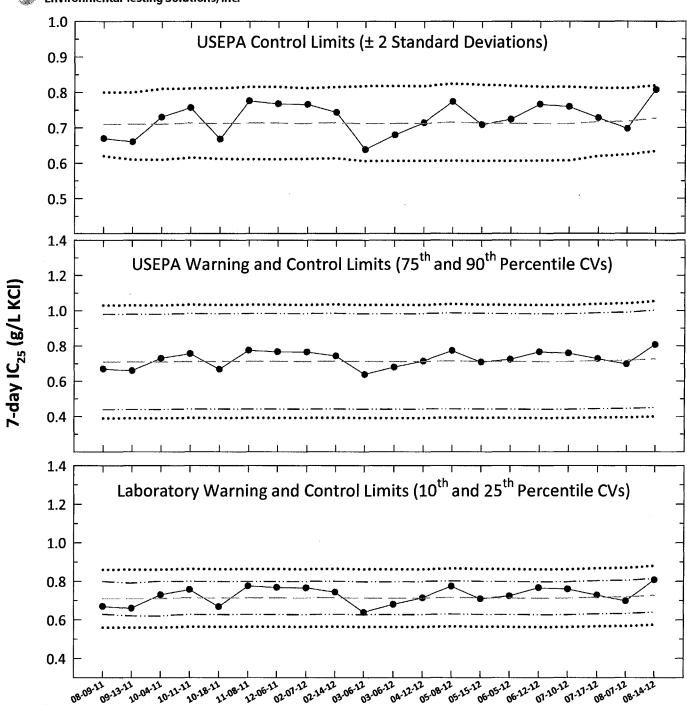
Sequoyah Nuclear Plant Biomonitoring August 14 – 21, 2012

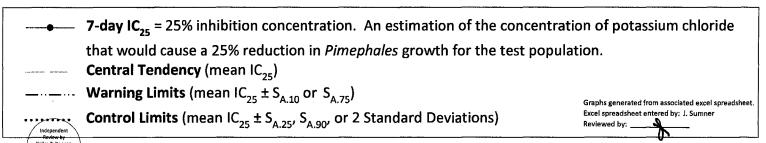
Appendix D

Reference Toxicant Test and Control Chart



Pimephales promelas Chronic Reference Toxicant Control Chart Organism Source: Aquatox, Inc.





Test date





Pimephales promelas Chronic Reference Toxicant Control Chart

_						d USEPA			ratory			ratory	_		EPA		USE		
Test number	Test date	7-day IC ₂₅	ст	S	Contro	l Limits	S _{A.10}	Warnin	g Limits	S _{A.25}	Contro	l Limits	S _{A.75}	Warnin	g Limits	S _{A.90}	Contro	Limits	CV
		(g/L KCI)	(g/L KCI)		CT - 2S	CT + 2S		CT - S _{A.10}	CT + S _{A.10}		CT - S _{A.25}	CT + S _{A.25}		CT - S _{A.75}	CT + S _{A.75}		CT - S _{A.90}	CT + S _{A.90}	
1	08-09-11	0.67	0.71	0.05	0.62	0.80	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
2	09-13-11	0.66	0.71	0.05	0.61	0.80	80.0	0.62	0.79	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
3	10-04-11	0.73	0.71	0.05	0.61	0.81	0.09	0.62	0.80	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
4	10-11-11	0.76	0.71	0.05	0.62	0.81	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.99	0.32	0.39	1.03	0.07
5	10-18-11	0.67	0.71	0.05	0.61	0.81	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
6	11-08-11	0.78	0.71	0.05	0.61	0.82	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
7	12-06-11	0.77	0.71	0.05	0.61	0.82	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
8	02-07-12	0.77	0.71	0.05	0.61	0.81	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
9	02-14-12	0.74	0.71	0.05	0.61	0.82	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.99	0.32	0.39	1.04	0.07
10	03-06-12	0.64	0.71	0.05	0.61	0.82	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
11	03-06-12	0.68	0.71	0.05	0.61	0.82	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
12	04-12-12	0.71	0.71	0.05	0.61	0.82	0.09	0.63	08.0	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
13	05-08-12	0.77	0.72	0.05	0.61	0.82	0.09	0.63	0.80	0.15	0.57	0.87	0.27	0.44	0.99	0.32	0.39	1.04	80.0
14	05-15-12	0.71	0.71	0.05	0.61	0.82	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.99	0.32	0.39	1.04	0.08
15	06-05-12	0.72	0.71	0.05	0.61	0.82	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
16	06-12-12	0.77	0.71	0.05	0.61	0.82	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
17	07-10-12	0.76	0.71	0.05	0.61	0.82	0.09	0.63	0.80	0.15	0.56	0.86	0.27	0.44	0.98	0.32	0.39	1.03	0.07
18	07-17-12	0.73	0.72	0.05	0.62	0.81	0.09	0.63	0.80	0.15	0.57	0.87	0.27	0.44	0.99	0.32	0.39	1.04	0.07
19	08-07-12	0.70	0.72	0.05	0.62	0.81	0.09	0.63	0.80	0.15	0.57	0.87	0.27	0.45	0.99	0.32	0.40	1.04	0.07
20	08-14-12	0.81	0.73	0.05	0.63	0.82	0.09	0.64	0.81	0.15	0.57	0.88	0.28	0.45	1.00	0.33	0.40	1.05	0.06

Note:

7-d IC25 = 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 IC25).

S = Standard deviation of the IC₂₅ values.

Laboratory Control and Warning Limits

Laboratory control and warning limits were established using the standard deviation of the IC₂₅ 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)

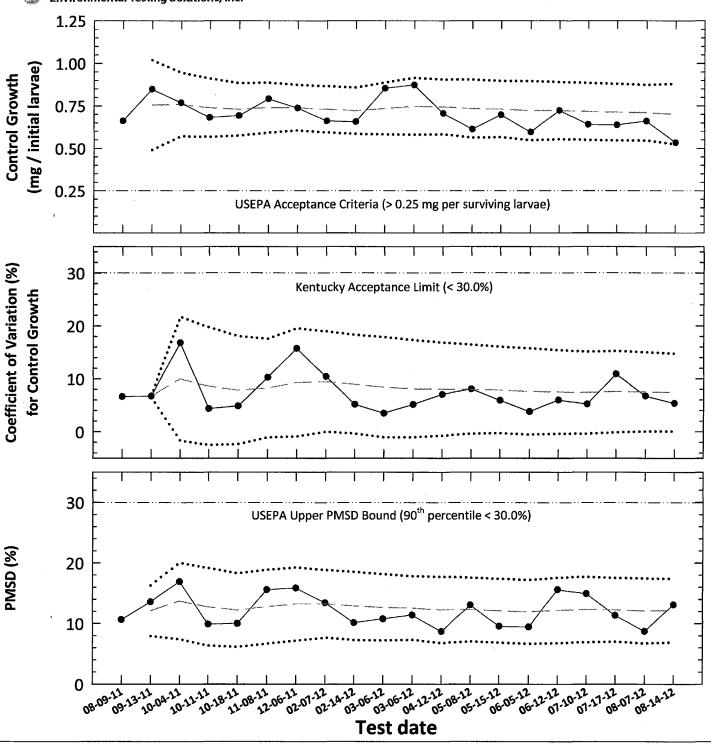
 $S_{A.90}$ = Standard deviation corresponding to the 90th percentile CV. $(S_{A.90} = 0.45)$

CV = Coefficient of variation of the IC₂₅ 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.



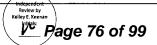
Pimephales promelas Chronic Reference Toxicant Control Chart Precision of Endpoint Measurements Organism Source: Aquatox, Inc.



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)





Precision of Endpoint Measurements

Pimephales promelas Chronic Reference Toxicant Data

Test number	Test date	Control Survival	Control Mean Growth	ст	cv	ст	MSD	PMSD	ст
•		(%)	(mg/larvae)	for Control Growth (mg/larvae)	(%)	for Control Growth CV (%)		(%)	for PMSD (%)
1	08-09-11	100	0.662		6.6		0.07	10.6	
2	09-13-11	100	0.848	0.755	6.7	6.7	0.12	13.6	12.1
3	10-04-11	100	0.768	0.759	16.8	10.0	0.13	16.9	13.7
4	10-11-11	100	0.681	0.740	4.3	8.6	0.07	9.9	12.8
5	10-18-11	100	0.693	0.730	4.8	7.9	0.07	10.0	12.2
6	11-08-11	100	0.792	0.741	10.3	8.3	0.12	15.6	12.8
7	12-06-11	100	0.738	0.740	15.7	9.3	0.12	15.9	13.2
8	02-07-12	100	0.662	0.730	10.5	9.5	0.09	13.4	13.2
9	02-14-12	97.5	0.658	0.722	5.2	9.0	0.07	10.1	12.9
10	03-06-12	100	0.854	0.735	3.5	8.4	0.09	10.8	12.7
11	03-06-12	100	0.873	0.748	5.1	8.1	0.10	11.4	12.6
12	04-12-12	97.5	0.706	0.744	7.0	8.0	0.06	8.7	12.2
13	05-08-12	100	0.613	0.734	8.1	8.1	0.08	13.1	12.3
14	05-15-12	100	0.697	0.732	5.9	7.9	0.07	9.5	12.1
15	06-05-12	97.5	0.596	0.723	3.8	7.6	0.06	9.4	11.9
16	06-12-12	100	0.723	0.723	6.0	7.5	0.11	15.6	12.2
17	07-10-12	100	0.641	0.718	5.2	7.4	0.10	14.9	12.3
18	07-17-12	100	0.638	0.713	10.9	7.6	0.07	11.4	12.3
19	08-07-12	97.5	0.660	0.711	6.7	7.5	0.06	8.7	12.1
20	08-14-12	100	0.533	0.702	5.4	7.4	0.07	13.1	12.1

Note:

CV = Coefficient of variation for control growth.

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.

Lower PMSD bound determined by USEPA (10th percentile) = 12%.

Upper PMSD bound determined by USEPA (90th percentile) = 30%.

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

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.

USEPA. 2001a, 2001b. Final Report: Interlaboratory Variability Study of EPA Short-term Chronic and Acute Whole Effluent Toxicity Test Methods, Volumes 1 and 2 Appendix. EPA-821-B-01-004 and EPA-821-B-01-005. US Environmental Protection Agency, Cincinnati, OH.





Potassium Chloride Chronic Reference Toxicant Test (EPA-821-R-02-013 Method 1000.0)

Species: Pimephales promelas

PpKClCR Test Number: _255

Dilution prepara	tion inf	ormation	:			Comments:	
KCl Stock INSS nu	ımber:	INSS	1089				
Stock preparation:		50 g KCI/	L:	I-L Milli-Q v	vater.		
Dilution prep (mg/L)	450	600	750	900	1050		
Stock volume (mL)	9	12	15	18	21		
Diluent volume (mL)	991	988	985	982	979		
Total volume (mL)	1000	1000	1000	1000	1000		 -

Test organism informati	on:	Test information:	
Organism age:	20,42 Hours OLD	Randomizing template:	PURPLE.
Date and times organisms were born between:	04-13-12 1600	Incubator number and shelf location:	<i>d</i> E
Organism source:	ATTOX BATCH Pp 08-13-12	Artemia CHM number:	CHM 652
		Drying information for determination:	r weight
Transfer vessel	pH = 7.60 S.U.	Date / Time in oven:	08-21-12 1200
information:	Temperature = 75.1 °C	Initial oven temperature:	60.C
Average transfer volume:		Date / Time out of oven:	08-22-12 1200
,	0.1209	Final oven temperature:	60.C
		Total drying time:	24-HOURS

Daily feeding and renewal information:

Day Date		Morning 1	eeding	Afternoon feeding		Test initiatio or termi	MHSW batch used	
		Time	Analyst	Time	Analyst	Time	Analyst	
0	08-14-12		-11	1500	X.	1225	_X	08.12.12
1	08-15-12	0000	1	1300	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	1175	1 1	08.12-12
2	08-16-12	0115	X	1315	N.	1125	4	08-14-12
3	08.17.12	0100	الأ	1300	Й	1127	N.	08-14-12
4	08-18-12	0915	Й	1515	H,	1138	L X	08.16.12
5	08-19-12	osis	X	1415	N	1126	J AL	08.16.12
6	08-20-12	0700	X	1300	X	1125	1,1	08-16-12
7	08-21-12					1138	V	

Control information:		Acceptance criteria	Summary of test endpoints:		
% Mortality:	01.	≤ 20%	7-day LC ₅₀	898.26	
Average weight per initial larvae:	0.533		NOEC	600	
Average weight per surviving larvae:	0.533	≥ 0.25 mg/larvae	LOEC	750	
			ChV	670.8	
			IC ₂₅	807.5	



Species: Pimephales promelas

PpKClCR Test Number: 255

Survival and Growth Data

<u> </u>		Survival and Growth Data										
Day		Cor	itrol			450 mg	g KCl/L			600 mg	KCl/L	,
ì	· А	В	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	0)
4	10	ID	10	10	10	10	10	10	94	qid	10	10
5	١Ď	10	10	10	10	10	10	10	9	9	10	10
6	10	10	10	10	10	10	10	10	9	9	10	10
7	10	10	10	0	10	10	10	10	9	9	10	10
A = Pan weight (mg) Tray color code:: Analyst: Date: 08.03-12	13.63	13.46	14.89	14.13	13.88	13.43	14.54	15.02	13.81	14.69	13.62	13.42
B = Pan + Larvae weight (mg) Analyst:	M.27	18.53	20,40	19.24	19.66	19.19	20.81	z1.50	18,50	20.32	19.40	19.62
C = Larvae weight (mg) = B – A Hand calculated. Analyst:	ડ,બ	5.01	S.S l	5.11	5.78	S.76	6.27	6.48	ય્. દ૧	5.63	5.78	6.20
Weight per initial number of larvae (mg) = C / Initial number of larvae Hand calculated. Analyst:	435.0	0. Sg.	5.	13:0	35.0	0.5%	٥. وي	39°0	13°.	\$35. \$25.		0,650
Average weight per initial number of larvae (mg) Percent reduction from control (%)	0.5				0.6		- 13		٥.5	\$8	-4.	s <i>7</i> .

<u>Comment codes</u>: 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.

Comments:	 *		





Species: Pimephales promelas

PpKClCR Test Number: 255

Survival e	and (Growth	Data
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					Survi	al ana	Growi	n Duiu				
Day		750 mg	KCI/L			900 mg	KCI/L			1050 m	g KCl/I	
	M	N	0	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	8	74	734	401	3		460	468
2	10	10	919	10	8	٦	7	ی	3	319	4	4
3	10	gid		10	8	id	7	6	3	3	4	3'9
4	10	9	9	9id	7	6	7	S	2	2	3	3
5	10	9	9	9	7	ما	٦	5	1.9	2	2	2 id
6	10	9	9	9	6	6	٦	S	١	2	12d	1 'd
7	8 ² d	9	9	9	5'd	6	٦	5	ı	2.16	Cid	منر
A = Pan weight (mg) Tray color code:: Analyst: Date: 08.03.12	13.12	14.56	13.78	12.86	14.59	13.72	12.18	14.11	12.85	13.18	13.04	13.26
B = Pan + Larvae weight (mg) Analyst: JJ Date: 08-27-12	17.89	19.24	18.31	17.98	17.69	17.28	16.23	17.30	13.36	14.76		«
C = Larvae weight (mg) = B - A Hand calculated. Analyst:	4.77	4.68	4.53	5.12	3.10	3.56	4.05	3.19	0.51	1.58		—-н
Weight per initial number of larvae (mg) = C / Initial number of larvae Hand calculated. Analyst:	450	O. 46.	£4.0	215.0	0. So	35.0	36.0	6. de	150:0	35.0	٥	. 0
Average weight per initial number of larvae (mg) reduction from control (%)	٥٠٠			.\$7.	6.0		34		0.0	052	90.	27.

<u>Comment codes</u>: 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.

Comments:			-	
	·			
·				





Pimephales promelas Chronic Reference Toxicant Test EPA-821-R-02-013, Method 1000.0

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

255 Test number: August 14-21, 2012 Test dates:

Concentration (mg/L KCi)	Replicate	initial number of larvae	Final number of larvee	A = Pan weight (mg)	B = Pan + Larvae weight (mg)	Larvae weight (mg) = A - B	Weight / Surviving number of lervae (mg)	Mean weight/ Surviving number of larvae (mg)	Coefficient of variation (Mean weight per surviving number of larvee) (%)	Weight / Initial number of larvae (mg)	Mean survival (%)	Mean weight/ initial number of larvae (mg)	Coefficient of varietion (%)	Percent reduction from control (%)
	Α	10	10	13.63	19.27	5.64	0.564			0.564				
Control	В	10	10	13.46	18.53	5.07	0.507	0.533	5.4	0.507	100.0	0.533	5.4	Not applicable
Control	С	10	10	14.89	20.40	5.51	0.551	0.555	5.4	0.551	100.0	0.555	3.4	140t applicable
	٥	10	10	14.13	19.24	5.11	0.511			0.511				
1	E	10	10	13.88	19.66	5.78	0.578			0.578				
450	F	10	10	13.43	19.19	5.76	0.576	0.607	5.9	0.576	100.0	0.607	5.9	-13.9
430	G	10	10	14.54	20.81	6.27	0.627] 0.007	3.5	0.627	100.0	0.007	3.3	-13.5
	Н	10	10	15.02	21.50	6.48	0.648			0.648				
	I	10	9	13.81	18.50	4.69	0.521			0.469				
600	J	10	9	14.69	20.32	5.63	0.626	0.586 8.2	0.563	95.0	0.558	11.4	-4.5	
800	K	10	10	13.62	19.40	5.78	0.578		0.2	0.578	j 93.0	0.550		1
	L	10	10	13.42	19.62	6.20	0.620		l	0.620		.		
	М	10	8	13.12	17.89	4.77	0.596			0.477				
750	N	10	9	14.56	19.24	4.68	0.520	0.547	7.9	0.468	87.5	0.478	5.2	10.5
/30 [0	10	9	13.78	18.31	4.53	0.503] 0.34/	7.5	0.453] %.3	0.478	3.2	10.3
	Р	10	9	12.86	17.98	5.12	0.569	l l		0.512	L			
	Q	10	5	14.59	17.69	3.10	0.620			0.310				
900	R	10	6	13.72	17,28	3.56	0.593	0.607	4.4	0.356	57.5	0.348	12.4	34.8
500	S	10	7	12.18	16.23	4.05	0.579] 0.60/	4.4	0.405	37.3	0.346	12.4	34.0
	T	10	5	14.11	17.30	3.19	0.638	1		0.319	1		•	1
	U	10	1	12.85	13.36	0.51	0.510			0.051	T			
1050	v	10	2	13.18	14.76	1.58	0.790	0 0,650	20.5	0.158	1 ,,	0.052	142.6	00.2
7020	w	10	0	0.00	0.00	0.00	0.000		30.5	0.000	7.5	0.052	142.6	90.2
ľ	x	10	0	0.00	0.00	0.00	0.000	1 1		0.000	1			

Dunnett's MSD value:

MSD = PMSD = Minimum Significant Difference 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. Lower PMSD bound determined by USEPA (10th percentile) = 12%. Upper PMSD bound determined by USEPA (90th percentile) = 30%.

Lower and upper PMSD bounds were determined from the 10th and 90th percentile, respectively, of PMSD data from EPA's WET Interlaboratory Variability Study (USEPA, 2001a; USEPA, 2001b).

USEPA. 2001a, 2001b. Final Report: Interlaboratory Variability Study of EPA Short-term Chronic and Acute Whole Effluent Toxicity Test Methods, Volumes 1 and 2-Appendix. EPA-821-B-01-004 and EPA-821-B-01-005. US Environmental Protection Agency, Cincinnati, OH.



Statistical Analyses

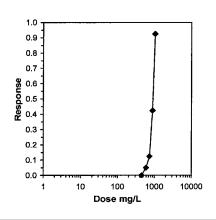
			La	rval Fish Gro	owth and Surviv	al Test-7 Day Su	ırvival
Start Date:	8/14/2012		Test ID:	PpKCICR		Sample ID:	REF-Ref Toxicant
End Date:	8/21/2012		Lab ID:	ETS-Envir. T	esting Sol.	Sample Type:	KCL-Potassium chloride
Sample Date:			Protocol:	FWCHR-EP	A-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:							
Conc-mg/L	1	2	3	4			
D-Control	1.0000	1.0000	1.0000	1.0000			
450	1.0000	1.0000	1.0000	1.0000			
600	0.9000	0.9000	1.0000	1.0000			
750	0.8000	0.9000	0.9000	0.9000			
900	0.5000	0.6000	0.7000	0.5000			
1050	0.1000	0.2000	0.0000	0.0000			

			Tra	ansform:	Arcsin Sc	uare Roof	t .	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	
450	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00	0	40	
600	0.9500	0.9500	1.3305	1.2490	1.4120	7.072	4	14.00	10.00	2	40	
*750	0.8750	0.8750	1.2136	1.1071	1.2490	5.846	4	10.00	10.00	5	40	
*900	0.5750	0.5750	0.8620	0.7854	0.9912	11.405	4	10.00	10.00	17	40	
*1050	0.0750	0.0750	0.2757	0.1588	0.4636	53.294	4	10.00	10.00	37	40	

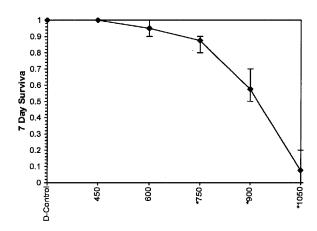
Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates nor	mal distribu	ition (p >	0.01)		0.93302	0.884	0.39148	0.28113
Equality of variance cannot be co	nfirmed							
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	600	750	670.82					
Treatments vs D-Control								

Trimmed Spearman-Karber

EC50	95%	CL	
902.19	867.55	938.21	
909,49	869.16	951.70	
898.26	863.27	934.67	
	902.19 909.49	902.19 867.55 909.49 869.16	902.19 867.55 938.21 909.49 869.16 951.70



Dose-Response Plot





File: ppkclcr_081412.xlsx Entered by: J. Sumner Reviewed by: _____



Statistical Analyses

			La	rval Fish Growth and Surv	ival Test-7 Day G	rowth
Start Date:	8/14/2012		Test ID:	PpKCICR	Sample ID:	REF-Ref Toxicant
End Date:	8/21/2012		Lab ID:	ETS-Envir. Testing Sol.	Sample Type:	KCL-Potassium chloride
Sample Date:			Protocol:	FWCHR-EPA-821-R-02-01	3 Test Species:	PP-Pimephales promelas
Comments:						
Conc-mg/L	1	2	3	4		
D-Control	0.5640	0.5070	0.5510	0.5110		
450	0.5780	0.5760	0.6270	0.6480		
600	0.4690	0.5630	0.5780	0.6200		
750	0.4770	0.4680	0.4530	0.5120		
900	0.3100	0.3560	0.4050	0.3190		•
1050	0.0510	0.1580	0.0000	0.0000		

		-		Transforr	n: Untrar	sformed			1-Tailed		Isotonic		
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean	
D-Control	0.5333	1.0000	0.5333	0.5070	0.5640	5.353	4				0.5703	1.0000	
450	0.6073	1.1388	0.6073	0.5760	0.6480	5.924	4	-2.307	2.180	0.0699	0.5703	1.0000	
600	0.5575	1.0455	0.5575	0.4690	0.6200	11.433	4	-0.756	2.180	0.0699	0.5575	0.9776	
750	0.4775	0.8955	0.4775	0.4530	0.5120	5.244	4				0.4775	0.8374	
900	0.3475	0.6517	0.3475	0.3100	0.4050	12.430	4				0.3475	0.6094	
1050	0.0523	0.0980	0.0523	0.0000	0.1580	142,558	4				0.0523	0.0916	

Auxiliary Tests		Statistic		Critical		Skew	Kurt			
Shapiro-Wilk's Test indicates nor		0.94603		0.805		-0.6553	0.58729			
Bartlett's Test indicates equal var	iances (p =	0.40)			1.85289		9.21035			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	600	>600			0.06992	0.13112	0.00569	0.00206	0.11571	2, 9
Total design to the same of th										

Treatments vs D-Control

mg/L 629.55 683.02

736.48

774.58

807.48

902.72

931.69

SD 44.05 39.17

32.27

14.39

14.81

14.24

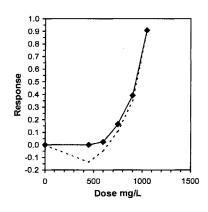
9.08

Point IC05 IC10

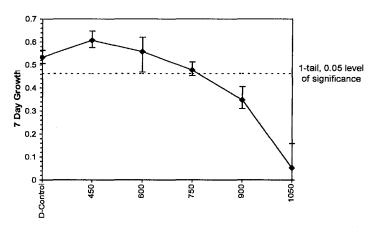
IC15 IC20 IC25

IC40 IC50

95% CL		r Interpolat Skew	ion (200 Resamples)
422.75	677.99	-1.2511	
471.16	745.11	-1.6458	
546.98	788.00	-2.5024	1.0
725.29	814.40	0.0156	0.9 1
763.34	852.44	0.1502	
850.75	928.37	-0.5101	
905.24	958.94	0.1578	0.7 -
763.34 850.75	852.44 928.37	0.1502 -0.5101	0.9 - 0.8 - 0.7 -



Dose-Response Plot





File: ppkclcr_081412.xlsx Entered by: J. Sumner Periewed by:



Species: Pimephales promelas

PpKClCR Test Number: 255

Daily Chemistry:

	stry:				ay		
			ntified for each da	y, performed pl	I, D.O. and cond	ductivity measu	rements only.)
			0		1		2
· · · · · · · · · · · · · · · · · · ·	Analyst	JU	ಶ್ರಾತ	ত্যে	WHS	mus	nun
Concentration	Parameter						
	pH (S.U.)	7.66	7.44	7.43	7.29	7.55	7.50
	DO (mg/L)	7.7	7.4	7.7	2.9	7.9	99
	Conductivity (µmhos/cm)	306		313	a.	310	
CONTROL	*Alkalinity (mg CaCO ₃ /L)	62		at Market		62	
	*Hardness (mg CaCO ₃ /L)	92		X		88	
	*Temperature (°C)	54.8	24.4	74.8	74.6	24.8	24.5
	pH (S.U.)	7.73	7.53	7.57	7.48	7.66	7.52
	DO (mg/L)	7.7	7.9	7.7	1.9	7.9	79
450 mg KCl/L	Conductivity (µmhos/cm)	1070		1090		1070	
	*Temperature (°C)	24.8	24.2	24.7	24.7	3.4.8	24.5
	pH (S.U.)	7.75	7.57	7.60	7.52	7.70	3.54
	DO (mg/L)	7.7	7.9	7-8	7.9	7,9	39
600 mg KCl/L	Conductivity (µmhos/cm)	1330		1360		1350	
•	*Temperature (°C)	24.8	24.3	24.6	ખ.7	24.8	24.7
	pH (S.U.)	7.77	7.60	7.63	7.55	7.73	7.55
	DO (mg/L)	7.7	7.8	7.8	8.0	7,9	7.55 79
750 mg KCl/L	Conductivity (µmhos/cm)	1280		1610		1590	
	*Temperature (°C)	24.8	243	24.7	74.7	24.8	24.8
	pH (S.U.)	7.80	7.60	7.65	7.62	7.76	7.54
	DO (mg/L)	7.8	7.8	7.8	8.0	7.9	9.9
900 mg KCl/L	Conductivity (µmhos/cm)	1850		1890		1860	
	*Temperature (°C)	24.7	24.3	24.6	24.7	24.8	24.1
	pH (S.U.)	7.81	7.03	7.68	7.63	7.78	4.57
	DO (mg/L)	7.8	7.9	7.8	8.0	7.9	7.8
1050 mg KCl/L	Conductivity (µmhos/cm)	2070		2120		2050	
	*Temperature (°C)	24.7	24.2	24.6	24.5	24.8	24.7
STOCK	Conductivity (µmhos/cm)	64400					
		Initial	Final	Initial	Final	Initial	Final

^{*}Temperatures performed at the time of test initiation, renewal or termination by the analyst identified in the Daily Renewal Information table located on Page Alkalinity and hardness performed by the analyst identified on the bench sheet specific for each analysis and transcribed to this bench sheet by:





Species: Pimephales promelas

PpKClCR Test Number: 255

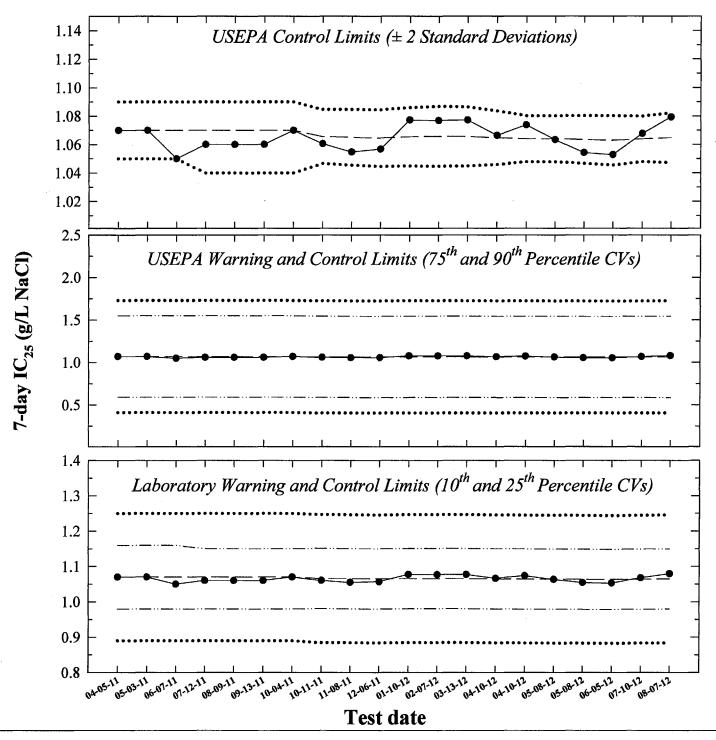
		I			r	ay			
. •			(Analyst iden	tified for each o	ay, performed p	H, D.O. and co	nductivity meas	urements only.)	
•			3		4		5		6
	Analyst	KILW	30B	JUS	JB	JU	ร เ ชิ	JUB	য়্য
Concentration	Parameter								<u> </u>
	pH (S.U.)	7,49	7.37	7.60	7.37	7.67	7.47	7.44	7.16
	DO (mg/L)	7.6	7.6	7.6	7.5	7.6	7.5	7.6	7.5
	Conductivity (µmhos/cm)	302		315		310		323	
CONTROL	*Alkalinity (mg CaCO ₃ /L)	1 Warm		62		OMAN		- Warr	
	*Hardness (mg CaCO ₃ /L)	X		88		X		×	
,	*Temperature (°C)	24.9	24.6	24.8	24.4	24.6	24.7	ટ પ. ફ	24,4
	pH (S.U.)	7.46	7.51	7.64	7.48	7.70	7.64	7.64	7.45
	DO (mg/L)	7.6	7.6	7.6	7.4	7.6	7.5	7.6	7.4
450 mg KCl/L	Conductivity (µmhos/cm)	1050		1050		1060		1100	
	*Temperature (°C)	25.0	24.8	24.8	24.4	24.7	24.7	24.8	24.6
	pH (S.U.)	7.70	7.57	7,70	7.51	7.74	7.69	7.71 = 6.3	7.50
	DO (mg/L)	7.6	7.5	7.6	7.4	7.6	7.5	7. G	7.5
600 mg KCl/L	Conductivity (µmhos/cm)	1310		1310		1310		1370	
	*Temperature (°C)	25.0	24.5	74.8	24.2	24.6	24.8	24.9	અ.1
	pH (S.U.)	7.70	7.60	7.74	7.52	7.77	7.71	7.75	7.51
	DO (mg/L)	4.7	7.5	7.6	7.3	7.6	7.5	7.7	7.0
750 mg KCl/L	Conductivity (µmhos/cm)	1560		1560		1560		1600	
	*Temperature (°C)	ره. ο د	24.5	74.8	24.6	24.b	7년•7	24.9	24.7
	pH (S.U.)	4,70	7.64	7.77	7.53	7.79	7.73	7.77	7.52
	DO (mg/L)	7.7	7.5	7.6	7.3	7.6	7.5	7.7	7.8
900 mg KCl/L	Conductivity (µmhos/cm)	1800		1820		1800		1860	
	*Temperature (°C)	25. 0	24.5	24.9	24.6	24.6	24.6	ર ષ.ક	24.5
	pH (S.U.)	7.73	7.63	7.79	7. S4	7.81	7.74	7.79	7.56
•	DO (mg/L)	7.7	7.5	7.6	7.3	7,6	7,5	7.9	7.9
1050 mg KCl/L	Conductivity (µmhos/cm)	avao		2040		2050		2160	
	*Temperature (°C)	25.0	24.7	24.9	24.5	24.6	24.6	24.9	24.6
		Initial	Final .	Initial	Final	Initial	Final	Initial	Final

^{*}Temperatures performed at the time of test initiation, renewal or termination by the analyst identified in the Daily Renewal Information table located on Page 1. Alkalinity and hardness performed by the analyst identified on the bench sheet specific for each analysis and transcribed to this bench sheet by:





Ceriodaphnia dubia Chronic Reference Toxicant Control Chart



7-day IC₂₅ = 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 IC₂₅)

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)

Review by (Celley E. Reenan Initials: Page 86 of 99





Ceriodaphnia dubia Chronic Reference Toxicant Control Chart

					State an	d USEPA		Labo	ratory		Labor	ratory		US	EPA		USI	EPA	
Test number	Test date	7-day IC ₂₅	СТ	S	Contro	l Limits	S _{A.10}	Warnin	g Limits	S _{A.25}	Contro	l Limits	S _{A.75}	Warnin	g Limits	S _{A.90}	Contro	l Limits	cv
		(g/L NaCl)	(g/L NaCl)		CT - 2S	CT + 25		CT - \$ _{A.10}	CT + S _{A.10}		CT - S _{A.25}	CT + S _{A.25}		CT - \$ _{A.75}	CT + S _{A.75}		CT - S _{A.90}	CT + S _{A.90}	
1	04-05-11	1.07	1.07	0.01	1.05	1.09	0.09	0.98	1.16	0.18	0.89	1.25	0.48	0.59	1.55	0.66	0.41	1.73	0.01
2	05-03-11	1.07	1.07	0.01	1.05	1.09	0.09	0.98	1.16	0.18	0.89	1.25	0.48	0.59	1.55	0.66	0.41	1.73	0.01
3	06-07-11	1.05	1.07	0.01	1.05	1.09	0.09	0.98	1.16	0.18	0.89	1.25	0.48	0.59	1.55	0.66	0.41	1.73	0.01
4	07-12-11	1.06	1.07	0.01	1.04	1.09	0.09	0.98	1.15	0.18	0.89	1.25	0.48	0.59	1.55	0.66	0.41	1.73	0.01
5	08-09-11	1.06	1.07	0.01	1.04	1.09	0.09	0.98	1.15	0.18	0.89	1.25	0.48	0.59	1.55	0.66	0.41	1.73	0.01
6	09-13-11	1.06	1.07	0.01	1.04	1.09	0.09	0.98	1.15	0.18	0.89	1.25	0.48	0.59	1.55	0.66	0.41	1.73	0.01
7	10-04-11	1.07	1.07	0.01	1.04	1.09	0.09	0.98	1.15	0.18	0.89	1.25	0.48	0.59	1.55	0.66	0.41	1.73	0.01
8	10-11-11	1.06	1.07	0.01	1.05	1.08	0.09	0.98	1.15	0.18	0.88	1.25	0.48	0.59	1.55	0.66	0.40	1.73	0.01
9	11-08-11	1.05	1.07	0.01	1.05	1.08	0.09	0.98	1.15	0.18	0.88	1.25	0.48	0.59	1.54	0.66	0.40	1.73	0.01
10	12-06-11	1.06	1.06	0.01	1.04	1.08	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
11	01-10-12	1.08	1.07	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	1.73	0.01
12	02-07-12	1.08	1.07	0.01	1.04	1.09	0.09	0.98	1.15	0.18	0.88	1.25	0.48	0.59	1.55	0.66	0.40	1.73	0.01
13	03-13-12	1.08	1.07	0.01	1.04	1.09	0.09	0.98	1.15	0.18	0.88	1.25	0.48	0.59	1.55	0.66	0.40	1.73	0.01
14	04-10-12	1.07	1.06	0.01	1.05	1.08	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
15	04-10-12	1.07	1.06	0.01	1.05	1.08	0.09	0.98	1.15	0.18	0.88	1.24	0.48	0.59	1.54	0.66	0.40	1.72	0.01
16	05-08-12	1.06	1.06	0.01	1.05	1.08	0.09	0.98	1.15	0.18	0.88	1.24	0.48	0.59	1.54	0.66	0.40	1.72	0.01
17	05-08-12	1.05	1.06	0.01	1.05	1.08	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
18	06-05-12	1.05	1.06	0.01	1.05	1.08	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
19	07-10-12	1.07	1.06	0.01	1.05	1.08	0.09	0.98	1.15	0.18	0.88	1.24	0.48	0.59	1.54	0.66	0.40	1.72	0.01
20	08-07-12	1.08	1.06	0.01	1.05	1.08	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 IC25 = 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.

Laboratory Control and Warning Limits

Laboratory control and warning limits were established using the standard deviation of the IC₂₅ 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)

 $\textbf{S}_{\textbf{A.90}}\!=\!\,\text{Standard}$ deviation corresponding to the 90^{th} percentile CV. (S_{A.90}\,\simeq\,0.62)

CV = Coefficient of variation of the IC25 values.

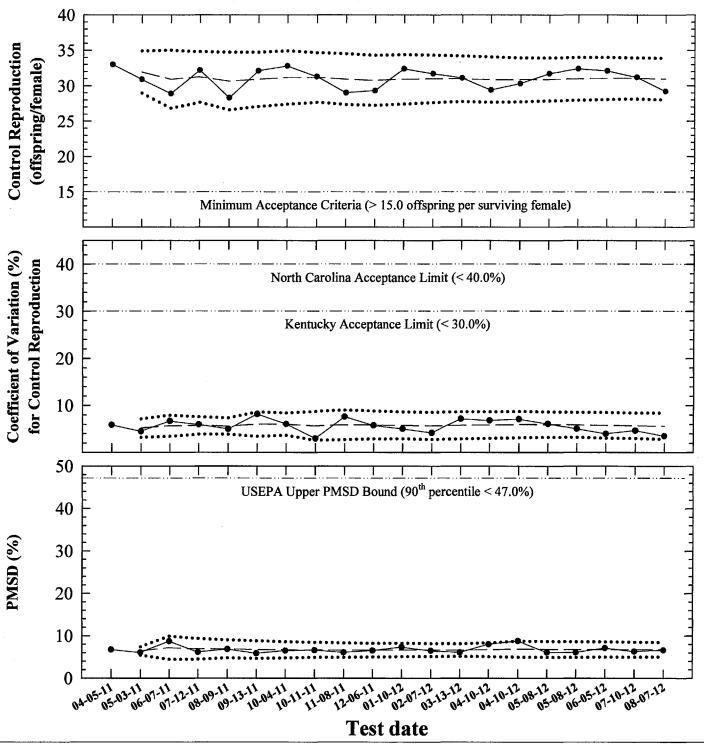
USEPA. 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination Program. EPA-833-R-00-003. US Environmental Protection Agency, Cincinnati, OH.

CT = Central tendency (mean IC₂₅).

S = Standard deviation of the IC₂₅ values.



Ceriodaphnia dubia Chronic Reference Toxicant Control Chart Precision of Endpoint Measurements



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)



Precision of Endpoint Measurements

Ceriodaphnia dubia **Chronic Reference Toxicant Data**

Test number	Test date	Control Survival	Control Mean Reproduction	ст	cv	ст	MSD	PMSD	ст
1		(%)	(offspring/female)	for Control Mean Reproduction (offspring/female)	(%)	for Control Reproduction CV (%)		(%)	for PMSD (%)
1	04-05-11	100	33.0		5.9		2.2	6.7	
2	05-03-11	100	30.9	32.0	4.5	5.2	1.9	6.1	6.4
3	06-07-11	100	28.9	30.9	6.7	5.7	2.5	8.7	7.2
4	07-12-11	100	32.2	31.3	6.0	5.8	2.0	6.2	6.9
5	08-09-11	100	28.3	30.7	5.0	5.6	1.9	6.8	6.9
6	09-13-11	100	32.1	30.9	8.2	6.1	1.9	5.8	6.7
7	10-04-11	100	32.8	31.2	6.1	6.1	2.1	6.5	6.7
8	10-11-11	100	31.3	31.2	3.0	5.7	2.1	6.6	6.7
9	11-08-11	100	29.0	30.9	7.6	5.9	1.8	6.1	6.6
10	12-06-11	100	29.3	30.8	5.8	5.9	1.9	6.5	6.6
11	01-10-12	100	32.4	30.9	5.1	5.8	2.4	7.4	6.7
12	02-07-12	100	31.7	31.0	4.2	5.7	2.1	6.5	6.7
13	03-13-12	100	31.1	31.0	7.2	5.8	1.9	6.1	6.6
14	04-10-12	100	29.4	30.9	6.8	5.9	2.4	8.0	6.7
15	04-10-12	100	30.3	30.8	7.1	6.0	2.7	8.8	6.8
16	05-08-12	100	31.7	30.9	6.1	6.0	1.9	6.1	6.8
17	05-08-12	100	32.4	31.0	5.1	5.9	2.0	6.1	6.8
18	06-05-12	100	32.1	31.1	4.0	5.8	2.3	7.1	6.8
19	07-10-12	100	31.2	31.1	4.7	5.8	2.0	6.3	6.8
20	08-07-12	100	29.2	31.0	3.5	5.6	1.9	6.6	6.7

Note:

CV = Coefficient of variation for control reproduction.

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. Lower PMSD bound determined by USEPA (10th percentile) = 13%.

Upper PMSD bound determined by USEPA (90th percentile) = 47%.

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

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.

USEPA. 2001a, 2001b. Final Report: Interlaboratory Variability Study of EPA Short-term Chronic and Acute Whole Effluent Toxicity Test Methods, Volumes 1 and 2-Appendix. EPA-821-B-01-004 and EPA-821-B-01-005. US Environmental Protection Agency, Cincinnati, OH.



File: CdNaClCR_080712.xlsx Entered by: J. Sumner Reviewed by:



Sodium Chloride Chronic Reference Toxicant Test (EPA-821-R-02-013 Method 1002.0)

Species: Ceriodaphnia dubia

CdNaClCR#: 138

Dilution prepara	tion info	Comments:	· · · · · · · · · · · · · · · · · · ·				
NaCl Stock INSS numb	er:	INSS I	076				
Stock preparation:		100 g NaC	I/L:	500 mL Mill	li-Q 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 source information:											Test information:	
Organism age:				<	24-ho	urs ol	d				Randomizing template color:	FOUR
Date and times organisms we between:	re bo	rn		0	08.07.12 0745 TO 1030				0 10	30	Incubator number and shelf location:	281
Culture board:	gr.	31.	12.	A								
Replicate number:	1	2	3	4	5	6	7	8	9	10	YWT batch:	
Culture board cup number:	1	2	8	9	10	III	19	20	22	32	l .	0619-12
Transfer vessel information: pH = 7.6		67	7 S.U. Temperature = 74.4 °C					°C	Selenastrum batch:			
Average transfer volume (mL): 0.0		037	27 -	7 ml .					01:31-12			

Daily renewal information:

Day	Date	Test initiation and feeding, renewal and feeding, or termination time	MHSW batch used	Analyst
0	08-07-12	1045	08-03-12 A	A
1	08-04-12	0946	08-03-12-A	X
2	08-09-12	OAUS	04-03-12B	X
3	08-10-12	0945	08-03-128	X
4	68.11-12	0950	08-08-12	H
5	08-12-12	0945	04.08.12	Ň
6	08-13-17_	0945	08-08-12	X
7	08-14-12	0958		K

Control information:		Acceptance criteria	Summary of test endpoints:			
% of Male Adults:	07.	≤ 20%	7-day LC ₅₀	>1400		
% Adults having 3 rd Broods:	1007.	≥ 80%	NOEC	1000		
% Mortality:	07.	≤ 20%	LOEC	1200		
Mean Offspring/Female:	29.2	≥ 15.0 offspring/female	ChV	1095.5		
% CV:	3.57.	< 40.0 %	IC ₂₅	1079.3		



Species: Ceriodaphnia dubia

CdNaClCR#: 138

CONTROL /

Survival and Reproduction Data

COIT	INOL /	But vivat and Reproduction Data									
					I	Replicate	e numbe	r			
Day		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	J	U	J		L	L	J	L	L	J
2	Young produced	٥	٥	0	0	0	٥	0	0	0	0
	Adult mortality	U	し	L	L	L	L	L	U	L	
3	Young produced	٥	0	0	0	0	0	0	0	0	0
	Adult mortality		L	J	~	L	L	L		L	
4	Young produced	4	5	4	Ч	S	5	6	4	5	S
	Adult mortality	し	L	J	J	\		L	L	<u> </u>	
5	Young produced	11	0	10	10	10	10	12	10	10	10
	Adult mortality	ر		ا	_	L		ز	J	L	し
6	Young produced	0	10	0	0	0	0	0	0	0	0
	Adult mortality	ر	ر	ر	<u> </u>	L	L		ب		
7	Young produced	15	3	Ž	15	14	15	13	16	13	13
Total you	ing produced	30	28	29	29	29	30	31	36	58	2.8
	ult Mortality	し	J			<u></u>	J			L	
X for 3 rd	Broods	X.	<u>, </u>	<u>×</u>	×	×		<u> </u>	· > <	\times	_×

Note: Adult mortality (L = live, D = dead), SB = split broad (single broad split between two days), <math>CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	29.2

600 mg NaCl/L

Survival and Reproduction Data

ооо ш	gracul	Sui iii ana Repioanemon Dana										
						Replicat	e number					
Day	•	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	U	J	L	L	L	L	L	L	Ų	ر	
2	Young produced	0	0	0	0	0	0	0	0	0	0	
	Adult mortality	ب	し	L	L	L	L	Ü		J	J	
3	Young produced	0	0	Ò	0	0	0	.0	0	0	0	
	Adult mortality	ز	١	ل	L			1	L		ز	
4	Young produced	5	5	7	L	9	P	6	5	S	5	
	Adult mortality	ر	J	J	L	L	L	L	<u>_</u>		J	
5	Young produced	11	0	10	10	13	11	11	10	13	10	
	Adult mortality	ر	J	ز	L	U	Ĺ	ب	L	L	ر	
6	Young produced	0	11	O	0	0	0	0	0	0	Ö	
	Adult mortality	ا	ر	ل	J	L	<u></u>	ال	ر		J	
7	Young produced	14	13	14	14	14	16	16	14	13	13	
Total you	ing produced	36	29	28	30	33	31	33	29	***********	58	
Final Ad	ult Mortality			L	J	L	L	L	J	٠ رع	L	

Note: Adult mortality (L = live, D = dead), SB = split broad (single broad split between two days), <math>CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	30.2
% Reduction from Control:	-3.47.



Species: <u>Ceriodaphnia dubia</u> 800 mg NaCl/L

CdNaClCR#: 138

Survival and Reproduction Data

000 111	g machin	DM 111 at a Rope Continue D and										
					F	Replicat	e numbe	r				
Day		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	J	J	L		J	J	ر	
2	Young produced	Ø	0		0	0	٥	0	0	O	0	
	Adult mortality		L	C	~	L			L)		
3	Young produced	0	0		0	0	0	0	0	0	0	
	Adult mortality		C	L	<u> </u>	L	L	<u></u>	L.			
4	Young produced	5	5	प	प	4	5	4	6	6	S	
	Adult mortality	Ĺ	L	L		<u></u>			Ü	J	_	
5	Young produced	11	11	10	11	10	12	0	13	12.	10	
	Adult mortality	ل	ر		J	J	L	J		Ĺ		
6	Young produced	0	0	0	0	C	0	0	ပ	0	0	
	Adult mortality	ر	ر	J	J	J	ز	J	-	ر	J	
7	Young produced	17	14	14	13	13	16	15	17	13	17	
Total you	ing produced	30	30	58	28	27	33	29	36	31	29	
Final Adı	ult Mortality		C				L		J	U	L	

Note: Adult mortality (L = live, D = dead), SB = split broad (single broad split between two days), <math>CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	30.1
% Reduction from Control:	-3.1%

1000 mg NaCl/L

Survival and Reproduction Data

1000 1	1000 mg NaC/12 Surviva and Reproduction Data										
						Replicat	e number				,
Day		1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	O	0	0	0	0	0	0
	Adult mortality	J	ر	L	L	L	L		L.	L	
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	J	ر	Ļ	L	L	L	U	Ü	し	J
3	Young produced	0	0	0	0	٥	0	(O)	Ò	0	0
	Adult mortality	J		L	L	L	L	L		L	L
4	Young produced	3	4	6	प	4	Ч	4	3	प	प
	Adult mortality	J	J		L	L	L	し	L	U)
5	Young produced	0	12.	11	11	10	10	10	10	10	10
	Adult mortality	J	ر	L	Ĺ	U	L	٠ ٠		C	-
6	Young produced	11	0	0	0	Ö	0	0	0	0	0
	Adult mortality	J	<u>.</u> ر	ر		١	J	J	ر	L	Ų
7	Young produced	15	15	13	15	12	14	13	13	13.	14
Total you	ing produced	31	31	36	30	26	2.8	27	26	27	28
Final Ad	ult Mortality		L			Ù	ر	J	L	し	L

Note: Adult mortality (L = live, D = dead), SB = split broad (single broad split between two days), <math>CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	28.4
% Reduction from Control:	2.7%



Species: Ceriodaphnia dubia

CdNaClCR#: 138

1200 r	ng NaCl/L		Survival and Reproduction Data										
			Replicate number										
Day		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	U	L	<u></u>		L	<u> </u>	<u> </u>	L	L		
2	Young produced	0	0	0	0	0	0	٥	0	0	0		
	Adult mortality)	C		L	J	L	し	L				
3	Young produced	0	0	0	0	0	0	٥	0	0	0		
	Adult mortality		し		C	J		ل	L				
4	Young produced	3	1	2.	2	3	2	1	3	3	3		
	Adult mortality	ر	<u></u>	L	. `	L	L	ر	L	L	L		
5	Young produced	٦	0	6	4	5	8	S	6	9	.5		
	Adult mortality	J	7	ر	L	ر	ر	ر	٦	<u></u>	J.		
6	Young produced	0	٩	0	0	0	0	0	0	0	0		
	Adult mortality	ر		J	J	ر	J	ر			-		
7	Young produced	7	حا	5	3	S	2	7	4	4	5		
Total you	Total young produced			13	9	13	12	13	13	16	13		
Final Ad	ult Mortality	J				L	ر		J		L		

Note: Adult mortality (L = live, D = dead), SB = split broad (single broad split between two days), CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	13.7
% Reduction from Control:	54.8

1400 mg NaCl/L

Survival and Reproduction Data

	ng riae Cara											
						Replicate	e number					
Day		1	2	3	4	5	6	7	8	9	10	
1	Young produced	0	0	Q	0	Ö	0	0	0	0	0	
	Adult mortality)	ل	L	L		J	ل	١	J	L	
2	Young produced	0	0	0	0	0	0	0	0	0	0	
	Adult mortality	١	J	L		L	J	ر	ر	L	ر	
3	Young produced	0	0	0	\Diamond	0	0	<u>'</u>	0	0	0	
	Adult mortality	ر	ل	ل	١	ل	ر	زا	لہ		٦	
4	Young produced	1	1	١	2	٧	3	2	3	3	. !	
	Adult mortality	J	ر	ز	٦	ر	ل	ل	ر	ل	J	
5	Young produced	٥	0	2	3	0	٦.	7	1	2	2	
	Adult mortality	ر	J	J	ر	ر	J	ر	ر	ز	را	
6	Young produced	1	3	0	0	ک	0	0	0	0	0	
	Adult mortality	J	ſ	ر	J	J	٦	ſ	ر	ر	ل	
7	Young produced	٧.	2_	1	1	1	3	2	3	1	3	
Total you	Total young produced		6	7	6.	5	£	8	٦.	<u>.</u> ن	6	
Final Ad	ult Mortality			ſ	L		L	C		7	J	

Note: Adult mortality (L = live, D = dead), SB = split broad (single broad split between two days), CO = carry over (offspring carried over with adult during transfer).

Concentration:	
% Mortality:	07.
Mean Offspring/Female:	6.0
% Reduction from Control:	79.5%

Verification of Ceriodaphnia Reproduction Totals

Control

Dov		Replicate number											
Day	1	2	3	4	5	6	7	8	9	10	Total		
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	4	5	5	6	4	5	5	47		
5	11	0	10	10	10	10	12	10	10	10	93		
6	0	10	0	0_	0	0	0	0	0	0	10		
7	15	13	15	15	14	15	13	16	13	13	142		
Total	30	28	29	29	29	30	31	_30	28	28	292		

600 mg NaCl/L

Dovi			Total								
Day	1	2	3	4	5	6	7	8	9	10	Total
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	4	6	6	4	6	5	5	5	51
5	11	0	10	10	13	11	11	10	13	10	99
6	0	11	0	0	0	0	0	0	0	0	11
7	14	13	14	14	14	16	16	14	13	13	141
Total	_30	29	28	30	33	31	33	29	31	28	302

800 mg NaCl/L

Dov				Re	plicate	e num	ber				Total
Day	1	2	3	4	5	6	7	8	9	10	Total
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	4	4	4	5	4	6	6	5	48
5	11	11	10	11_	10	12	10	13	12	10	110
6	0	0	0	0	0	0	0	0	0	0	0
7	14	14	14	13	13	16	15	17	13	14	143
Total	30	30	28	28	27	33	29	36	31	29	301

1000 mg NaCl/L

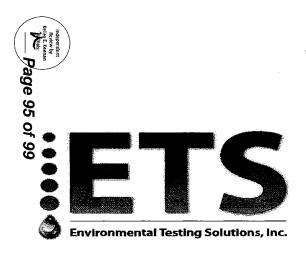
Dov				Re	plicate	e num	oer				Total
Day	1	2	3	4	5	6	7	8	9	10	Totai
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0_	0	0	0
3	0	0	0	0	0	0	0	0_	0	0	0
4	5	4	6	4	4	4	4	3	4	4	42
5	0	12	11	11	10	10	10	10	10	10	94
6	11	0	0	0	0	0	0	0	0	0	11
7	15	15	13	15	12	14	13	13_	_13	14	137
Total	31	31	30	30	26	28	27	26	27	28	284

1200 mg NaCl/L

Day				Re	plicate	e numl	ber				Total
Day	1	2	3	4	5	6	7	8	9	10	Totai
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	1	2	2	3	2	1	3	3	3	23
5	7_	0	6	4	5	8	_ 5	6	9	5	55
6	0	9	0	0	0	0	0	0	0	0	9
7	4	6	5	3	5	2	7	4	4	_5	_45
Total	14	16	13	9	13	12	13	13	16	13	132

1400 mg NaCl/L

31100 1115	,										
Dev				Re	plicate	e numl	ber				Total
Day	1	2	3	4	5	6	7	8	9	10	IOIAI
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	1_	1	1	2	2	3	2	3	3	1	19
5	0	0	2	3	0	2	4	1	2	2	16
6	1	3	0	0	2	0	0	0	0	0	6
7	2	2	1	1	1	3	2	3	1	3	19
Total	4	6	4	6	5	_ 8	8	7	6	6	60



Ceriodaphnia dubia Chronic Reference Toxicant Test EPA-821-R-02-013, Method 1002.0

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

Test number: CdNaCiCR #138

Test dates: August 07-14, 2012

Concentration					Replicate	number					Survival	Average reproduction	Coefficient of	Percent reduction from
(mg/L NaCl)	1	2	3	4	5	6	7	8	9	10	(%)	(offspring/female)	variation (%)	control (%)
Control	30	28	29	29	29	30	31	30	28	28	100	29.2	3.5	Not applicable
600	30	29	28	30	33	31	33	29	31	28	100	30.2	6.0	-3.4
800	30	30	28	28	27	33	29	36	31	29	100	30.1	8.9	-3.1
1000	31	31	30	30	26	28	27	26	27	28	100	28.4	6.9	2.7
1200	14	16	13	9	13	12	13	13	16	13	100	13.2	15.1	54.8
1400	4	6	4	6	5	8	8	7	6	6	100	6.0	23.6	79.5

Dunnett's MSD value: PMSD:

1.929

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.

Lower PMSD bound determined by USEPA (10^{th} percentile) = 13%.

Upper PMSD bound determined by USEPA (90th percentile) = 47%.

Lower and upper PMSD bounds were determined from the 10th and 90th percentile, respectively, of PMSD data from EPA's WET Interlaboratory Variability Study (USEPA, 2001a; USEPA, 2001b).

USEPA. 2001a, 2001b. Final Report: Interlaboratory Variability Study of EPA Short-term Chronic and Acute Whole Effluent Toxicity Test Methods, Volumes 1 and 2-Appendix. EPA-821-B-01-004 and EPA-821-B-01-005. US Environmental Protection Agency, Cincinnati, OH.

File: CdNaClCR_080712.xlsx
Table populated from associated "Verification of *Ceriodaphnia* Reproduction Totals" spreadsheet.

Spreadsheet entered by: J. Sumner

Reviewed by:



Statistical Analyses

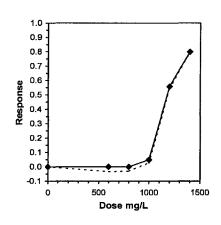
			Ceriod	aphnia Su	rvival and	i Reproc	luction Tes	st-Repro	duction	
Start Date:	8/7/2012		Test ID:	CdNaCICF	₹		Sample ID):	REF-Ref	Toxicant
End Date:	8/14/2012		Lab ID:	ETS-Envir	. Testing S	Sol.	Sample Ty	/pe:	NACL-Soc	fium chloride
Sample Date:			Protocol:	FWCHR-E	PA-821-F	R-02-013	Test Spec	ies:	CD-Cerioo	laphnia dubia
Comments:										
Conc-mg/L	1	2	3	4	5	6	7	8	9	10
D-Control	30.000	28.000	29.000	29.000	29.000	30.000	31.000	30.000	28.000	28.000
600	30.000	29.000	28.000	30.000	33.000	31.000	33.000	29,000	31.000	28.000
800	30.000	30.000	28.000	28.000	27.000	33.000	29.000	36.000	31.000	29.000
1000	31.000	31.000	30.000	30.000	26.000	28.000	27.000	26.000	27.000	28.000
1200	14.000	16.000	13.000	9.000	13.000	12.000	13.000	13.000	16.000	13.000
1400	4.000	6.000	4.000	6.000	5.000	8.000	8.000	7.000	6.000	6.000

				Transform	n: Untran	sformed		Rank	1-Tailed	lsot	onic
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
D-Control	29.200	1.0000	29.200	28.000	31.000	3.537	10			29.833	1.0000
600	30.200	1.0342	30.200	28.000	33.000	6.005	10	121.00	75.00	29.833	1.0000
800	30.100	1.0308	30.100	27.000	36.000	8.921	10	111.50	75.00	29.833	1.0000
1000	28.400	0.9726	28.400	26.000	31.000	6.884	10	92.00	75.00	28.400	0.9520
*1200	13.200	0.4521	13.200	9.000	16.000	15.067	10	55.00	75.00	13.200	0.4425
*1400	6.000	0.2055	6.000	4.000	8.000	23.570	10	55.00	75.00	6.000	0.2011

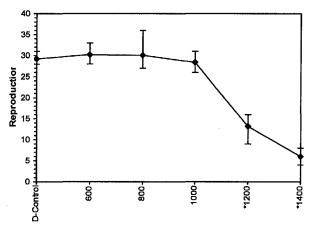
Auxiliary Tests					Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non	-normal dis	stribution	$(p \le 0.01)$		1.17686	1.035	0.53863	0.89662
Bartlett's Test indicates equal var	iances (p =	0.14)			8.40619	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU				
Steel's Many-One Rank Test	1000	1200	1095.45					

	reatments	٧S	D-Control	
۰				_

				Linea	ar Interpolat	ion (200 Resamples)
Point	mg/L	SD	95%	CL	Skew	· • • • • • • • • • • • • • • • • • • •
IC05	1000.77	44.7051	868.009	1015.87	-1.6465	
IC10	1020.39	9.61319	991.422	1034.38	-1.3975	
IC15	1040.02	7.68096	1020.26	1053.25	-0.3510	1.0
IC20	1059.65	7.19436	1041.68	1071.64	-0.3336	0.9
IC25	1079.28	6.83735	1063.08	1090.45	-0.3157	4
IC40	1138.16	6.71529	1123.99	1148.74	-0.2616	0.8
IC50	1177.41	7.42545	1162.25	1189.63	-0.2048	0.7 -



Dose-Response Plot



File: CdNaClCR_080712,xlsx Entered by: J. Sumner Reviewed by:

Page 96 of 99



Statistical Analyses

			Ceriod	aphnia Su	rvival and	Reprod	uction Tes	t-Repro	duction	
Start Date:	8/7/2012		Test ID:	CdNaCIC	₹		Sample ID):	REF-Ref	oxicant [
End Date:	8/14/2012		Lab ID:	ETS-Envir	. Testing S	Sol.	Sample Ty	ype:	NACL-Soc	lium chloride
Sample Date:			Protocol:	FWCHR-E	PA-821-F	R-02-013	Test Spec	ies:	CD-Cerioo	laphnia dubia
Comments:	Used for P	MSD ca	lculation	only.						
Conc-mg/L	1	2	3	4	5	6	7	8	9	10
D-Control	30.000	28.000	29.000	29.000	29.000	30.000	31.000	30.000	28.000	28.000
600	30.000	29.000	28.000	30.000	33.000	31.000	33.000	29.000	31.000	28.000
800	30.000	30.000	28.000	28.000	27.000	33.000	29.000	36.000	31.000	29.000
1000	31.000	31.000	30.000	30.000	26.000	28.000	27.000	26.000	27.000	28.000
1200	14.000	16.000	13.000	9.000	13.000	12.000	13.000	13.000	16.000	13.000
1400	4.000	6.000	4.000	6.000	5.000	8.000	8.000	7.000	6.000	6.000

				Transforr	n: Untran	sformed		_	1-Tailed	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	29.200	1.0000	29.200	28.000	31.000	3.537	10			
600	30.200	1.0342	30.200	28.000	33.000	6.005	10	-1.186	2.287	1.929
800	30.100	1.0308	30.100	27.000	36.000	8.921	10	-1.067	2.287	1.929
1000	28.400	0.9726	28.400	26.000	31.000	6.884	10	0.948	2.287	1.929
*1200	13.200	0.4521	13.200	9.000	16.000	15.067	10	18.969	2.287	1.929
*1400	6.000	0.2055	6.000	4.000	8.000	23.570	10	27.505	2.287	1.929

Auxiliary Tests		Statistic		Critical		Skew	Kurt			
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)					1.17686		1.035		0.53863	0.89662
Bartlett's Test indicates equal vari	iances (p =	0.14)			8.40619		15.0863			
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	1000	1200	1095.45		1.92879	0.06605	1109.51	3.55741	1.6E-38	5, 54
Treatments vs D-Control										



File: CdNaClCR_080712.xlsx Entered by: J. Sumner Reviewed by: ______



Species: Ceriodaphnia dubia

CdNaClCR#: 138

Daily Chemistry:

i .		(Analyst ide	ntified for each da	Da v, performed pl	y I, D.O. and cond	luctivity measu	rements only.)
			0	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1		2
	Analyst	JUS	MHF/503	MHECEB	wite	wite	1100
Concentration	Parameter	YELDY?					
	pH (S.U.)	7.65	7.6.2	7.60	7.62	7.60	7.61
	DO (mg/L)	7.7	8,0	7.6	8.0	7.9	17
	Conductivity (µmhos/cm)	307		321		301	
CONTROL	*Alkalinity (mg CaCO ₃ /L)	61		Mag-12		62	
	*Hardness (mg CaCO ₃ /L)	87		9		87	
	*Temperature (°C)	24.9	75.1	24.9	249	74.6	75.2
	pH (S.U.)	7.76	7,71	7.68	7.76	7.73	7.07
	DO (mg/L)	7.7	8.0	7.9	8.9	8.0	4.7
600 mg NaCl/L	Conductivity (µmhos/cm)	1330		1410		1340	
	*Temperature (°C)	24.9	25.1 "	25.0	24.8	24.7	75.0
	pH (S.U.)	7.76	7.7(7.70	7.77 8.(7.77	7.69
000 N CIA	DO (mg/L)	7.7	8.0	7.9	8.1	8.0	7.7
800 mg NaCl/L	Conductivity (µmhos/cm)	1700		1790		1710	
	*Temperature (°C)	24.9	25.0	25.0	24.8	24.7	52.0
	pH (S.U.)	7.77	7.72	7.72	7.78	7.79	3,70
1000 N. Cl/I	DO (mg/L)	7.7	8,0	8,0	8.1	8.0	7.7
1000 mg NaCl/L	Conductivity (µmhos/cm)	2070		2110		2050	
	*Temperature (°C)	75.0	25.0	25.0	75.0	24.7	75.0
	pH (S.U.)	7.77	7.74	7.73	· 7.80	7.80	7.72
1200 mg NaCl/L	DO (mg/L)	7.7	₹. 0	80	8.1	8.1	3.7
1200 mg NaC/L	Conductivity (µmhos/cm)	2410		2500		2430	
	*Temperature (°C)	75. D	ሪኔ. 2	25.0	75.2.	24.7	४.1
	pH (S.U.)	7.78	7.73	7.72	7.80	7.81	7.72
1 400 NT - 671/7	DO (mg/L)	7.8	8.1	8.1	8.1	8.1	7.7
1400 mg NaCl/L	Conductivity (µmhos/cm)	Z630		7870		2710	
	*Temperature (°C)	₹. 0	25.1	15.0	₹.0	24.7	24.9
STOCK	Conductivity (µmhos/cm)	103000					
		Initial	Final	Initial	Final	Initial	Final

^{*}Temperatures performed at the time of test initiation, renewal or termination by the analyst identified in the Daily Renewal Information table located on Page 1. Alkalinity and hardness performed by the analyst identified on the bench sheet specific for each analysis and transcribed to this bench sheet by:





Species: Ceriodaphnia dubia

CdNaClCR#: 138

			(Amalant iden	ified for each		ay H, D.O. and co	nduotivit	promonts1 \	
* *			3	inted for each d	4	H, D.O. and col	5		6
*	Analyst	1900	ग्रह	₩.	JUS	JŪJ	WHS	WH	യ
Concentration	Parameter								
ı	pH (S.U.)	7.77	7.55	7.65	7.65	7.65	7.58	7.63	7.41
si e	DO (mg/L)	7,7	8.0	7.1	8.0	76	7.9	7.8	7.9
	Conductivity (µmhos/cm)	809		367		303		31l	
CONTROL	*Alkalinity (mg CaCO ₃ /L)	Parsons.		62		24.21.20		COMPUZ	
	*Hardness (mg CaCO ₃ /L)	8		87		- 38			
	*Temperature (°C)	24.9	75.7	૨૫.૧	24.9	24.8	25.1	24.7	24.9
	pH (S.U.)	4.72	7.72.	7.72	7.82	7.80	7.75 7.9	7.70	7.67
	DO (mg/L)	7.7	8.0	8.6	7.8	7.9	7.9	7.8	8.0
600 mg NaCl/L	Conductivity (µmhos/cm)	1350		1336		1340		1340	
·	*Temperature (°C)	24.9	25.2	24.8	15.0	24.8	24.8	24.7	24.9
-	pH (S.U.)	7.73	7.75	7.80	7.85	7.86	7.78	7.77	7.72
	DO (mg/L)	7.7	8.0	в.0	7.9	8.0	1.9	7,8	7.9
800 mg NaCl/L	Conductivity (µmhos/cm)	1720		1710		1730		1750	
	*Temperature (°C)	24.9	75.1	25.0	25.0	24.7	٦4.8	24.7	24.9
	pH (S.U.)	2.17	7.77	7.83	7.87	7.88	7.78	7.80	7.72
	DO (mg/L)	7.77 7.7	8.0	გ.ბ	7.8	7.9	8,0	79	7.9
1000 mg NaCl/L	Conductivity (µmhos/cm)	2040		Z030		2040		2110	
· · · · · · · · · · · · · · · · · · ·	*Temperature (℃)	24.9	zs.d	75.0	25.1	724.7	24.9	24.7	٦5.١
	pH (S.U.)	4.77	7.79	7.84	7.89	7.89	7.79	7.82	7.77
	DO (mg/L)	7.7	. 8.0	8.0	7.8	7.9	8.0	7.9	7.9
1200 mg NaCl/L	Conductivity (µmhos/cm)	8410		2406		2446		7500	
	*Temperature (°C)	24.9	25.0	र इ. ०	25.1	24.7	24.9	24.7	75.1
	pH (S.U.)	4.79	7.80	7.85	7.91	7.91	7.81	7.83	7.74
•	DO (mg/L) .	47	8.9	8.1	7.9	7.9	8.0	29	8.1
1400 mg NaCl/L	Conductivity (µmhos/cm)	2730		2720		2740		2850	
	*Temperature (°C)	2S. 0	25.0	24.5	25.1	ર વ. 8	24.9	24.7	25.1
		Initial	Final	Initial	Final	Initial	Final	Initial	Final

^{*}Temperatures performed at the time of test initiation, renewal or termination by the analyst identified in the Daily Renewal Information table located on Page 1. Alkalinity and hardness performed by the analyst identified on the bench sheet specific for each analysis and transcribed to this bench sheet by:



S58 121110 800 - NPDES CORRESPONDENCE

November 10, 2012

Ms. Christina Morgan
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

Dear Ms. Morgan:

TENNESSEE VALLEY AUTHORITY (TVA) - SEQUOYAH NUCLEAR PLANT (SQN) - NPDES PERMIT NO. TN0026450 - DISCHARGE MONITORING REPORT (DMR) FOR OCTOBER 2012

Enclosed is the October 2012 Discharge Monitoring Report for Sequoyah Nuclear Plant. The turbine building sump (TBS) discharged directly to the yard drainage pond during the reporting period and was monitored in accordance with the narrative condition found in Part 1.A.2. of the subject permit. Enclosed is TBS monitoring data as well as attachments describing two collection system overflows that occurred during the reporting period. At no time was there a threat to public drinking supplies, to human health, or the environment.

If you have any questions or need additional information, please contact Brad Love by email at bmlove@tva.gov or by phone at (423) 843-6714.

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.

Sincerely.

Paul R. Simmons Plant Manager

Signatory Authority for:

John T. Carlin Site Vice President Sequoyah Nuclear Plant

Enclosures

cc (Enclosures):

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

S.D. Booker, MOB 1F-WBN B. E. Brickhouse, BR 4A-C

J. T. Carlin, OPS 4A-SQN

J. A. Cross, POB 2A-SQN T.R. Markum, BR 4A-C

D. B. Nida, BR 4A-C

U.S. Nuclear Regulatory Commission Attn: Document Control Desk

Washington, DC 20555

J.W. Proffitt, OPS 4C-SQN
A. A. Ray, WT 11A-K
G. R. Signer, WT 6A-K
P.R. Simmons, POB 2B-SQN
B. N. Smith (EDMS), MPB 1E-M



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

November 10, 2012

Ms. Christina Morgan
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

Dear Ms. Morgan:

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Sineerely

Paul R. Simmons Plant Manager

Signatory Authority for: John T. Carlin Site Vice President Seguoyah Nuclear Plant

Enclosures cc (Enclosures):

Chattanooga Environmental Field Office 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, DC 20555

TVA Sequoyah Nuclear Plant NPDES Permit No. TN0026450 Attachment 1

Description of the Event and Determination of Cause

On 10/19/2012 at 04:25 EDT the Sequoyah (SQN) Shift Manager was notified of a sewage overflow coming from a manhole located on the west side of the SQN Cafeteria. The shift manager initiated the SQN Spill Plan and dispatched personnel to investigate. A slight stream of sewage was discovered flowing out of the manhole and running approximately 50 feet down an access road before it reached a yard drain. On 10/19/2012 at 04:40 EDT the sewage overflow was stopped by cycling the number two pump from auto to manual and pumping the manhole down. Preliminary information regarding the overflow was communicated by telephone to the Chattanooga Environmental Field Office on 10/19/2012 at 15:03 EDT.

The total quantity of sewage which overflowed into a yard drain was estimated at less than 5 gallons. The initial investigation did not reveal any interruptions in power which could have caused the number two pump to trip in the off position. The cause of the overflow was attributed to partial clogging of the number two pump. This manhole is also where the cafeteria grey water enters the sewer system. At this time SQN is in a refueling outage and the partial clogging of the number two pump was caused by increased usage of the sewer system by support personnel and continuous cafeteria usage. All remaining sewage residue in the access road was neutralized with lime. The yard drain flows to the SQN Yard Drainage Pond, which discharges to the Diffuser Pond. The Diffuser Pond discharges through Outfall 101 to the Tennessee River. At no time was there a threat to public drinking supplies, to human health, or the environment.

Period of Discharge

The shift manager was notified of the overflow on 10/19/2012 at 04:25 EDT. The sewage overflow had just reached the yard drain as personnel responding to the spill arrived. The number two sewage ejector pump was restarted on 10/19/2012 at 04:40 EDT and this action immediately stopped the overflow and discharge to the yard drain. The estimated time of discharge was less than 15 minutes.

Steps Being Taken to Reduce, Eliminate, and Prevent Recurrence

This incident was entered into the TVA Corrective Action Program. Sequoyah has implemented shiftly monitoring of this sewage ejector location as an added precaution for the remaining duration of the outage to prevent another overflow.

TVA Sequoyah Nuclear Plant NPDES Permit No. TN0026450 Attachment 2

Description of the Event and Determination of Cause

On 10/27/2012 at 23:00 EDT Sequoyah (SQN) Shift Manager was notified of a high level alarm and a small amount of water coming out of the control panel for the turbine building sewage ejector pump controls. The shift manager initiated the SQN Spill Plan and dispatched personnel to investigate. On 10/27/2012 at 23:15 EDT a Senior Reactor Operator (SRO) responded to the sewage ejector control panel which did not have any lights indicating sewage ejector pump operation. The sewage water had filled the electrical conduit supplying power to the ejector pumps and was trickling out of the sewage ejector control panel, running down the building wall, and into a floor drain. The SRO reset the sewage ejector control panel and the pumps restarted. On 10/27/2012 at 23:30 EDT all sewer water leakage was isolated from the control panel. The total estimated quantity of sewer water which reached the floor drain was estimated at less than 1 gallon. The floor drain flows into the turbine building sump. The turbine building sump is discharged to the Low Volume Waste Treatment Pond which discharges through Internal Monitoring Point 103 to the Diffuser Pond. The Diffuser Pond discharges through Outfall 101 to the Tennessee River. At no time was there a threat to public drinking supplies, to human health, or the environment.

Period of Discharge

The shift manager was notified of the high level alarm and a small amount of water flowing out of the sewage ejector pump control box on 10/27/2012 at 23:00 EDT. The sewer water was running out of the electrical control panel, traveling down the building wall, and entering the floor drain below. The sewage ejector control box was reset and the pumps restarted. The sewer water flowing out of the control panel was stopped on 10/27/2012 at 23:30 EDT. The estimated time of discharge is approximately 30 minutes.

Steps Being Taken to Reduce, Eliminate, and Prevent Recurrence

This incident was entered into the TVA Corrective Action Program. An investigation is ongoing to determine the exact cause of the loss of power at the turbine building sewage ejector control panel. Sequoyah has implemented shiftly monitoring of this sewage ejector location as an added precaution until the apparent cause has been identified and repaired to prevent another overflow. An update on the apparent cause will be provided in the November DMR submittal.

TVA Sequoyah Nuclear Plant NPDES Permit No. TN0026450 Attachment 3

The turbine building sump was discharged directly to the yard drainage pond on 10/24/2012 and 10/28/2012 - 10/31/2012. During this period, the turbine building sump was monitored in accordance with the narrative condition found in Part 1.A.2 of NPDES Permit TN0026450.

Turbine Building Sump Monitoring Data

Parameter	Daily Minimum	Monthly Average	Daily Maximum	No. of Samples
Flow	-	1.525 MGD	2.580 MGD	5
pН	8 s.u.	-	9 s.u.	5
O&G	-	< 5 mg/L	< 6 mg/L	5
TSS	-	7 mg/L	10 mg/L	5

•											
PERMITTEE NAME/ADDRESS (Include I Name TVA - SEQUOYAH NUCLI		lfferent) —			GE ELIMINATION SY	STEM (NPDES) (DMR)	MAJOR (SUBR 01)			m Approved. //B No. 2040-0	
Address P.O. BOX 2000 (INTEROFFICE OPS-5N-SQN)			TNO	026450		101 G	F - FINAL				
SODDY - DAISY, TN 37384			PERMI	T NUMBER	DISCHAR	SE NUMBER	DIFFUSER DISCHA	ARGE			
Facility TVA - SEQUOYAH NUCLEAR Location HAMILTON COUNTY		 			ORING PERIOD		EFFLUENT			•	
ATTN: Brad Love	•		From 12	MO DAY 10 01	To 12	MO DAY 10 31	*** NO DISCHAR	GE	***		
/// ///. b.da 2010							NOTE: Read inst	ructions before	comple	ting this form	I.
PARAMETER	PARAMETER					QUALITY OR C	ONCENTRATION		NO. EX	FREQUENCY OF	SAMPL
		AVERAGE	MAXIMIM	LINITS	MINIMIM	AVERAGE	MAXIMI'IM	LINITS		ANALYSIS	

	•						NOTE: Read instru	uctions before	e compl	eting this form	1.
PARAMETER		QUAI	NTITY OR LOADING			QUALITY OR CONC	ENTRATION		NO.	FREQUENCY OF	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS		ANALYSIS	
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	****	**	*****	*****	36.0	04	0	31 / 31	RCORDR
00010 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	***	*****	*****	Req. Mon.	DEG. C.		CONTI	CALCTD
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	******	**	*****	*****	25.4	04	0	31 / 31	MODELD
00010 Z 0 INSTREAM MONITORING	PERMIT. REQUIREMENT	*****	*****	***	*****	******	30.5 DAILY MX	DEG. C.		CONTI	CALCTD
TEMP. DIFF. BETWEEN SAMP. & UPSTRM DEG.C	SAMPLE MEASUREMENT	****	*****	**	*****	******	3	04	0	31 / 31	CALCTD
00016 1 S EFFLUENT GROSS	PERMIT REQUIREMENT	****	*****	****	*****	******	3 DAILY MX	DEG. C.		CONTI NUOUS	CALCTD
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	*****	1755	03	*****	*****	*****	**	0	31 / 31	RCORDR
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	Req. Mon.	MGD	*****	*****	****	****		CONTI	RCORDR
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	*****	*****	**	*****	0.015	0.059	19	0	23 / 31	GRAB
50060 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	******	****	*****	0.1 MO AVG	0.1 DAILY MAX	MG/L		FIVE PER WEEK	CALCTD
TEMPERATURE - C, RATE OF CHANGE	SAMPLE MEASUREMENT	****	0	62	*****	*****		**	0	31 / 31	CALCTD
82234 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	2 DAILY MX	DEG C/HR		********	******	****		CONTI	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

	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	21000	TE	LEPHONE		DATE	
Paul R. Simmons	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	Seguovah Plant Manager					
Sequoyan Plant Manager	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,	SIGNATURE OF PRINCIPAL EXECUTIVE	423	843-6502	12	11	10
TYPED OR PRINTED	including the possibility of fine and imprisonment for knowing violations.	OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	МО	DAY
COMMENTS AND EVEL ANATION OF ANYLING AT	TIONS (Defended if the bound to be						

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

No closed mode operation. Veliger monitoring data is included as an attachment. The following injections occurred: 1. Floguard MS6236 (max. calc. conc. was 0.029mg/L--limit 0.2mg/L) 2. Biodetergent 73551 (max. calc. conc. was 0.038mg/L--limit 2.0mg/L) 3. Spectrus CT1300 (max. calc. conc. was 0.036mg/L--limit 0.050mg/L)

Sample Date	Mean # of ZM/m3	% Settlers	Water Temp. ('C)	Sample Date	Mean# of Asiatic Clams/m3	Water Temp. (°C)	LOCATION	SUB LOCATION	NOTES: % Gravid Asiatic Clam	COLLECTED BY
01/03/2012	14	100	26	01/03/2012	. 0	26		1-25-545		PKS
01/10/2012	0	0	9	01/10/2011	0	9	RCW			WBE
01/17/2011	0	0	10	01/17/2011	0	10		1-ISV-24-1234		PB
01/24/2012	0	0	13	01/24/2012	0	13		1-25-545		WDT
01/31/2012	0	0	17.6	01/31/2012	0	17.6		1-25-545		CR
02/07/2012	0	0	12	02/07/2012	0	12		1-25-545		BB
02/14/2012	0	0	8.3	02/14/2012	0	8.3		1-24-1234		WE
02/21/2012	0	0	26.5	02/21/2012	0	26.5		1-25-545		CR
02/28/2012	0	0	11.1	02/28/2011	0	11.1		1-ISV-24-1234		WBE
03/06/2012	0	0	11.7	03/06/2012	0	11.7		1-ISV-24-1234		WBE
03/13/2012	0	0	13	03/13/2012	0	13		1-ISV-24-1234		WBE
03/20/2012	0	0	14.6	03/20/2012	0	14.6		1-ISV-24-1234		WBE
03/27/2012	1623	. 1.3	17.2	03/27/2012	0	17.2		1-ISV-24-1234		WBE
04/03/2012	229	. 0	18	04/03/2012	0	18		1-ISV-24-1234		PB
04/10/2012	79	20	22	04/10/2012	0	22		1-ISV-24-1234		PB
04/18/2012	326	5	18.8	04/18/2012	0	18.8		1-ISV-24-1234		MJW
May 2012										No Samples Collected
June 2012										No Samples Collected
July 2012										No Samples Collected
August 2012									•	No Samples Collected
September 2012										No Samples Collected
10/23/2012	394	. 8	17	10/23/2012	82	17		1-ISV-24-1234		WAW

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) Address				NITORING REPORT		MAJOR Form Approved. (SUBR 01) CMB No. 2040-0004						
Address P.O. BOX 2000 (INTEROFFICE OPS-5N-SQN)		-	TNO	0026450		101 T	F - FINAL					
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ocation HAMILTON COUNTY		_	VEAD		TORING PERIOD	MO DAY	EFFLUENT					
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Paul R. Simmons Sequoyah Plant Manager	properly gather a persons who man information, the i	and evaluate the information nage the system, or tho information submitted is	ation submitted. Based on se persons directly respo , to the best of my knowle	n my inquiry of the naible for gather edge and belief,	ne person or ring the true, accurate,	Sequoyah Pi		423 84	3-6502	2 12	11	10
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COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

Toxicity was not sampled in October 2012.

TYPED OR PRINTED

YEAR

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DAY

AREA CODE

NUMBER

OFFICER OR AUTHORIZED AGENT

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) Name TVA - SEQUOYAH NUCLEAR PLANT Address P.O. BOX 2000					RGE ELIMINATION SY NITORING REPORT		MAJOR Form Approved. (SUBR 01) OMB No. 2040-0004				
Address P.O. BOX 2000		 		10000450		100.0	•				•
(INTEROFFICE OPS-5N-SQN)	. 		10026450		103 G	F - FINAL				
SODDY - DAISY, TN 37384 Facility TVA - SEQUOYAH NUCLEAR	BI ANT	-	PER	MIT NUMBER	DISCHAR	GE NUMBER	LOW VOL. WASTE	TREATMEN	AT PO	۸D	
Location HAMILTON COUNTY	FLAN	- -	VEAD	MONIT MO DAY	TORING PERIOD		EFFLUENT				
ATTN: Brad Love			From 12	10 01		10 31	*** NO DISCHARG		***	atina thin s	
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00400 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	****	**	6 MINIMUM	*****	9 MAXIMUM	SU		THREE/ WEEK	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*****	******	**	*****	9	13	19	0	2/31	GRAB
00530 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	*****	. **	*****	30 MO AVG	100 DAILY MX	MG/L		TWICE/ MONTH	GRAB
OIL AND GREASE	SAMPLE MEASUREMENT	****	****	**	*****	<6	<6	19	0	2/31	GRAB
00556 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	**	*****	15 MO AVG	20 DAILY MX	MG/L		TWICE/ MONTH	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	1.242	1.834	03	****	*****	*****	**	0	31 / 31	RCORDR
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NAME/TITLE PRINCIPAL EXECUTIVE O	OFFICER Certify under pa	nalty of law that this do	cument and all attachm	ents were prepare	d under my	2/	·	TELEPH	IONE		DATE
Paul R. Simmons	direction or super properly gather a persons who mar	vision in accordance wi nd evaluate the informa rage the system, or thos nformation submitted is	th a system designed t tion submitted. Based o e persons directly resp	o assure that quali on my inquiry of the consible for gatheri	fied personnel e person or ing the	Sequoyah Pla	ant Manager		13-6502		11 10

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

Sequoyah Plant Manager

TYPED OR PRINTED

and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

YEAR

NUMBER

AREA CODE

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

MO

DAY

Name	TVA - SEQUOYAH NUCLEAR PLANT
Address	P.O. BOX 2000
	(INTEROFFICE OPS-5N-SQN)
	SODDY - DAISY, TN 37384
Facility	TVA - SEQUOYAH NUCLEAR PLANT
Location	HAMILTON COUNTY

ATTN: Brad Love

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

MAJOR (SUBR 01) Form Approved.
OMB No. 2040-0004

TN0026450 PERMIT NUMBER

MO

10

YEAR

12

From

110 G DISCHARGE NUMBER F - FINAL RECYCLED COOLING WATER

EFFLUENT

*** NO DISCHARGE XX ***

NOTE: Read instructions before completing this form PARAMETER QUANTITY OR LOADING QUALITY OR CONCENTRATION FREQUENCY SAMPLE NO. EX TYPE ANALYSIS **AVERAGE** UNITS MAXIMUM UNITS MINIMUM **AVERAGE** MAXIMUM TEMPERATURE, WATER DEG. SAMPLE ****** ****** ******* ****** 04 MEASUREMENT CENTIGRADE 00010 1 0 PERMIT ****** ******* ****** ****** DEG C CONTIN CALCTD REPORT REQUIREMENT **EFFLUENT GROSS VALUE** UOUS DAILY MX TEMPERATURE, WATER DEG. SAMPLE ***** ***** **** ****** 04 MEASUREMENT CENTIGRADE 00010 Z 0 PERMIT ****** ****** ****** ****** DEG C CONTIN CALCTD 30.5 REQUIREMENT INSTREAM MONITORING UOUS DAILY MX TEMP. DIFF, BETWEEN SAMP. & SAMPLE ****** ****** ****** 04 MEASUREMENT UPSTRM DEG.C 00016 1 0 PERMIT ****** ****** DEG C CONTIN CALCTD ****** ***** REQUIREMENT EFFLUENT GROSS VALUE UOUS DAILY MX FLOW, IN CONDUIT OR THRU SAMPLE ****** ****** ****** **** 03 -MEASUREMENT TREATMENT PLANT 50050 1 0 PERMIT CONTIN RCORDR ***** MGD ****** ****** ****** Reg. Mon. REQUIREMENT EFFLUENT GROSS VALUE UOUS DAILY MX CHLORINE, TOTAL RESIDUAL SAMPLE ****** ****** ****** 19 MEASUREMENT 50060 1 0 PERMIT **** ***** ***** MG/L Five per CALCTD 0.1 0.1 REQUIREMENT EFFLUENT GROSS VALUE Week MO AVG DAILY MX TEMPERATURE - C, RATE OF SAMPLE ****** ****** ****** 04 MEASUREMENT CHANGE 82234 1 0 PERMIT ** CONTIN CALCTD ***** 2 DEG C ***** ****** ****** REQUIREMENT EFFLUENT GROSS VALUE UOUS DAILY MX SAMPLE MEASUREMENT PERMIT REQUIREMENT

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I Certify under penalty of law that this document and all attachments were prepared under my
Paul R. Simmons	direction or supervision in accordance with a system designed to assure that qualified personn 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
Sequoyah Plant Manager	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.
TYPED OF PRINTED	_including the possibility of the and imprisorment for knowing violations.

TELEPHONE DATE Sequoyah Plant Manager 423 843-6502 12 11 10 SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT AREA NUMBER MO DAY YEAR CODE

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

No Discharge this Period

PERMITTEE NAME/ADDRESS (Include Name TVA - SEQUOYAH NUC	TVA - SEQUOYAH NUCLEAR PLANT				ARGE ELIMINATION SYSPINITORING REPORT		MAJOR (SUBR 01)			rm Approved IB No. 2040	
Address P.O. BOX 2000			TN0026450 110 T				F - FINAL				
(INTEROFFICE OPS-5N-SQ		- .			7,00,10,00	110 T		INIO INIATED			
SODDY - DAISY, TN 37384 Facility TVA - SEQUOYAH NUCLEA	P DI ANT	_	PERM	IT NUMBER	DISCHARG	GE NUMBER	RECYCLED COOL	ING WATER			
ocation HAMILTON COUNTY	<u> </u>	_		MONI	TORING PERIOD		EFFLUENT				
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ATTN: Brad Love			From 12	10 01	To 12	10 31		لسسا			
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NAME/TITLE PRINCIPAL EXECUTIVE	OFFICER Certify under per	ally of law that this de	ocument and all attachma	nts were prepare	ad under my			TELEPH	ONE	1	DATE
	direction or super	vision in accordance w	rith a system designed to	assure that qual	ified personnel	Kuf A	(1-	12757	JI1E		
Paul R. Simmons			ation submitted. Based or se persons directly respo				ant Manager				
Sequoyah Plant Manager	information, the in	formation submitted is	, to the best of my knowl	edge and belief,	true, accurate,	Sequoyan Pl		423 84	3-6502	12	11 10
Codecian Liant manager	and complete. I ar	n aware that there are	significant penalties for	submitting false i	nformation, SIGN	IATURE OF PRIM	ICIPAL EXECUTIVE				

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

No Discharge this Period

TYPED OR PRINTED

including the possibility of fine and imprisonment for knowing violations.

YEAR

DAY

AREA CODE

OFFICER OR AUTHORIZED AGENT

NUMBER

ERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)		NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) DISCHARGE MONITORING REPORT (DMR)				MAJOR (SUBR 01)	Form Approved. OMB No. 2040-0004					
Address P. O. BOX 2000 (INTEROFFICE OPS-5N-SQN) (INTEROFFICE OPS-5N-SQN) (SODDY - DAISY, TN 37384 (Sacility TVA - SEQUOYAH NUCLEAR PLANT)			TN0026450 118 G PERMIT NUMBER DISCHARGE NUMBER				F - FINAL WASTEWATER & STORM WATER					
ocation HAMILTON COUNTY	<u> </u>	- -	YEAR		TORING PERIOD Y YEAR		EFFLUENT NO DISCUAR	NE [VV]	***		, .	
ATTN: Brad Love			From 12	10 01	To 12	10 31	NOTE: Read instri			eting this form		
PARAMETER		QUAN	ITITY OR LOADING	·	· ·	QUALITY OR CO	ONCENTRATION		NO.	FREQUENCY OF		
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS		ANALYSIS	""-	
OXYGEN, DISSOLVED (DO)	SAMPLE MEASUREMENT	*****	*****	**		*****	******	19				
03300 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	****	2 MINIMUM	******	*****	MG/L		TWICE/ WEEK	GRAB	
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*****	******	**	******	******		19				
00530 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	*****	***	****	******	100 DAILY MX	MG/L		TWICE/ WEEK	GRAB	
SOLIDS, SETTLEABLE	SAMPLE MEASUREMENT	*****	******	**	*****	*****		25	!			
00545 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	******	***	*****	******	1 DAILY MX	ML/L		ONCE/ MONTH	GRAB	
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			03	*****	******	****	**			_	
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	Req. Mon. MO AVG	Req. Mon. DAILY MX	MGD	*****	******	******	•		ONCE/ BATCH	ESTIMA	
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NAME/TITLE PRINCIPAL EXECUTIVE OFF	ICER Certify under po	enalty of law that this do	cument and all attachmen	ts were prepare	d under my			TELEPH	ONE		DATE	
	Idirection or europ	nuision in accordance wi	th a evetom decianed to a	ecura that mucl	fied personnel V	1/1//	en i			1		

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.

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.

Paul R. Simmons

Sequoyah Plant Manager

TYPED OR PRINTED

12

YEAR

11

MO

10

DAY

843-6502

NUMBER

423

AREA CODE

Sequoyah Plant Manager

SIGNATURE OF PRINCIPAL EXECUTIVE

OFFICER OR AUTHORIZED AGENT

REVIEW/CONCURRENCE SHEET

DOCUMENT NAME: <u>SEQUOYAH NUCLEAR PLANT - October 2012 DMR</u>

ORGANIZATION: <u>Environmental</u>

DOCUMENT PREPARED BY: Brad Love

DATE: <u>11/09/2012</u>

CONCURRENCES							
Name	R V	C N	Signature - Comment	Date			
B.M. Love	Х		6	11/0/12			
L.M. Koby	Х		Thatan	11/10/12			
J.A. Cross		Х	James A nos	11/10/12			

INSTRUCTIONS: Originator will determine the review/concurrence assignment.

REVIEW:

Examine technical content and commitments made. A

review (RV) should confirm the truth and accuracy of factual statements and indicate agreement with commitments made which are applicable to the

reviewer's organization.

CONCURRENCE: Indication of agreement with the document as a whole.

Concurrence (CN) signifies that the document is responsive to the

intended purpose, logical in construction, and clear in meaning in the eyes of the recipient. A concurrence signature indicates that the individual

would be willing to sign the document for the agency.

S58 121214 800 - NPDES CORRESPONDENCE

December 14, 2012

Ms. Christina Morgan
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

Dear Ms. Morgan:

TENNESSEE VALLEY AUTHORITY (TVA) - SEQUOYAH NUCLEAR PLANT (SQN) - NPDES PERMIT NO. TN0026450 - DISCHARGE MONITORING REPORT (DMR) FOR NOVEMBER 2012

Enclosed is the November 2012 Discharge Monitoring Report for Sequoyah Nuclear Plant. The turbine building sump (TBS) discharged directly to the yard drainage pond during the reporting period and was monitored in accordance with the narrative condition found in Part 1.A.2. of the subject permit.

Also enclosed are two attachments containing information regarding a collection system overflow that occurred during the reporting period, TBS monitoring data, and an update for previously reported collection system overflows. At no time has there been any observed threat to public drinking supplies, to human health, or the environment.

If you have any questions or need additional information, please contact Brad Love by email at bmlove@tva.gov or by phone at (423) 843-6714.

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.

Sincerely.

Site Vice President

Sequoyah Nuclear Plant

Enclosures

cc (Enclosures):

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

S.D. Booker, MOB 1F-WBN B. E. Brickhouse, BR 4A-C

J. T. Carlin, OPS 4A-SQN

J. A. Cross, POB 2A-SQN

T.R. Markum, BR 4A-C

D. B. Nida, BR 4A-C

U.S. Nuclear Regulatory Commission Attn: Document Control Desk Washington, DC 20555

J.W. Proffitt, OPS 4C-SQN
A. A. Ray, WT 11A-K
G. R. Signer, WT 6A-K
P.R. Simmons, POB 2B-SQN
B. N. Smith (EDMS), MPB 1E-M



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

December 14, 2012

Ms. Christina Morgan
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

Dear Ms. Morgan:

TENNESSEE VALLEY AUTHORITY (TVA) - SEQUOYAH NUCLEAR PLANT (SQN) - NPDES PERMIT NO. TN0026450 - DISCHARGE MONITORING REPORT (DMR) FOR NOVEMBER 2012

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Sincerely.

Site Vice President Sequoyah Nuclear Plant

Enclosures

cc (Enclosures):

Chattanooga Environmental Field Office 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, DC 20555

TVA Sequoyah Nuclear Plant NPDES Permit No. TN0026450 Attachment 1

Description of the Event and Determination of Cause

On 11/25/2012 at 22:13 EDT the Sequoyah (SQN) Shift Manager was notified of a low-flow sewage overflow coming from a manhole located in the roadway between the Plant Office Building, Multi-Purpose Building, and Security Building. The shift manager initiated the SQN Spill Plan and dispatched personnel to investigate. An intermittent stream of sewage was discovered flowing out of the manhole and running approximately 20 feet across the road before it reached a yard drain. On 11/25/2012 at 22:30 EDT the sewage overflow was stopped from entering the yard drain. All remaining sewage residue in the road was neutralized with lime. The yard drain flows to the SQN Yard Drainage Pond, which discharges to the Diffuser Pond. The Diffuser Pond discharges through Outfall 101 to the Tennessee River. At no time was there any observed threat to the public drinking supplies, to human health, or the environment.

The total quantity of sewage that overflowed into a yard drain was estimated to be less than 5 gallons. The overflow was caused by a mass of foreign material becoming entangled around the ejector pump float switch. The ejector pump float switch became locked in the high level position and the pump continued to run. The ejector pump eventually tripped due to overheating which led to an associated trip of the high level alarm.

Period of Discharge

The shift manager was notified of the overflow on 11/25/2012 at 22:13 EDT. The sewage overflow was entering the yard drain as personnel responding to the spill arrived. The sewage was stopped from entering the yard drain on 11/25/2012 at 22:30 EDT. The estimated time of discharge was approximately 17 minutes.

Steps Being Taken to Reduce, Eliminate, and Prevent Recurrence

This incident was entered into the TVA Corrective Action Program. Sequoyah continues daily monitoring of sewage ejector pump locations to ensure control power has not been isolated and has added visual inspections of associated manholes to verify the absence of foreign material which may cause ejector pump issues.

TVA Sequoyah Nuclear Plant NPDES Permit No. TN0026450 Attachment 2

Turbine Building Sump Monitoring Data

The turbine building sump was discharged directly to the yard drainage pond from 11/10/2012 to 11/15/2012. During this period, the turbine building sump was monitored in accordance with the narrative condition found in Part 1.A.2 of NPDES Permit TN0026450.

Parameter	Daily Minimum	Monthly Average	Daily Maximum	No. of Samples
Flow	-	0.480 MGD	1.150 MDG	6
pН	8 s.u.	-	8 s.u.	5
O&G	-	< 4 mg/L	< 6 mg/L	5
TSS	-	4 mg/L	7 mg/L	5

Update on Previously Reported Sewage Collection System Overflows

SQN is herein providing an update regarding sewage collection system overflow events previously reported to the Division. Each event was entered into the TVA Corrective Action Program, and an investigation was initiated to determine the cause(s). Throughout the investigation and the duration of the Steam Generator Replacement outage, Sequoyah has implemented shiftly monitoring of onsite sewage ejectors as an added precaution.

SQN determined the sewage collection system overflows had two apparent causes. The investigation indicated there was no consistent method to inform secondary and tertiary electrical feeds when switching circuit breakers of primary electrical systems. The investigation also indicated there are potential opportunities to improve the inspection program. As a result, TVA will elicit the involvement of a Grade I collection system operator to review the existing system and provide recommendations for necessary upgrades to the material condition and inspection program. The review will include at a minimum an evaluation of current alarm system design and inspection program scope and frequency. In addition, measures will be taken by site personnel to improve response awareness and ensure prompt and appropriate actions continue to be taken.

PERMITTI	EE NAME/ADDRESS (Include Facility Name/Location if Different)
Name	TVA - SEQUOYAH NUCLEAR PLANT
Address	P.O. BOX 2000
	(INTEROFFICE OPS-5N-SQN)
	SODDY - DAISY, TN 37384
<u>Facility</u>	TVA - SEQUOYAH NUCLEAR PLANT
<u>Location</u>	HAMILTON COUNTY
ATTN: B	rad Love

MAJOR (SUBR 01) Form Approved.
OMB No. 2040-0004

TN0026450 101 G
PERMIT NUMBER
DISCHARGE NUMBER

F-FINAL

DIFFUSER DISCHARGE

EFFLUENT

| MONITORING PERIOD | YEAR | MO | DAY | YEAR | MO | DAY | To | 12 | 11 | 30 |

*** NO DISCHARGE

NOTE: Read instructions before completing this form.

PARAMETER		QUA	NTITY OR LOADING			QUALITY OR CONC	ENTRATION	-	NO. EX	FREQUENCY OF	SAMPLE TYPE	
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS	1	ANALYSIS		
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	*****	*****	29.6	04	0	30 / 30	RCORDR	
00010 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	******	***	******	*****	Req. Mon. DAILY MAX	DEG. C.		CONTI	CALCTD	
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	*****	****	17.4	04	0	30 / 30	MODELD	
00010 Z 0 INSTREAM MONITORING	PERMIT REQUIREMENT	*****	*****	***	*****	******	30.5 DAILY MX	DEG. C.		CONTI	CALCTD	
TEMP. DIFF. BETWEEN SAMP. & UPSTRM DEG.C	SAMPLE MEASUREMENT	*****	*****	##	*****	*****	2	04	0	30 / 30	CALCTD	
00016 1 1 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	****.	*****	*****	5 DAILY MX	DEG. C.		CONTI	CALCTD	
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	*****	983	03	*****	*****	*****	**	0	30 / 30	RCORDR	
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	Req. Mon. DAILY MAX	MGD	*****	*****	****	****		CONTI	RCORDR	
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	*****	*****	**	****	0.012	0.020	19	0	14 / 30	GRAB	
50060 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	*****	****	*****	0.1 MO AVG	0.1 DAILY MAX	MG/L		FIVE PER WEEK	CALCTD	
TEMPERATURE - C, RATE OF CHANGE	SAMPLE MEASUREMENT	*****	0	62	******	******		**	0	30 / 30	CALCTD	
82234 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	2 DAILY MX	DEG C/HR	******	****	****	****		CONTI NUOUS	CALCTD	
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT									•		

	I Certify under penalty of law that this document and all attachments were prepared under my
John T. Carlin	direction or supervision in accordance with a system designed to assure that qualified personne properly gather and evaluate the information submitted. Based on my inquiry of the person or
Site Vice President	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.
TYPED OR PRINTED	

TELEPHONE DATE

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 closed mode operation. Veliger monitoring data is included as an attachment. The following injections occurred: 1. Floguard MS6236 (max. calc conc. was 0.103mg/L--limit 0.2mg/L), 2. Biodetergent 73551 (max. calc. conc. was 0.051mg/L--limit 2.0mg/L)

Sample Date	Mean # of ZM/m3	% Settlers	Water Temp. (°C)	Sample Date	Mean# of Asiatic Clams/m3	Water Temp. (°C)	LOCATION	NOTES: % Gravid Asiatic Clam	COLLECTED BY
01/03/2012	14	100	26	01/03/2012	0	26			PKS
01/10/2012	, 0	0	9	01/10/2011	0	9	RCW		WBE
01/17/2011	0	0	10	01/17/2011	. 0 .	10			PB
01/24/2012	0	0	13	01/24/2012	0	13	1-25-545		WDT
01/31/2012	0	0	17.6	01/31/2012	0	17.6	1-25-545		CR
02/07/2012	0	0	12	02/07/2012	0	12	1-25-545		BB
02/14/2012	0	0	8.3	02/14/2012	0	8.3	1-24-1234		WE
02/21/2012	0	0	26.5	02/21/2012	0	26.5	1-25-545		CR
02/28/2012	0	0	11.1	02/28/2011	0	11.1	1-ISV-24-1234		WBE
03/06/2012	0	0	11.7	03/06/2012	0	11.7	1-ISV-24-1234		WBE
03/13/2012	0	0	13	03/13/2012	0.	13	1-ISV-24-1234		WBE
03/20/2012	0	0	14.6	03/20/2012	0	14.6	1-ISV-24-1234		WBE
03/27/2012	1623	1.3	17.2	03/27/2012	0	17.2	1-ISV-24-1234		WBE
04/03/2012	229	0	18	04/03/2012	0	18	1-ISV-24-1234		PB
04/10/2012	79	20	22	04/10/2012	0	22	1-ISV-24-1234		PB
04/18/2012	326	5	18.8	04/18/2012	0	18.8	1-ISV-24-1234		MJW
May 2012									No Samples Collected
June 2012									No Samples Collected
July 2012									No Samples Collected
August 2012									No Samples Collected
ptember 2012						-		•	No Samples Collected
10/23/2012	394	8	17	10/23/2012	82	17	1-ISV-24-1234		WAW
10/30/2012	34	50	17	10/30/2012	- 17	17	1-ISV-24-1234		WAW
11/06/2012	0	0	17	11/06/2012	0	17	1-ISV-24-1234		WAW
11/13/2012	,0	0	15	11/13/2012	0	15	1-ISV-24-1234		WAW
11/20/2012	. 0	0	13	11/20/2012	0	13	1-ISV-24-1234		WAW
11/28/2012	0	0	12	11/28/2012	0	12	1-ISV-24-1234		WAW
12/04/2012	0	0	12	12/04/2012	0	12	1-ISV-24-1234		WAW

•

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different) Name TVA - SEQUOYAH NUCLEAR PLANT Address P.O. BOX 2000 (INTEROFFICE OPS-5N-SON)			NATIO		UTANT DISCHA					MAJOR (SUBR 01)		Fo ON	rm Approved MB No. 2040	i. -0004	
(INTEROFFICE OPS-5N-SQN) SODDY - DAISY, TN 37384		_ _			0026450 IT NUMBER		DISCHA	101 RGE NI		F - FINAL BIOMONITORING	FOR OUTFA	LL 101			
Facility TVA - SEQUOYAH NUCLEAR PI Location HAMILTON COUNTY	LANT	<u>-</u>		MONITORING PERIOD EFFLUENT YEAR MO DAY YEAR MO DAY											
ATTN: Brad Love			From		11 01			11	30						
PARAMETER		QUAI	NTITY OR LO	DADING				QUAL	ITY OR C	ONCENTRATION	a double belor		FREQUENCY	<u> </u>	
		AVERAGE	MAXII	MUM	UNITS	MII	MUMIN		VERAGE	MAXIMUM	UNITS		ANALYSIS		
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	****	***	***	**		itoring Required	1	*****	****	23				
TRP3B 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	***	***	****	4	13.2 IMUM		*****	*****	PERCENT		SEMI ANNUAL	СОМ	POS
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	****	****	***	**	Mon	itoring Required		*****	******	23				
TRP6C 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	****	***	***	****	. 4	13.2 IINUM		******	*****	PERCENT		SEMI ANNUAL	COM	POS
	SAMPLE MEASUREMENT								P-100-4-10-1						
	PERMIT REQUIREMENT														
	SAMPLE MEASUREMENT														
	PERMIT REQUIREMENT														
	SAMPLE MEASUREMENT														
	PERMIT REQUIREMENT	•										-			
	SAMPLE MEASUREMENT														
	PERMIT REQUIREMENT														
	SAMPLE MEASUREMENT								,						
	PERMIT REQUIREMENT							1							
NAME/TITLE PRINCIPAL EXECUTIVE OF	FICER Certify under per	nalty of law that this do	cument and a	ll attachme	nts were prepare	ed under m	y 1		4/		TELEPH	IONE		DATE	
John T. Carlin Site Vice President	direction or supen properly gather ar persons who man information, the in	vision in accordance want of the information or the system, or the formation submitted is	rith a system d ation submitted se persons dir , to the best o	esigned to i. Based or ectly respo f my knowl	assure that qua my inquiry of the nsible for gather edge and belief,	lified persone ne person o ring the , true, accul	nnel er rate,			President		3-7001		12	14
TYPED OR PRINTED	including the poss	n aware that there are ibility of fine and impri	sonment for kr	names for s	ations.	monsement.	. ,			NCIPAL EXECUTIVE HORIZED AGENT	AREA N	UMBER	YEAR	МО	DAY
	F ANY VIOLATIONS (Reference all attachments here)								LODE						

EPA Form 3320-1 (REV 3/99)

Previous editions may be used

	Address P.O. BOX 2000				RGE ELIMINATION		MAJOR (SUBR 01)		Fo	orm Approve MB No. 2040	j. -0004	
(INTEROFFICE OPS-5N-SQN) SODDY - DAISY, TN 37384		· _		026450 T NUMBER	DISCHA	103 G	F - FINAL LOW VOL. WASTI	TDEATM	ENT DO	ND		
Facility TVA - SEQUOYAH NUCLEAR Location HAMILTON COUNTY	PLANT			MONI	TORING PERIO	ODO	EFFLUENT	E INCATIVI	ENT PO	ND		
ATTN: Brad Love			From 12	MO DAY		11 30	*** NO DISCHA					
PARAMETER		QUAN	TITY OR LOADING			QUALITY OR CO	NOTE: Read ins	tructions bef	NO.	FREQUENC	SAM	
		AVERAGE	MAXIMUM	MAXIMUM UNITS		AVERAGE	MAXIMUM	UNITS	EX	OF ANALYSIS	TY	/PE
PH	SAMPLE MEASUREMENT	*****	*****			*****	8	12	0	13 / 30	GR	RAB
00400 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	******	**	6 MINIMUM	*****	9 MAXIMUM	su		THREE/ WEEK	GR	RAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	******	*****	**	*****	8	10	19	0	2/30	GR	RAB
00530 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	**	*****	30 MO AVG	100 DAILY MX	MG/L		TWICE/ MONTH	GR	RAB
OIL AND GREASE	SAMPLE MEASUREMENT	*****	*****	**	*****	<6	<6	19	0	2/30	GR	RAB
00556 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	****	**	*****	15 MO AVG	20 DAILY MX	MG/L		TWICE/ MONTH	GR	RAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	1.254	1.685	03	*****	*****	*****	**	0	30 / 30	RCO	ORDR
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	Req. Mon. MO AVG	Req. Mon	MGD	*****	******	*****	**		SEE PERMIT	1	ORDR
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											
	SAMPLE MEASUREMENT				<u> </u>							
	PERMIT REQUIREMENT											
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT	•									1	$\neg \neg$
					/	Dan	2			<u> </u>		
NAME/TITLE PRINCIPAL EXECUTIVE O	direction or supe	rvision in accordance wi	th.a system designed to a	assure that quali	fied personnel			TELEF	PHONE		DATE	
John T. Carlin Site Vice President	persons who ma information, the	nage the system, or thos nformation submitted is	tion submitted. Based on the persons directly respor to the best of my knowle	nsible for gatheri edge and belief, i	ng the true, accurate,	Site Vice		423 8	343-7001	12	12	14
			significant penalties for si conment for knowing viola			GNATURE OF PRIN	ICIPAL EXECUTIVE HORIZED AGENT	AREA	NUMBER	YEAR	МО	DAY
TYPED OR PRINTED COMMENTS AND EXPLANATION OF AN	Y VIOLATIONS (Refer	ence all attachments i	here)					CODE				لــــا

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)
Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE OPS-5N-SQN)
SODDY - DAISY, TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY
ATTN: Brad Love

MAJOR (SUBR 01) Form Approved. OMB No. 2040-0004

TN0026450 110 G **PERMIT NUMBER** DISCHARGE NUMBER F - FINAL **RECYCLED COOLING WATER**

EFFLUENT

MONITORING PERIOD YEAR MO DAY YEAR MO DAY From 12 To 30 11 01 12 11

*** NO DISCHARGE XX ***

NOTE: Read instructions before completing this form.

PARAMETER		QUA	NTITY OR LOADING			NO.	FREQUENCY	SAMPLE TYPE			
		AVERAGE	MAXIMUM	UNITS	MINIMUM ·	AVERAGE	MAXIMUM	UNITS		ANALYSIS	
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		04			
00010 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	**	*****	*****	REPORT DAILY MX	DEG C		CONTIN	CALCTD
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	***	*****		04			
00010 Z 0 INSTREAM MONITORING	PERMIT REQUIREMENT	*****	*****	**	*****	*****	30.5 DAILY MX	DEG C		CONTIN	CALCTD
TEMP. DIFF. BETWEEN SAMP. & UPSTRM DEG.C	SAMPLE MEASUREMENT	****	*****	**	*****	*****		04			
00016 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	****	**	****	*****	5 DAILY MX	DEG C		CONTIN	CALCTD
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	****		03	*****	****	*****	**			
50050 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	Req. Mon. DAILY MX	MGD	*****	*****	******	**		CONTIN	RCORDR
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	****	*****	**	*****			19			
50060 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	**	*****	0.1 MO AVG	0.1 DAILY MX	MG/L		Five per Week	CALCTD
TEMPERATURE - C, RATE OF CHANGE	SAMPLE MEASUREMENT	*****		04	*****	*****	*****	**			
82234 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	****	2 DAILY MX	DEG C	******	*****	*****	**		CONTIN	CALCTD
·	SAMPLE MEASUREMENT										
	PERMIT . REQUIREMENT										

	I Certify under penalty of law that this document and all attachments were prepared under my	
John T. Carlin	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	
Site Vice President	information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	SIGNATURE OF PRINCIPAL EXECUTIVE
TYPED OR PRINTED	including the possibility of line and imprisonment for knowing violations.	OFFICER OR AUTHORIZED AGENT

TELEPHONE DATE 423 843-7001 12 12 14 AREA NUMBER YEAR MO DAY CODE

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

No Discharge this Period

PERMITTEE NAME/ADDRESS (Includ Name TVA - SEQUOYAH NUC	•	Different) —	NATIO				LIMINATION S		•	MAJOR (SUBR 01)			orm Approved MB No. 2040-	-
Address P.O. BOX 2000 (INTEROFFICE OPS-5N-SQ		_		TNO	026450			110) T	F - FINAL				
SODDY - DAISY, TN 37384		_	-		T NUMBE	R	DISCHAI			RECYCLED COOLIN	IG WATER			
Facility TVA - SEQUOYAH NUCLEA				1 51/11/1					JIVIDEIN		10 11111211			
Location HAMILTON COUNTY		<u> </u>					IG PERIO			EFFLUENT				
			·	YEAR		AY .	YEAR		DAY	*** NO DISCHARO	GE XX	***		
ATTN: Brad Love	•		From	12	11 0	11	To 12	11_	30	NOTE: Read instr			atina this to	•
DADAMETER		0114	NTITY OR L	O A DINIC				OLIAL	ITV OR C		uctions before		FREQUENCY	
PARAMETER		QUA	MINTORL	ITITY OR LOADING QUALITY OR CON					UNCENTRATION		NO.	OF	SAMPLE TYPE	
		AVERAGE	MAXI	MUM	UNITS	N	MINIMUM AVERAGE		MAXIMUM	UNITS		ANALYSIS		
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	******	***	*****				*****		******	23			
TRP3B 1 0 0	PERMIT	*****	***	****			43.2	٠,	*****	*****	PERCENT	-	SEMI	COMPOS
EFFLUENT GROSS VALUE	REQUIREMENT						NIMUM						ANNUAL	
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	*****	***	***	**			****		*****	.23			
TRP6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	****	***	****		43.2 NIMUM	,	*****	******	PERCENT		SEMI ANNUAL	COMPOS
	SAMPLE MEASUREMENT													
	PERMIT REQUIREMENT													
	SAMPLE MEASUREMENT													
	PERMIT REQUIREMENT			, m										
	SAMPLE MEASUREMENT													

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

John T. Carlin

John T. Carlin

Site Vice President

TYPED OR PRINTED

J 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 personner 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.

TELEPHONE DATE Site Vice President 423 843-7001 12 12 14 SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT AREA NUMBER YEAR MO DAY CODE

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

No Discharge this Period

PERMIT REQUIREMENT SAMPLE MEASUREMENT PERMIT REQUIREMENT SAMPLE MEASUREMENT PERMIT REQUIREMENT

PERMITTE	E NAME/ADDRESS (Include Facility Name/Location if Different)
Name	TVA - SEQUOYAH NUCLEAR PLANT
Address	P.O. BOX 2000
	(INTEROFFICE OPS-5N-SQN)
	SODDY - DAISY, TN_37384
Facility	TVA - SEQUOYAH NUCLEAR PLANT
Location	HAMILTON COUNTY

MAJOR (SUBR 01)

Form Approved. OMB No. 2040-0004

TN0026450 118 G PERMIT NUMBER DISCHARGE NUMBER

DAY

01

YEAR

12

From

MO

11

MONITORING PERIOD

To

YEAR

12

MO

11

DAY

30

F - FINAL

WASTEWATER & STORM WATER

EFFLUENT

*** NO DISCHARGE XX ***

ATTN: Brad Love

NOTE: Read instructions before completing this form. PARAMETER QUANTITY OR LOADING FREQUENCY SAMPLE **QUALITY OR CONCENTRATION** NO. EX TYPE **ANALYSIS AVERAGE** MAXIMUM UNITS MINIMUM **AVERAGE** MAXIMUM UNITS SAMPLE ***** **** ***** OXYGEN. DISSOLVED (DO) ****** ** 19 MEASUREMENT 00300 1 0 PERMIT **** ***** ****** ***** MG/L TWICE/ **GRAB** 2 REQUIREMENT EFFLUENT GROSS **WEEK** MINIMUM SAMPLE ***** ***** SOLIDS, TOTAL SUSPENDED ****** 19 MEASUREMENT ****** PERMIT **** **** ***** MG/L TWICE/ **GRAB** 00530 1 0 100 REQUIREMENT **EFFLUENT GROSS** WEEK **DAILY MX** SAMPLE **** ***** ****** SOLIDS, SETTLEABLE ***** 25 MEASUREMENT PERMIT **** ***** **** ***** ***** ONCE/ **GRAB** 00545 1 ML/L 0 1 REQUIREMENT **EFFLUENT GROSS** DAILY MX MONTH FLOW, IN CONDUIT OR THRU SAMPLE ***** ****** 03 MEASUREMENT TREATMENT PLANT 50050 1 PERMIT MGD ****** ****** ****** ONCE/ **ESTIMA** Reg. Mon. Rea. Mon. REQUIREMENT **BATCH** EFFLUENT GROSS **MO AVG DAILY MX** SAMPLE **MEASUREMENT** PERMIT REQUIREMENT SAMPLE MEASUREMENT PERMIT REQUIREMENT SAMPLE MEASUREMENT PERMIT REQUIREMENT

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER 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 John T. Carlin 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, Site Vice President and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. TYPED OR PRINTED

Site Vice President 423 SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT AREA

TELEPHONE DATE 843-7001 12 12 14 NUMBER YEAR MO DAY CODE

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.

S58 130107 800 - NPDES CORRESPONDENCE

January 7, 2013

Ms. Christina Morgan
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

Dear Ms. Morgan:

TENNESSEE VALLEY AUTHORITY (TVA) - SEQUOYAH NUCLEAR PLANT (SQN) - NPDES PERMIT NO. TN0026450 - DISCHARGE MONITORING REPORT (DMR) FOR DECEMBER 2012

Enclosed is the December 2012 Discharge Monitoring Report for Sequoyah Nuclear Plant. Also enclosed is one attachment containing information regarding a collection system overflow that occurred during the reporting period. At no time has there been any observed threat to public drinking supplies, to human health, or the environment.

If you have any questions or need additional information, please contact Brad Love by email at bmlove@tva.gov or by phone at (423) 843-6714.

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.

Sincerely

John T. Carlin Site Vice President Seguovah Nuclear Plant

Enclosures

cc (Enclosures):

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

S.D. Booker, MOB 1F-WBN B. E. Brickhouse, BR 4A-C J. T. Carlin, OPS 4A-SQN J. A. Cross, POB 2A-SQN T.R. Markum, BR 4A-C D. B. Nida, BR 4A-C U.S. Nuclear Regulatory Commission Attn: Document Control Desk Washington, DC 20555

J.W. Proffitt, OPS 4C-SQN
A. A. Ray, WT 11A-K
G. R. Signer, WT 6A-K
P.R. Simmons, POB 2B-SQN
B. N. Smith (EDMS), MPB 1E-M



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

January 7, 2013

Ms. Christina Morgan
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

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Site Vice President Sequoyah Nuclear Plant

Enclosures cc (Enclosures):

Chattanooga Environmental Field Office 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, DC 20555

TVA Sequoyah Nuclear Plant NPDES Permit No. TN0026450 Attachment 1

Description of the Event and Determination of Cause

On 12/03/2012 at approximately 19:00 EDT a toilet located in the Mechanical Maintenance shop was observed to be overflowing. The shift manager initiated the SQN Spill Plan and dispatched personnel to investigate. An intermittent stream of sewage was observed overflowing out of the toilet and running approximately 20 feet across the mechanical maintenance shop floor before it entered a floor drain. There were no solids observed in the overflow. On 12/03/2012 at approximately 20:00 EDT the sewage overflow was stopped from entering the floor drain. All remaining sewage residue in the mechanical maintenance shop was neutralized and cleaned up. The floor drain flows to the service building sump. The service building sump is automatically pumped into the SQN Yard Drainage System with discharges to the Yard Drainage Pond. The Yard Drainage Pond discharges to the Diffuser Pond, which discharges through Outfall 101 to the Tennessee River. At no time was there any observed threat to the public drinking supplies, to human health, or the environment.

The overflow was caused by a mass of foreign material becoming lodged in a check valve in the sewage ejector system. The check valve was not able to fully close causing the toilet to overflow as the level in the sewage system increased.

Period of Discharge

The overflow was observed at approximately 19:00 EDT on 12/03/2012. The sewage overflow was entering the floor drain as personnel responding to the spill arrived. The sewage was stopped from entering the floor drain on 12/03/2012 at approximately 20:00 EDT. The estimated time of discharge was approximately 1 hour.

Steps Being Taken to Reduce, Eliminate, and Prevent Recurrence

This incident was entered into the TVA Corrective Action Program. Sequoyah has closed the two restrooms in the mechanical maintenance shop until further review of this incident has been conducted. Additionally, plans are being developed to install physical barriers between the restroom and local floor drains that will aide in preventing future overflows from reaching the floor drains.

PERMITTEE NAME/ADDRESS (Include F Name TVA - SEQUOYAH NUCLE		Different)			RGE ELIMINATION S	,,	MAJOR (SUBR 01)	-		om Approved VB No. 2040	
Address P.O. BOX 2000		_	TNO	026450	— — —	101 G	F - FINAL				
(INTEROFFICE OPS-5N-SQN)		.—									
SODDY - DAISY, TN 37384		· —	PERM	T NUMBER	DISCHAF	RGE NUMBER	DIFFUSER DISCHA	RGE			
Facility TVA - SEQUOYAH NUCLEAR I	<u> </u>	· 		MONIT	ORING PERIOR		EFFLUENT				
		· 	YEAR 12				*** NO DISCHARG	3E	***		
ATTN: Brad Love			110111 12	12 01	10 12	12 31	NOTE: Read instr	uctions before	e compl	etina this for	n
PARAMETER		QUA	NTITY OR LOADING			QUALITY OR CO				FREQUENCY	
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS	-	ANALYSIS	ITPE
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	****	*****	27.6	04	0	31 / 31	RCORDR
00010 1 0	PERMIT	*****	*****	****	*****	******	Reg. Mon.	DEG. C.		CONTI	CALCTD
EFFLUENT GROSS	REQUIREMENT				•		DAILY MAX			NUOUS	
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	******	**	******	******	15.4	04	0	31 / 31	MODELD
00010 Z 0	PERMIT	******	*****	****	****	******	30.5	DEG. C.		CONTI	CALCTD
INSTREAM MONITORING	REQUIREMENT						DAILY MX			NUOUS	
TEMP. DIFF. BETWEEN SAMP. & UPSTRM DEG.C	SAMPLE MEASUREMENT	*****	******	**	*****	*****	3	04	0	31 / 31	CALCTD
00016 1 1	PERMIT	******	******	****.	*****	******	5	DEG. C.		CONTI	CALCTD
EFFLUENT GROSS	REQUIREMENT						DAILY MX			NUOUS	
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	*****	1534	03	*****	*****	*****	**	0	31 / 31	RCORDR
50050 1 0	PERMIT	******	Reg. Mon.	MGD	*****	*****	*****	***		CONTI	RCORDR
EFFLUENT GROSS	REQUIREMENT	· .	DAILY MAX							NUOUS	
CHLORINE, TOTAL RESIDUAL	SAMPLE	*****	******	**	*****	0.020	0.037	19	0	14/31	GRAB

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER | Certify under penalty of law that this document and all attachments were prepared under my TELEPHONE DATE direction or supervision in accordance with a system designed to assure that qualified personnel John T. Carlin properly gather and evaluate the information submitted. Based on my inquiry of the person of persons who manage the system, or those persons directly responsible for gathering the Site Vice President 423 843-7001 13 01 07 information, the information submitted is , to the best of my knowledge and belief, true, accurate, Site Vice President and complete. I am aware that there are significant penalties for submitting false information, SIGNATURE OF PRINCIPAL EXECUTIVE including the possibility of fine and imprisonment for knowing violations. OFFICER OR AUTHORIZED AGENT AREA NUMBER YEAR MO DAY TYPED OR PRINTED CODE

62

DEG

C/HR

0.1

MO AVG

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

No closed mode operation. Veliger monitoring data is included as an attachment. The following injections occurred: 1. Floguard MS6236 (max. calc. conc. was 0.051mg/L--limit 0.2mg/L) 2. Biodetergent 73551 (max. calc. conc. was 0.051mg/L--limit 2.0mg/L)

50060 1

CHANGE 82234 1

EFFLUENT GROSS

EFFLUENT GROSS

TEMPERATURE - C, RATE OF

MEASUREMENT

REQUIREMENT

SAMPLE

MEASUREMENT

PERMIT

REQUIREMENT

SAMPLE MEASUREMENT PERMIT REQUIREMENT ****

1

2

DAILY MX

FIVE PER CALCTD

CALCTD

CALCTD

WEEK

31/31

CONTI

NUOUS

0

MG/L

**

0.1

DAILY MAX

01/03/2012 14 100 26 01/03/2012 0 26 PKS 01/10/2011 0 0 9 01/10/2011 0 10 PB 01/12/12011 0 0 0 10 01/17/2011 0 10 PB 01/12/12012 0 0 13 01/24/2012 0 13 1-25-545 WDT 01/31/2012 0 0 0 12 02/07/2012 0 12 1-25-545 CR 02/07/2012 0 0 0 12 02/07/2012 0 12 1-25-545 BB 02/14/2012 0 0 0 8.3 02/14/2012 0 8.3 1-24-1234 WE 02/21/2012 0 0 0 8.3 02/14/2012 0 8.3 1-24-1234 WE 02/21/2012 0 0 0 26.5 02/21/2012 0 26.5 1-25-545 CR 02/28/2012 0 0 0 11.1 02/28/2011 0 11.1 1-1SV-24-1234 WBE 03/06/2012 0 0 0 11.7 03/06/2012 0 11.1 1-SV-24-1234 WBE 03/30/2012 0 0 0 11.7 03/06/2012 0 11.1 1-SV-24-1234 WBE 03/27/2012 1623 1.3 17.2 03/27/2012 0 13 1-SV-24-1234 WBE 03/27/2012 1623 1.3 17.2 03/27/2012 0 17.2 1-ISV-24-1234 WBE 04/03/2012 229 0 18 04/03/2012 0 15. 1-SV-24-1234 WBE 04/03/2012 79 20 22 04/10/2012 0 18 1-ISV-24-1234 PB 04/10/2012 79 20 22 04/10/2012 0 22 1-SV-24-1234 PB 04/10/2012 79 20 22 04/10/2012 0 18.8 1-ISV-24-1234 PB 04/10/2012 326 5 18.8 04/18/2012 0 18.8 1-ISV-24-1234 PB 04/10/2012 34 50 17 10/30/2012 17 17 1-ISV-24-1234 WAW 11/06/2012 0 0 17 11/06/2012 0 18.8 1-ISV-24-1234 WAW 11/06/2012 0 0 15 11/13/2012 0 18.8 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 18.8 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 18.8 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 18.8 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 15 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 17 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 17 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 17 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 17 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 17 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 17 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 17 1-ISV-24-1234 WAW 11/13/2012 0 0 0 15 11/13/2012 0 17 1-ISV-24-1234 WAW 11/13/2012 0 0 0 12 11/28/2012 0 13 1-ISV-24-1234 WAW 11/13/2012 0 0 0 12 11/28/2012 0 13 1-ISV-24-1234 WAW 11/13/2012 0 0 0 12 11/28/2012 0 12 1-ISV-24-1234 WAW 11/20/2012 0 0 0 11 12/20/2012 0 12 1-ISV-24-1234 WAW	Sample Date	Mean # of ZM/m3	% Settlers	Water Temp. (°C)	Sample Date	Mean# of Asiatic Clams/m3	Water Temp. (°C)	LOCATION	NOTES: % Gravid Asiatic Clam	COLLECTED BY
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PERMITTEE NAME/ADDRESS (Includ	de Facility Name/Location if L	Different) —			ARGE ELIMINATION SY DNITORING REPORT		MAJOR (SUBR 01)			rm Approved AB No. 2040		
Address P.O. BOX 2000 (INTEROFFICE OPS-5N-SQ	<u></u>	_	TNO	0026450		101 T	F - FINAL					
SODDY - DAISY, TN 37384			<u> </u>	IT NUMBER	R DISCHAR	GE NUMBER	BIOMONITORING	FOR OUTFA	LL 101			
Facility TVA - SEQUOYAH NUCLEA	AR PLANT	_		MON	ITORING PERIOD		EFFLUENT					
ocation HAMILTON COUNTY			YEAR	MO DA				÷	***			
ATTN: Brad Love			From 12	12 0		12 31	*** NO DISCHAF	ــــا				•
							NOTE: Read ins	tructions before				
PARAMETER		QUA	NTITY OR LOADING			QUALITY OR CO	DICENTRATION		NO.	FREQUENCY OF	1	
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM ·	UNITS		ANALYSIS	TYPE	
C25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	*****	*****	**	Monitoring Not Required	******	*****	23				
「RP3B 1 0 ≣FFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	****	43.2 MINIMUM	*****	****	PERCENT		SEMI ANNUAL	COMP	OS
C25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	******	*****	**	Monitoring Not Required	*****	******	23				
TRP6C 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	. ***	43.2 MIMINUM	******	*****	PERCENT		SEMI ANNUAL	COMP	OS
	SAMPLE MEASUREMENT				·							
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NAME/TITLE PRINCIPAL EXECUTIVE			ocument and all attachme				·	TELEPH	ONE		DATE	
John T. Carlin Site Vice President	properly gather a persons who mar information, the ir	nd evaluate the inform rage the system, or tho rformation submitted is	with a system designed to ation submitted. Based or ose persons directly respo s, to the best of my knowl	n my inquiry of to ensible for gather edge and belief	he person or ring the , true, accurate,		resident	423 84	3-7001	13	01	07
TYPED OR PRINTED			e significant penalties for s risonment for knowing viol		. 1 0100	ATURE OF PRIN FFICER OR AUT	ICIPAL EXECUTIVE HORIZED AGENT	AREA NU	JMBER	YEAR	MO E	DAY
COMMENTS AND EXPLANATION OF	ANY VIOLATIONS (Refere	nce all attachments	here)						-			
	1.0000		· · · - · - ·									

Toxicity was not sampled in December 2012.

PERMITTEE NAME/ADDRESS (Include For Name TVA - SEQUOYAH NUCLE) Address P.O. BOX 2000		Different) 			ARGE ELIMINATION S'	•	MAJOR (SUBR 01)			orm Approved MB No. 2040	
(INTEROFFICE OPS-5N-SQN)		-	TNO	0026450		103 G	F - FINAL				
SODDY - DAISY, TN 37384			PERM	IT NUMBER	DISCHAR	GE NUMBER	LOW VOL. WASTE	TREATME	NT PO	ND	
Facility TVA - SEQUOYAH NUCLEAR F Location HAMILTON COUNTY	<u></u>	· <u> </u>	YEAR		TORING PERIOD		EFFLUENT	<u></u>			
ATTN: Brad Love			From 12	12 01		12 31	NOTE: Read ins		*** e compl	etina this form	n
PARAMETER		QUAN	ITITY OR LOADING	,		QUALITY OR CO	ONCENTRATION	·	NO.	FREQUENCY	
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS		ANALYSIS	
PH	SAMPLE MEASUREMENT	*****	******	**	7	*****	8	12	0	13 / 31	GRAB
00400 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	******	**	6 MINIMUM	*****	9 MAXIMUM	SU		THREE/ WEEK	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*****	******	**	*****	12	13	19	0	2/31	GRAB
00530 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	**	*****	30 MO AVG	100 DAILY MX	MG/L		TWICE/ MONTH	GRAB
OIL AND GREASE	SAMPLE MEASUREMENT	*****	******	**	******	<4	<6	19	. 0	2/31	GRAB
00556 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	******	**	******	15 MO AVG	20 DAILY MX	MG/L		TWICE/ MONTH	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	0.963	1.205	03	*****	******	******	**	0	31 / 31	RCORDR
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	Req. Mon. MO AVG	Reg. Mon	MGD	*****	******	*****	**		SEE PERMIT	RCORDR
	SAMPLE MEASUREMENT										
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		<u> </u>	J			MY	1				<u> </u>
NAME/TITLE PRINCIPAL EXECUTIVE OF	FICER I Certify under pa		cument and all attachment tha system designed to			$\mathcal{L}[\mathcal{V}, \mathcal{V}] \cap \mathcal{V}$,	TELEPH	IONE		DATE
John T. Carlin	properly gather a	and evaluate the informa	tion submitted. Based on se persons directly respo	my inquiry of the	e person or	MANUA			_		
Site Vice President	information, the and complete. It	nformation submitted is am aware that there are	to the best of my knowle significant penalties for s somment for knowing viole	edge and belief, submitting false in	true, accurate, SIGI		ICIPAL EXECUTIVE		3-7001		01 07
TYPED OR PRINTED COMMENTS AND EXPLANATION OF ANY				·		OFFICER OR AUTI	NORIZED AGEN I	AREA N	UMBER	YEAR	MO DAY

EPA Form 3320-1 (REV 3/99)

Previous editions may be used

PERMITTE	E NAME/ADDRESS (Include Facility Name/Location if Different)
Name	TVA - SEQUOYAH NUCLEAR PLANT
Address	P.O. BOX 2000
	(INTEROFFICE OPS-5N-SQN)
	SODDY - DAISY, TN 37384
Facility	TVA - SEQUOYAH NUCLEAR PLANT
Location	HAMILTON COUNTY
ATTN: Br	rad Love

MONITORING PERIOD

To

MAJOR (SUBR 01)

Form Approved.
OMB No. 2040-0004

TN0026450 PERMIT NUMBER

12

From

12

MO DAY

01

110 G DISCHARGE NUMBER

12

DAY

31

YEAR MO

12

F - FINAL

RECYCLED COOLING WATER

EFFLUENT

LITEOLIAI

*** NO DISCHARGE XX ***

NOTE: Read instructions before completing this form,

PARAMETER		QUA	NTITY OR LOADING			QUALITY OR CONC	ENTRATION		NO. EX	FREQUENCY OF	SAMPLE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS		ANALYSIS	···-
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	******	*****	**	****	*****		04			
00010 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	**	*****	*****	REPORT DAILY MX	DEG C		CONTIN	CALCTD
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	*****	*****	**	****	*****		04			
00010 Z 0 INSTREAM MONITORING	PERMIT REQUIREMENT	*****	*****	**	****	******	30.5 DAILY MX	DEG C		CONTIN	CALCTD
TEMP. DIFF. BETWEEN SAMP. & UPSTRM DEG.C	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		04			
00016 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	****	******	**	****	******	5 DAILY MX	DEG C		CONTIN	CALCTD
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	****		03	*****	*****	****	**			
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CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	*****	****	**	****			19			
50060 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	******	**	*****	0.1 MO AVG	0.1 DAILY MX	MG/L		Five per Week	CALCTD
TEMPERATURE - C, RATE OF CHANGE	SAMPLE MEASUREMENT	*****		04	****	*****	****	**			
82234 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	****	2 DAILY MX	DEG C	*****	*****	****	##		CONTIN	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

	I Certify under penalty of law that this document and all attachments were prepared under my
John T. Carlin	direction or supervision in accordance with a system designed to assure that qualified personne 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
Site Vice President	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.
TYPED OR PRINTED	

TELEPHONE DATE

SIGNATURE OF PRINCIPAL EXECUTIVE
OFFICER OR AUTHORIZED AGENT

AREA CODE NUMBER YEAR MO

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

No Discharge this Period

07

DAY

PERMITTEE NAME/ADDRESS (Include Fa		Different) 	NATIO		UTANT DISCH CHARGE M				-	MAJOR (SUBR 01)			rm Approved MB No. 2040		
Address P.O. BOX 2000 (INTEROFFICE OPS-5N-SQN)				TNO	0026450			11	0 T	F - FINAL					
SODDY - DAISY, TN 37384		_	-		IT NUMBE	R	DISCHA		UMBER	RECYCLED COOL	ING WATER				
acility TVA - SEQUOYAH NUCLEAR P	PLANT	_	L	1					TOWNER		W. W. C.				
ocation HAMILTON COUNTY		_					G PERIC			EFFLUENT					
				YEAR				MO		*** NO DISCHA	RGE XX	***			
ATTN: Brad Love			From	12	12 0	1 1	0 12	12	31				aliana Alexa		
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		AVERAGE	MAXI	MUM	UNITS	MI	NIMUM		AVERAGE	MAXIMUM	UNITS		ANALYSIS	'''	FE.
ACCOUNTS TO AVOID	SAMPLE		***	4444		 	 		*****						
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NAME/TITLE PRINCIPAL EXECUTIVE OF	FICER I Certify under per	nalty of law that this do	cument and a	ll attachmer	nts were prepa	red under m	ny /	//	XXII 7	 	TELEPH	ONE		DATE	
	direction or super	vision in accordance w	th a system d	esigned to	assure that qua	alified perso	nnel (1	17/1/2/	11.1.1	1666111		- -	7	
John T. Carlin	persons who man	nd evaluate the informa age the system, or thos	e persons dir	ectly respon	nsible for gathe	aring the	ŀ	X	LUX.	/// President					
Site Vice President	information, the in	formation submitted is maware that there are	, to the best o	f my knowle	edge and belie	f, true, accu		1.1	DIRECTION OF		423 84	3-7001	13	01	07
		m aware that there are sibility of fine and impri				auomauon				ICIPAL EXECUTIVE HORIZED AGENT	AREA NU	MBER	YEAR	MO	DAY
TYPED OR PRINTED							1				CODE	MIDER	TEAR	МО	DAY
COMMENTS AND EXPLANATION OF ANY	VIOLATIONS (Peren	nco all attachments	homi										-		

No Discharge this Period EPA Form 3320-1 (REV 3/99)

Previous editions may be used

Page 1 of 1

PERMITTI	EE NAME/ADDRESS (Include Facility Name/Location if Different)
Name	TVA - SEQUOYAH NUCLEAR PLANT
	P.O. BOX 2000
	(INTEROFFICE OPS-5N-SQN)
	SODDY - DAISY, TN 37384
Facility	TVA - SEQUOYAH NUCLEAR PLANT
Location	HAMILTON COUNTY

ATTN: Brad Love

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

(SUBR 01) F - FINAL 118 G **WASTEWATER & STORM WATER**

DAY

31

Form Approved. OMB No. 2040-0004

TN0026450 **PERMIT NUMBER**

DISCHARGE NUMBER

EFFLUENT

MAJOR

*** NO DISCHARGE XX ***

MONITORING PERIOD YEAR MO DAY YEAR MO 12 To: 12 From 12 01 12

NOTE: Read instructions before completing this form.

PARAMETER		QUAN	TITY OR LOADING			QUALITY OR CONC	ENTRATION		NO. EX	FREQUENCY OF	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS	1	ANALYSIS	
OXYGEN, DISSOLVED (DO)	SAMPLE MEASUREMENT	*****	*****	**		*****	*****	19			
00300 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	***	2 MINIMUM	******	******	MG/L		TWICE/ WEEK	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		19			
00530 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	****	****	****	*****	100 DAILY MX	MG/L		TWICE/ WEEK	GRAB
SOLIDS, SETTLEABLE	SAMPLE MEASUREMENT	*****	****	**	*****	*****		25			
00545 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	*****	*****	****	*****	******	1 DAILY MX	ML/L		ONCE/ MONTH	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			03	*****	******	*****	**			
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	Req. Mon. MO AVG	Req. Mon. DAILY MX	MGD	****	******	*****	•		ONCE/ BATCH	ESTIMA
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
·	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT							1			

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	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
John T. Carlin	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
Site Vice President	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.
TYPED OR PRINTED	

TELEPHONE DATE 423 843-7001 13 01 07 SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT AREA NUMBER YEAR MO DAY CODE

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.

REVIEW/CONCURRENCE SHEET

DOCUMENT NAME: SEQUOYAH NUCLEAR PLANT - December 2012 DMR

ORGANIZATION: Environmental

DOCUMENT PREPARED BY: Brad Love

DATE: 1/04/2013

			CONCURRENCES	
Name	R V	CN	Signature - Comment	Date
B.M. Love	Х		BO	14/12/34
L.M. Koby	Х		Freda	1/4/13
J.A. Cross		Х	Mines A your	1/2/13

Originator will determine the review/concurrence assignment. INSTRUCTIONS:

REVIEW:

Examine technical content and commitments made. A

review (RV) should confirm the truth and accuracy of factual statements and indicate agreement with commitments made which are applicable to the

reviewer's organization.

CONCURRENCE: Indication of agreement with the document as a whole.

Concurrence (CN) signifies that the document is responsive to the intended purpose, logical in construction, and clear in meaning in the eyes of the recipient. A concurrence signature indicates that the individual

would be willing to sign the document for the agency.