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.

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

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

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.

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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

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
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)*

TN0026450	101 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	07	01	To	12	07	31

MAJOR
(SUBR 01)
F - FINAL
DIFFUSER DISCHARGE
EFFLUENT

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********	39.4	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	********	********	**	********	********	30.6	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 NUOUS	CALCTD
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	********	1745	03	********	********	********	**	0	31 / 31	RCORDR
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	Req. Mon. DAILY MAX	MGD	********	********	********	****		CONTI NUOUS	RCORDR
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	********	********	**	********	0.017	0.048	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										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
Paul R. Simmons Sequoyah Plant Manager	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.	Sequoyah Plant Manager SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-6502	12	08	15
TYPED OR PRINTED			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. 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.

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

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

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

TN0026450	101 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	07	01	To	12	07	31

MAJOR
(SUBR 01)
F - FINAL
BIOMONITORING FOR OUTFALL 101
EFFLUENT
*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	Monitoring Not Required	********	********	23			
TRP3B 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MINIMUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	Monitoring Not Required	********	********	23			
TRP6C 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MIMINUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
Paul R. Simmons Sequoyah Plant Manager	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.	Sequoyah Plant Manager SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-6502	12	08	15
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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
(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)*

TN0026450	103 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	07	01	To	12	07	31

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

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	********	********	**	7	********	8	12	0	15 / 31	GRAB
00400 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	**	6 MINIMUM	********	9 MAXIMUM	SU		THREE/ WEEK	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	********	********	**	********	6	6	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	0.942	1.164	03	********	********	********	**	0	31 / 31	RCORDR
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	Req. Mon. MO AVG	Req. Mon DAILY MX	MGD	********	********	********	**		SEE PERMIT	RCORDR
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
Paul R. Simmons Sequoyah Plant Manager	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.	Sequoyah Plant Manager SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-6502	12	08	15
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	110 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	07	01	To	12	07	31

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

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	**	********	********	REPORT DAILY MX	DEG C		CONTIN UOUS	CALCTD
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 Z 0 INSTREAM MONITORING	PERMIT REQUIREMENT	********	********	**	********	********	30.5 DAILY MX	DEG C		CONTIN UOUS	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 UOUS	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 UOUS	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 UOUS	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

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

No Discharge this Period

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	110 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	07	01	To	12	07	31

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

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

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

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

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

No Discharge this Period

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	118 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	07	01	To	12	07	31

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

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
OXYGEN, DISSOLVED (DO)	SAMPLE MEASUREMENT	********	********	**		********	********	19			
00300 1 0 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										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE		DATE		
Paul R. Simmons Sequoyah Plant Manager	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.	Sequoyah Plant Manager SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-6502	12	08	15
TYPED OR PRINTED			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.

REVIEW/CONCURRENCE SHEET

DOCUMENT NAME: SEQUOYAH NUCLEAR PLANT – July 2012 DMR

ORGANIZATION: Environmental

DOCUMENT PREPARED BY: Brad Love

DATE: 8/03/2012

CONCURRENCES				
Name	R V	C N	Signature - Comment	Date
B.M. Love	X			8/13/12
L.M. Koby	X			8/13/12
J.A. Cross		X		8/13/12

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 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,

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

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.

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Sincerely,

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

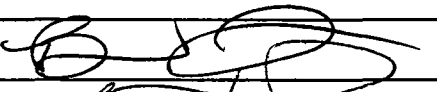
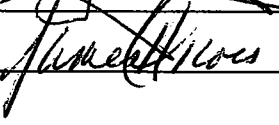
REVIEW/CONCURRENCE SHEET

DOCUMENT NAME: SEQUOYAH NUCLEAR PLANT – August 2012 DMR

ORGANIZATION: Environmental

DOCUMENT PREPARED BY: Brad Love

DATE: 9/06/2012

CONCURRENCES				
Name	R V	C N	Signature - Comment	Date
B.M. Love	X			9/7/12
L.M. Koby	X			9/9/12
J.A. Cross		X		9/10/12

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.

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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

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

TN0026450	101 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	08	01	To	12	08	31

MAJOR
(SUBR 01)
F - FINAL
DIFFUSER DISCHARGE
EFFLUENT

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
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 NUOUS	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 NUOUS	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										

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

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

No 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)

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

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

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

TN0026450	101 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	08	01	To	12	08	31

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

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	Other	********	********	23			
TRP3B 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	**43.2 MINIMUM**	********	********	PERCENT		SEMI ANNUAL	COMPOS
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	Other	********	********	23			
TRP6C 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	**43.2 MIMINUM**	********	********	PERCENT		SEMI ANNUAL	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

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

Toxicity was sampled August 12-17. A revised August DMR including toxicity results will be submitted during the next reporting period.

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

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

TN0026450	103 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	08	01	To	12	08	31

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

*** NO DISCHARGE ☐ ***

NOTE: Read instructions before completing this form.

Form Approved.
OMB No. 2040-0004

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	********	********	**	7	********	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	RCORDR
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	**Req. Mon. MO AVG**	**Req. Mon DAILY MX**	MGD	********	********	********	**		SEE PERMIT	RCORDR
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

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

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

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

TN0026450	110 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	08	01	To	12	08	31

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

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	**	********	********	**REPORT DAILY MX**	DEG C		CONTIN UOUS	CALCTD
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 Z 0 INSTREAM MONITORING	PERMIT REQUIREMENT	********	********	**	********	********	**30.5 DAILY MX**	DEG C		CONTIN UOUS	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 UOUS	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 UOUS	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 UOUS	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

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

No Discharge this Period

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	110 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	08	01	To	12	08	31

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

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

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

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

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

No Discharge this Period

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	118 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	08	01	To	12	08	31

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

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
OXYGEN, DISSOLVED (DO)	SAMPLE MEASUREMENT	********	********	**		********	********	19			
00300 1 0 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										

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

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

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

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.

Sincerely,

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

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

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Sincerely,

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

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

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

TN0026450	101 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	09	01	To	12	09	30

MAJOR
(SUBR 01)
F - FINAL
DIFFUSER DISCHARGE
EFFLUENT

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********	41.3	04	0	30 / 30	RCORDR
00010 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	********	********	**Req. Mon. DAILY MAX**	DEG. C.		CONTI NUOUS	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 NUOUS	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 NUOUS	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 NUOUS	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 NUOUS	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

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

No 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
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

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

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

TN0026450	101 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	09	01	To	12	09	30

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

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	Monitoring Not Required	********	********	23			
TRP3B 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MINIMUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	Monitoring Not Required	********	********	23			
TRP6C 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MIMINUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
Toxicity was not sampled in September 2012.

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

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

TN0026450	103 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	09	01	To	12	09	30

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

*** NO DISCHARGE ☐ ***

NOTE: Read instructions before completing this form.

Form Approved.
OMB No. 2040-0004

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	********	********	**	7	********	9	12	0	19 / 30	GRAB
00400 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	**	6 MINIMUM	********	9 MAXIMUM	SU		THREE/ WEEK	GRAB
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	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	RCORDR
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	Req. Mon. MO AVG	Req. Mon DAILY MX	MGD	********	********	********	**		SEE PERMIT	RCORDR
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

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

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	110 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From	12	09	01	To	12	09	30

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

*** NO DISCHARGE [XX] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	**	********	********	REPORT DAILY MX	DEG C		CONTIN UOUS	CALCTD
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 Z 0 INSTREAM MONITORING	PERMIT REQUIREMENT	********	********	**	********	********	30.5 DAILY MX	DEG C		CONTIN UOUS	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 UOUS	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 UOUS	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 UOUS	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
No Discharge this Period

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	110 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	09	01	To	12	09	30

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

*** NO DISCHARGE [XX] ***

Form Approved.
OMB No. 2040-0004

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PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
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										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
No Discharge this Period

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	118 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	09	01	To	12	09	30

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

*** NO DISCHARGE [XX] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
OXYGEN, DISSOLVED (DO)	SAMPLE MEASUREMENT	********	********	**		********	********	19			
00300 1 0 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										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
John T. Carlin Sequoyah Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Sequoyah Site Vice President SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-7001	12	10	10
TYPED OR PRINTED			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.

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

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

TN0026450	101 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	08	01	To	12	08	31

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

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	>100.0	********	********	23	0	1 / 180	COMPOS
TRP3B 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MINIMUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	>100.0	********	********	23	0	1 / 180	COMPOS
TRP6C 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MIMINUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

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

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): 1,579
6. Receiving Stream: Tennessee River (TRM 483.6)
7. 1Q10: 3,491
8. Outfall Tested: 101
9. Dates Sampled: August 12 – 17, 2012
10. Average Flow on Days Sampled (MGD): 1741.838, 1748.488, 1747.571
11. Pertinent Site Conditions: Production / operation data will be provided upon request.
12. Test Dates: August 14 – 21, 2012
13. Test Type: Short-term Chronic Definitive
14. Test Species: Fathead Minnows (*Pimephales promelas*)
    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:* IC_{25} > 100%
    Ceriodaphnia dubia: IC_{25} > 100%

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

18. Facility Contact: Brad Love Phone #: (423) 843-6714

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

20. Lab Contact: Jim Sumner 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 IC_{25} 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†	<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†	<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

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

4. Sample Manipulation: Samples from Outfall 101 and intake were warmed to test temperature ($25.0 \pm 1.0^{o}C$) in a warm water bath.

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

	Pimephales promelas	*Ceriodaphnia dubia*
Test Organisms:		
1. Source:	Aquatox, Inc.	In-house Cultures
2. Age:	20 – 20.22 hours old	< 24-hours old
Test Method Summary:		
1. Test Conditions:	Static, Renewal	Static, Renewal
2. Test Duration:	7 days	Until at least 60% of control females have 3 broods
3. Control / Dilution Water:	Moderately Hard Synthetic	Moderately Hard Synthetic
4. Number of Replicates:	4	10
5. Organisms per Replicate:	10	1
6. Test Initiation: (Date/Time)		
Outfall 101	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	08-21-12 1106 ET	08-21-12 1053 ET
UV Treated Outfall 101	08-21-12 1122 ET	
8. Test Temperature: Outfall 101:	Mean = 24.7°C (24.3 – 25.1°C)	Mean = 24.9°C (24.6 – 25.3°C)
Test Temperature: UV-Treated Outfall 101:	Mean = 24.8°C (24.2 – 25.1°C)	

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

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

TOXICITY TEST RESULTS (see Appendix C for Bench Sheets)

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

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

Test Solutions (% Effluent)	Percent Surviving (time interval used – days)						
	1	2	3	4	5	6	7
Control	100	100	100	100	100	100	100
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 (% Effluent)	Mean Dry Weight (mg) (replicate number)				
	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

IC_{25} Value: > 100% Permit Limit: 43.2% 95% Confidence Limits: Upper Limit: NA Lower Limit: NA	Calculated TU Estimates: < 1.0 TUc* Permit Limit: 2.3 TUc

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

TOXICITY TEST RESULTS (see Appendix C for Bench Sheets)

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

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

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

IC_{25} Value: > 100% Permit Limit: 43.2% 95% Confidence Limits: Upper Limit: NA Lower Limit: NA	Calculated TU Estimates: < 1.0 TUc* Permit Limit: 2.3 TUc

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

TOXICITY TEST RESULTS (see Appendix C for Bench Sheets)

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

Conducted August 14 – 21, 2012 using water from Intake

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

Test Solutions (% Effluent)	Reproduction (#young/female/7 days) Data (replicate number)										
	1	2	3	4	5	6	7	8	9	10	Mean
Control	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: > 100% Permit Limit: N/A 95% Confidence Limits: Upper Limit: NA Lower Limit: NA	Calculated TU Estimates: < 1.0 TUc* Permit Limit: N/A

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

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

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

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

Test Solutions (% Effluent)	Percent Surviving (time interval used – days)						
	1	2	3	4	5	6	7
Control	100	100	100	100	100	100	100
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 (% Effluent)	Mean Dry Weight (mg) (replicate number)				
	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% 95% Confidence Limits: Upper Limit: NA Lower Limit: NA	Calculated TU Estimates: < 1.0 TUc*

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

REFERENCE TOXICANT TEST RESULTS (see Appendix A and D)

Species	Date	Time	Duration	Toxicant	Results (IC_{25})
Pimephales promelas	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)		Dissolved Oxygen (mg/L)		pH (S.U.)		Conductance (µmhos/cm)	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)	Total Residual Chlorine (mg/L)
		Initial	Final	Initial	Final	Initial	Final				
Pimephales promelas	Control	24.8 24.7 - 24.9	24.7 24.6 - 25.1	7.7 7.6 - 7.9	7.9 7.8 - 8.0	7.55 7.43 - 7.67	7.50 7.36 - 7.59	311 302 - 323	62 62 - 62	89 88 - 92	
	10.8%	24.8 24.7 - 25.0	24.6 24.3 - 25.0	7.9 7.7 - 8.0	7.8 7.6 - 8.0	7.52 7.44 - 7.62	7.46 7.33 - 7.55	291 285 - 298			
	21.6%	24.8 24.7 - 25.0	24.6 24.4 - 24.9	7.9 7.7 - 8.0	7.8 7.6 - 8.0	7.54 7.44 - 7.62	7.44 7.33 - 7.55	278 272 - 283			
	43.2%	24.8 24.7 - 25.0	24.6 24.4 - 24.8	7.9 7.7 - 8.0	7.8 7.6 - 8.0	7.53 7.45 - 7.61	7.44 7.34 - 7.52	252 246 - 259			
	86.4%	24.8 24.7 - 25.0	24.6 24.3 - 24.8	7.9 7.6 - 8.0	7.8 7.6 - 7.9	7.51 7.45 - 7.60	7.42 7.31 - 7.52	198 192 - 205			
	100.0%	24.9 24.8 - 25.0	24.6 24.4 - 24.8	7.9 7.7 - 8.1	7.9 7.7 - 8.1	7.51 7.42 - 7.60	7.46 7.32 - 7.57	182 177 - 186	71 70 - 72	72 71 - 74	< 0.10 < 0.10 - < 0.10
	Intake	24.9 24.7 - 25.0	24.6 24.4 - 24.7	8.0 7.7 - 8.2	8.0 7.9 - 8.0	7.51 7.43 - 7.61	7.45 7.33 - 7.54	182 176 - 186	69 68 - 70	73 72 - 74	< 0.10 < 0.10 - < 0.10
Ceriodaphnia dubia	Control	24.8 24.7 - 24.9	25.1 25.0 - 25.2	7.7 7.6 - 7.9	8.0 7.8 - 8.2	7.55 7.43 - 7.67	7.51 7.28 - 7.59	311 302 - 323	62 62 - 62	89 88 - 92	
	10.8%	24.8 24.6 - 25.0	25.0 24.8 - 25.2	7.9 7.7 - 8.0	8.0 7.8 - 8.2	7.52 7.44 - 7.62	7.51 7.29 - 7.59	291 285 - 298			
	21.6%	24.8 24.7 - 25.0	25.0 24.8 - 25.1	7.9 7.7 - 8.0	8.0 7.8 - 8.2	7.54 7.44 - 7.62	7.52 7.30 - 7.60	278 272 - 283			
	43.2%	24.9 24.7 - 25.0	24.9 24.8 - 25.3	7.9 7.7 - 8.0	8.0 7.9 - 8.2	7.53 7.45 - 7.61	7.52 7.30 - 7.61	252 246 - 259			
	86.4%	24.9 24.7 - 25.1	25.0 24.8 - 25.2	7.9 7.6 - 8.0	8.0 7.9 - 8.2	7.51 7.45 - 7.60	7.51 7.28 - 7.61	198 192 - 205			
	100.0%	25.0 24.8 - 25.1	24.9 24.8 - 25.2	7.9 7.7 - 8.1	8.0 7.9 - 8.3	7.51 7.42 - 7.60	7.52 7.29 - 7.63	182 177 - 186	71 70 - 72	72 71 - 74	< 0.10 < 0.10 - < 0.10
	Intake	25.0 24.8 - 25.1	24.9 24.7 - 25.1	8.0 7.7 - 8.2	8.1 8.0 - 8.2	7.51 7.43 - 7.61	7.52 7.30 - 7.64	182 176 - 186	69 68 - 70	73 72 - 74	< 0.10 < 0.10 - < 0.10

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

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.

Test	Sample ID	Temperature (°C)		Dissolved Oxygen (mg/L)		pH (S.U.)		Conductance (µmhos/cm)	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)	*Total Residual Chlorine (mg/L)
		Initial	Final	Initial	Final	Initial	Final				
Pimephales promelas	**Control**	24.8 24.8 - 24.9	24.7 24.5 - 24.9	7.9 7.8 - 8.1	7.8 7.6 - 7.9	7.59 7.50 - 7.65	7.49 7.34 - 7.61	304 298 - 316	61 61 - 62	84 84 - 84	
	10.8%	24.9 24.8 - 25.0	24.7 24.5 - 25.0	7.9 7.9 - 8.0	7.8 7.6 - 7.8	7.60 7.50 - 7.66	7.48 7.34 - 7.57	291 282 - 298			
	21.6%	24.9 24.8 - 25.1	24.7 24.6 - 24.8	7.9 7.9 - 8.0	7.8 7.7 - 7.9	7.59 7.50 - 7.66	7.48 7.34 - 7.58	279 271 - 284			
	43.2%	24.9 24.8 - 25.1	24.7 24.6 - 24.8	7.9 7.9 - 8.0	7.8 7.7 - 7.9	7.58 7.49 - 7.66	7.47 7.33 - 7.58	254 246 - 258			
	86.4%	25.0 24.9 - 25.1	24.7 24.3 - 24.8	8.0 7.9 - 8.1	7.8 7.5 - 7.9	7.56 7.48 - 7.63	7.46 7.33 - 7.57	203 197 - 207			
	100.0%	25.1 25.0 - 25.1	24.6 24.2 - 24.7	8.0 7.8 - 8.3	7.8 7.5 - 7.9	7.55 7.47 - 7.62	7.45 7.31 - 7.55	184 178 - 188	70 70 - 70	72 72 - 72	< 0.10 < 0.10 - < 0.10
	Intake	25.0 24.8 - 25.1	24.6 24.5 - 24.9	8.1 7.9 - 8.2	7.9 7.7 - 8.0	7.54 7.46 - 7.61	7.46 7.32 - 7.58	184 178 - 191	70 70 - 70	72 71 - 72	< 0.10 < 0.10 - < 0.10

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

Overall temperature (°C)	**Average**	**Minimum**	**Maximum**
Pimephales promelas	24.8	24.2	25.1

SUMMARY / CONCLUSIONS

Outfall 101 samples collected August 12 – 17, 2012, showed no toxic effects to fathead minnows or daphnids. The resulting IC_{25} 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. *Pimephales promelas*

   None

2. *Ceriodaphnia dubia*

   None

DEVIATIONS / MODIFICATIONS TO PRETEST CULTURE OR HOLDING OF TEST ORGANISMS

1. *Pimephales promelas*

   None

2. *Ceriodaphnia dubia*

   None

PHYSICAL AND CHEMICAL METHODS

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

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

3. Temperature was measured by 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 IC_{25} values in g/L KCl or NaCl.

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

3. Dilution Water Used: Moderately hard synthetic water.

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

REFERENCES

1. NPDES Permit No. TN0026450.

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

3. Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005.

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

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

Table B-1. 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 Hypochlorite mg/L TRC	Towerbrom mg/L TRC	PCL-222 mg/L Phosphate	PCL-401 mg/L Copolymer	CL-363 mg/L DMAD	Cuprostat-PF mg/L Azole	H-130M mg/L Quat
01/31/2000	-	< 0.002	0.026	0.009	-	-	-
02/01/2000	-	0.011	0.026	0.028	-	-	-
02/02/2000	-	0.028	0.026	0.009	0.006	-	-
02/03/2000	-	0.008	0.027	0.009	-	-	-
02/04/2000	-	0.006	0.027	0.009	0.005	0.109	-
02/05/2000	-	< 0.002	0.027	0.009	-	-	-
02/06/2000	-	< 0.002	0.027	0.009	-	-	-
07/26/2000	-	< 0.0057	0.055	0.019	-	-	-
07/27/2000	-	0.019	0.055	0.019	-	-	-
07/28/2000	-	0.0088	0.053	0.018	0.004	0.108	-
07/29/2000	-	< 0.0088	0.055	0.019	-	-	-
07/30/2000	-	< 0.0076	0.055	0.019	-	-	-
07/31/2000	-	< 0.0152	0.055	0.019	0.006	-	-
08/01/2000	-	< 0.0141	0.055	0.019	0.005	-	-
12/11/2000	-	0.0143	0.025	0.020	0.005	-	-
12/12/2000	-	0.0092	0.025	0.020	0.005	-	-
12/13/2000	-	< 0.0120	0.025	0.020	-	-	-
12/14/2000	-	< 0.0087	0.025	0.020	-	-	-
12/15/2000	-	0.0120	0.025	0.020	0.005	-	-
12/16/2000	-	< 0.0036	0.025	0.020	-	-	-
12/17/2000	-	< 0.0036	0.025	0.020	-	-	-
08/26/2001	-	0.017	0.06	0.021	0.006	-	-
08/27/2001	-	<0.0096	0.06	0.021	0.005	-	0.021
08/28/2001	-	<0.0085	0.06	0.021	-	-	-
08/29/2001	-	<0.0094	0.059	0.020	0.005	-	0.021
08/30/2001	-	<0.0123	0.06	0.021	0.005	-	-
08/31/2001	-	<0.005	0.059	0.020	-	-	-
11/25/2001	-	<0.0044	-	-	-	-	-
11/26/2001	-	<0.0119	0.024	0.02	0.005	-	-
11/27/2001	-	0.0137	0.023	0.019	0.007	-	-
11/28/2001	-	<0.0089	0.022	0.019	0.006	-	-
11/29/2001	-	0.0132	0.024	0.02	0.007	-	-
11/30/2001	-	< 0.0043	0.024	0.02	-	-	-
12/09/2001	-	<0.0042	-	-	-	-	-
12/10/2001	-	<0.0042	-	-	-	-	-
12/11/2001	-	<0.0104	-	-	-	-	-
12/12/2001	-	0.0128	0.024	0.02	0.008	-	-
12/13/2001	-	<0.0088	0.024	0.02	-	-	-
12/14/2001	-	0.0134	0.024	0.02	0.007	-	-

Table B-1. 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 Hypochlorite mg/L TRC	Towerbrom mg/L TRC	PCL-222 mg/L Phosphate	PCL-401 mg/L Copolymer	CL-363 mg/L DMAD	Cuprostat-PF mg/L Azole	H-130M mg/L Quat
01/02/2002	-	< 0.0079	0.023	0.02	0.006	-	-
01/03/2002	-	< 0.0042	0.023	0.014	-	-	-
01/04/2002	-	0.0124	0.024	0.014	0.009	-	-
01/05/2002	-	< 0.0042	-	-	-	-	-
01/06/2002	-	< 0.0042	-	-	-	-	-
01/07/2002	-	< 0.0089	0.024	0.014	0.006	-	-
02/24/2002	-	< 0.004	-	-	-	-	-
02/25/2002	-	< 0.004	0.023	0.023	-	-	-
02/26/2002	-	0.0143	0.023	0.023	0.007	-	-
02/27/2002	-	< 0.0041	0.023	0.023	-	-	-
02/28/2002	-	< 0.0041	0.024	0.008	-	-	-
03/01/2002	-	< 0.0041	0.024	0.008	-	-	-
05/05/2002	-	-	-	-	-	-	-
05/06/2002	-	-	0.058	0.02	0.014	-	-
05/07/2002	-	-	0.058	0.02	0.015	-	-
05/08/2002	-	-	0.056	0.019	-	-	-
05/09/2002	-	-	0.057	0.02	0.014	-	-
05/10/2002	-	-	0.056	0.019	-	-	-
08/04/2002	-	<0.0058	-	-	-	-	-
08/05/2002	-	<0.0058	0.053	0.018	-	-	0.025
08/06/2002	-	0.0092	0.053	0.018	-	-	-
08/07/2002	-	<0.0107	0.055	0.019	0.007	-	-
08/08/2002	-	<0.0061	0.055	0.019	-	-	-
08/09/2002	-	0.0152	0.054	0.018	0.008	-	-
10/06/2002	-	<0.00497	-	-	-	-	-
10/07/2002	-	0.0153	0.054	0.018	0.009	-	-
10/08/2002	-	<0.0092	0.054	0.018	0.007	-	-
10/09/2002	-	0.0124	0.053	0.018	0.009	-	-
10/10/2002	-	0.0134	0.054	0.018	0.009	-	-
10/11/2002	-	<0.0042	0.054	0.018	-	-	-
01/12/2003	-	<0.0035	-	-	-	-	-
01/13/2003	-	<0.006	0.025	0.019	0.009	-	-
01/14/2003	-	<0.0118	0.026	0.020		-	-
01/15/2003	-	<0.0063	0.026	0.020	0.009	-	-
01/16/2003	-	<0.0034	0.026	0.020		-	-
01/17/2003	-	<0.0034	0.026	0.009	-	-	-
04/06/2003	-	<0.0073	-	-	-	-	-
04/07/2003	-	<0.0189	-	0.021	-	-	-
04/08/2003	-	<0.0117	-	0.021	-	-	-
04/09/2003	-	<0.0139	-	0.021	0.016	-	-
04/10/2003	-	<0.0113	-	0.021	0.018	-	-
04/11/2003	-	<0.0073	-	0.022	-	-	-

Table B-1 (continued). Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Growth of Microbiologically Induced Bacteria and Mollusks, During Toxicity Test Sampling, March 12, 1998 – 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
06/15/2003	-	< 0.0045	-	-	-	-	-
06/16/2003	-	< 0.0037	0.057	0.020	-	-	0.022
06/17/2003	-	< 0.0048	0.041	0.014	-	-	0.024
06/18/2003	-	< 0.0048	0.041	0.014	-	-	0.024
06/19/2003	-	< 0.0085	0.058	0.020	-	-	0.025
06/20/2003	-	< 0.0048	0.058	0.020	-	-	0.025
08/03/2003	-	<0.0050	-	-	-	-	-
08/04/2003	-	<0.0050	0.058	0.020	-	-	-
08/05/2003	-	<0.0051	0.057	0.020	-	-	0.025
08/06/2003	-	<0.0084	0.057	0.020	-	-	0.025
08/07/2003	-	0.0129	0.057	0.020	-	-	0.024
08/08/2003	-	0.0153	0.057	0.020	0.009	-	-
10/05/2003	-	<0.0043	0.057	0.020	-	-	-
10/06/2003	-	<0.0043	0.057	0.020	-	-	0.025
10/07/2003	-	<0.0090	0.057	0.020	-	-	0.025
10/08/2003	-	<0.0106	0.057	0.020	-	-	0.025
10/09/2003	-	0.0181	0.026	0.022	-	-	0.025
10/10/2003	-	0.0183	0.026	0.024	0.009	-	-
02/01/2004	-	0.0093	0.027	0.009	-	-	-
02/02/2004	-	<0.0034	0.026	0.009	-	-	-
02/03/2004	-	<0.0034	0.026	0.009	-	-	-
02/04/2004	-	0.0124	0.026	0.009	0.009	-	-
02/05/2004	-	<0.0034	0.026	0.009	-	-	-
02/06/2004	-	0.0105	0.026	0.009	0.010	-	-
05/04/2004	-	<0.0123	0.026	0.019	-	-	0.025
05/05/2004	-	<0.0144	0.026	0.014	0.009	-	0.025
05/06/2004	-	<0.0146	0.037	0.013	-	-	0.025
05/07/2004	-	0.0227	0.058	0.020	0.009	-	0.025
05/08/2004	-	0.016	0.060	0.021	-	-	-
05/09/2004	-	<0.0104	0.058	0.020	-	-	-
07/04/2004	-	0.0217	0.057	0.019	-	-	-
07/05/2004	-	<0.0085	0.057	0.020	0.009	-	-
07/06/2004	-	<0.0077	0.058	0.020	-	-	0.031
07/07/2004	-	0.0252	0.056	0.019	-	-	0.031
07/08/2004	-	0.0223	0.057	0.019	0.009	-	-
07/09/2004	-	0.0182	0.057	0.020	0.009	-	-

Table B-1. 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 Hypochlorite mg/L TRC	Towerbrom mg/L TRC	PCL-222 mg/L Phosphate	PCL-401 mg/L Copolymer	CL-363 mg/L DMAD	Cuprostat-PF mg/L Azole	H-130M mg/L Quat	Nalco 73551 mg/L EO/PO	H-150M mg/L Quat
11/07/2004	-	<0.0187	0.000	0.014	-	-	-	-	-
11/08/2004	-	<0.0192	0.047	0.030	-	-	-	-	-
11/09/2004	-	<0.0233	0.048	0.016	-	-	0.041	-	-
11/10/2004	-	<0.0149	0.047	0.016	-	-	0.041	-	-
11/11/2004	-	<0.0149	0.049	0.017	-	-	0.043	-	-
11/12/2004	-	<0.0253	0.048	0.017	-	-	0.042	-	-
02/06/2005	-	<0.0042	0.028	0.010	-	-	-	-	-
02/07/2005	-	<0.0116	0.028	0.010	-	-	-	0.007	-
02/08/2005	-	<0.0080	0.028	0.010	-	-	-	-	-
02/09/2005	-	0.0199	0.028	0.010	-	-	-	-	-
02/10/2005	-	<0.0042	0.028	0.010	-	-	-	-	-
02/11/2005	-	0.0155	0.028	0.010	-	-	-	0.007	-
06/05/2005	-	0.0063	-	-	-	-	-	-	-
06/06/2005	-	0.0043	-	-	-	-	-	-	0.037
06/07/2005	-	0.0103	-	-	-	-	-	-	0.037
06/08/2005	-	0.0295	-	-	-	-	-	-	0.037
06/09/2005	-	0.0129	-	-	-	-	-	-	-
06/10/2005	-	0.0184	-	-	-	-	-	-	-
07/17/2005	-	0.0109	0.026	0.009	-	-	-	-	-
07/18/2005	-	0.0150	0.026	0.009	-	-	-	-	0.036
07/19/2005	-	0.0163	0.026	0.009	-	-	-	-	0.036
07/20/2005	-	0.0209	0.026	0.009	-	-	-	0.014	0.036
07/21/2005	-	0.0242	0.026	0.009	-	-	-	-	-
07/22/2005	-	0.0238	0.054	0.018	-	-	-	0.014	-
10/30/2005	-	0.0068	-	-	-	-	-	-	-
10/31/2005	-	0.0112	-	-	-	-	-	-	-
11/01/2005	-	0.0104	-	-	-	-	-	-	0.035
11/02/2005	-	0.0104	-	-	-	-	-	-	0.036
11/03/2005	-	0.0117	-	-	-	-	-	-	0.036
11/04/2005	-	0.0165	-	-	-	-	-	-	0.035
11/14/2005	-	0.0274	-	-	-	-	-	-	-
11/15/2005	-	0.0256	-	-	-	-	-	-	-
11/16/2005	-	0.0234	-	-	-	-	-	-	-
11/17/2005	-	0.0231	-	-	-	-	-	-	-
11/18/2005	-	0.0200	-	-	-	-	-	-	-
11/19/2005	-	0.0116	-	-	-	-	-	-	-

Table B-1 (continued). Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Growth of Microbiologically Induced Bacteria and Mollusks, During Toxicity Test Sampling, March 12, 1998 – 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	-	0.0055	-	-	-	-	-	-	-	-
11/13/2006	-	0.0068	-	-	-	-	-	-	0.037	-
11/14/2006	-	0.0143	-	-	-	-	-	-	0.037	-
11/15/2006	-	0.0068	-	-	-	-	-	-	0.037	-
11/16/2006	-	0.0267	-	-	-	-	-	-	0.037	-
11/17/2006	-	0.0222	-	-	-	-	-	-	-	-
11/26/2006	-	0.0188	-	-	-	-	-	-	-	-
11/27/2006	-	0.0138	-	-	-	-	-	-	-	-
11/28/2006	-	0.0120	-	-	-	-	-	-	-	-
11/29/2006	-	0.0288	-	-	-	-	-	-	-	-
11/30/2006	-	0.0376	-	-	-	-	-	-	-	-
12/01/2006	-	0.0187	-	-	-	-	-	-	-	-
05/28/07	-	-	-	-	-	-	-	-	-	0.015
05/29/07	-	-	-	-	-	-	-	-	0.036	0.015
05/30/07	-	0.0084	-	-	-	-	-	0.017	0.036	0.015
05/31/07	-	0.0103	-	-	-	-	-	-	0.036	0.015
06/01/07	-	0.0164	-	-	-	-	-	0.017	0.036	0.015
06/02/07	-	0.0305	-	-	-	-	-	-	-	0.015
12/02/07	-	0.0241	-	-	-	-	-	-	-	-
12/03/07	-	0.0128	-	-	-	-	-	-	-	-
12/04/07	-	0.0238	-	-	-	-	-	-	-	-
12/05/07	-	0.0158	-	-	-	-	-	-	-	-
12/06/07	-	0.0162	-	-	-	-	-	-	-	-
12/07/07	-	0.0175	-	-	-	-	-	-	-	
04/13/08	-	0.0039	-	-	-	-	-	-	-	-
04/14/08	-	0.0124	-	-	-	-	-	-	-	-
04/15/08	-	0.0229	-	-	-	-	-	-	-	-
04/16/08	-	0.0143	-	-	-	-	-	-	-	-
04/17/08	-	0.0120	-	-	-	-	-	-	-	-
04/18/08	-	0.0149	-	-	-	-	-	-	-	-
10/26/08	-	0.0260	-	-	-	-	-	-	-	-
10/27/08	-	0.0151	-	-	-	-	-	0.017	-	-
10/28/08	-	0.0172	-	-	-	-	-	-	0.041	-
10/29/08	-	0.0154	-	-	-	-	-	0.018	0.041	0.030
10/30/08	-	-	-	-	-	-	-	-	0.041	0.030
10/31/08	-	0.0086	-	-	-	-	-	-	0.041	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,
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	Spectrus CT1300 mg/L Quat	H-150M mg/L Quat	MSW 101 mg/L Phosphate
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	-	-	-	-	-	-	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,
March 12, 1998 – August 17, 2012

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	-	0.0122	-	-	-	-	-	-	-	-	-	-
11/02/10	-	0.0112	-	-	-	-	-	-	-	-	-	-
11/03/10	-	0.0163	-	-	-	-	-	-	-	-	-	-
11/04/10	-	0.0107	-	-	-	-	-	-	-	-	-	-
11/05/10	-	0.0132	-	-	-	-	-	-	-	-	-	-
05/01/2011	-	-	-	-	-	-	-	-	-	-	-	-
05/02/2011	-	-	-	-	-	-	-	-	0.04	-	-	-
05/03/2011	-	-	-	-	-	-	-	-	0.04	-	-	-
05/04/2011	-	0.0155	-	-	-	-	-	-	0.04	-	-	-
05/05/2011	-	0.0179	-	-	-	-	-	-	0.04	-	-	-
05/06/2011	-	0.0089	-	-	-	-	-	-	-	-	-	-
11/06/2011	-	0.0168	-	-	-	-	-	-	-	-	-	-
11/07/2011	-	0.0225	-	-	-	-	-	-	-	-	-	-
11/08/2011	-	0.0141	-	-	-	-	-	-	-	-	-	-
11/09/2011	-	0.0239	-	-	-	-	-	-	-	-	-	-
11/10/2011	-	0.0242	-	-	-	-	-	-	-	-	-	-
11/11/2011	-	0.0231	-	-	-	-	-	-	-	-	-	-
05/06/2012	-	-	-	-	-	-	-	-	-	-	-	-
05/07/2012	-	-	-	-	-	-	-	-	-	-	-	-
05/08/2012	-	-	-	-	-	-	-	-	0.041	-	-	-
05/09/2012	-	0.0145	-	-	-	-	-	-	0.041	-	-	-
05/10/2012	-	0.0298	-	-	-	-	-	-	0.041	-	-	-
05/11/2012	-	0.0174	-	-	-	-	-	-	-	-	-	-
08/12/2012	-	-	-	-	-	-	-	-	-	-	-	0.029
08/13/2012	-	0.0256	-	-	-	-	-	0.028	0.037	-	-	0.029
08/14/2012	-	0.0209	-	-	-	-	-	-	0.037	-	-	0.029
08/15/2012	-	0.0279	-	-	-	-	-	0.028	-	-	-	0.029
08/16/2012	-	0.0076	-	-	-	-	-	-	-	-	-	0.029
08/17/2012	-	0.0446	-	-	-	-	-	-	-	-	-	0.032

Sequoyah Nuclear Plant Biomonitoring
August 14 – 21, 2012

Appendix C

Chain of Custody Records and
Toxicity Test Bench Sheets

BIOMONITORING CHAIN OF CUSTODY RECORD

Client: TVA

Project Name: Sequoyah NP Toxicity

P.O. Number: N/A

Facility Sampled: Sequoyah NP

NPDES Number: TN0026450

Collected By: Dustin Bingar

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

Delivered By (Circle One):

FedEx UPS Bus Client

Other (specify):_____

General Comments:

Took Samples at outfall at 0600, and Samples from Intake at 0630.

Field Identification / Sample Description	Grab/Comp.	Collection Date/Time		Container Number & Volume Collected	Flow (MGD)	Rain Event? (Mark as Appropriate)				Laboratory Use (Project 8207)				
	----	Start	End	----	----	Yes	If Yes, Inches	No	Trace	ETS Log Number	Arrival Temp. (°C)	By	Time ET	Appearance
SQN-101-TOX	Comp	8-12-12 0645 ET	8-13-12 0545 ET	2(2.5gal)	1741.838			X		120813.01	0.8/0.7 °C	JH	1540	*
SQN-INT-TOX	Comp	8-12-12 0705 ET	8-13-12 0605 ET	1(2.5 gal)						120813.02	0.9 °C	JH	1540	*

Sample Custody – Fill In From Top Down

* Custody seals intact. Samples received in good condition. TRC absent in all samples.

Relinquished By (Signature):	Date/Time	Received By (Signature):	Date/Time
Dustin Bingar TVA	8-13-12 0800 ET	BR Skiles Sonic	08-13-12 08:00 ET
BR Skiles Sonic	08-13-12 1540 ET	Jm/ ETS	08-13-12 1540 ET

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.

Whole Effluent Sample Receipt Log

Independent Review by Kelley E. Keenan Initials: KEK

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*Sample temperature performed using Sample Receiving Thermometer: SN 6338

Date Received	Time Received	Received by	Received from	*Sample Temp. (°C)	Project number	Sample number	Sample name and description	State	Comments
08-13-12	1540	J. Sumner	Sonic Delivery	0.8, 0.7	8207	120813 .01	TVA / SQN Outfall 101	TN	
08-13-12	1540	J. Sumner	Sonic Delivery	0.9	8207	120813 .02	TVA / SQN Intake	TN	

BIOMONITORING CHAIN OF CUSTODY RECORD

Client: TVA

Project Name: Sequoyah NP Toxicity

P.O. Number: N/A

Facility Sampled: Sequoyah NP

NPDES Number: TN0026450

Collected By: Dustin Bingner

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

Delivered By (Circle One):

FedEx UPS Bus Client

Other (specify):_____

General Comments:
Took Samples off at Outfall at 600 and Intake at 630.

Field Identification / Sample Description	Grab/Comp.	Collection Date/Time		Container Number & Volume Collected	Flow (MGD)	Rain Event? (Mark as Appropriate)				Laboratory Use (project# 9207)				
	----	Start	End	----	----	Yes	If Yes, Inches	No	Trace	ETS Log Number	Arrival Temp. (°C)	By	Time ET	Appearance
SQN-101-TOX	Comp	8-14-12 0700 ET	8-15-12 0600 ET	2(2.5gal)	1748.488 MGD			X		120815.10	1.9, 1.9°C		1553	*
SQN-INT-TOX	Comp	8-14-12 0720 ET	8-15-12 0620 ET	1(2.5 gal)				X		120815.11	2.0°C		1553	*

Sample Custody – Fill In From Top Down

* CUSTODY SEALS INTACT. SAMPLES RECEIVED IN GOOD CONDITION. TRC ABSENT IN ALL SAMPLES.

Relinquished By (Signature):	Date/Time	Received By (Signature):	Date/Time
TVA	8-15-12 1030 ET	SONIC	08-15-12 10:30 ET
SONIC	8-15-12 3:53 ET	ETS	08-15-12 1553 ET

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.

Whole Effluent Sample Receipt Log

*Sample temperature performed using Sample Receiving Thermometer: SN 6338

Date Received	Time Received	Received by	Received from	*Sample Temp. (°C)	Project number	Sample number	Sample name and description	State	Comments
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	
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	

BIOMONITORING CHAIN OF CUSTODY RECORD

Client: TVA

Project Name: Sequoyah NP Toxicity

P.O. Number: N/A

Facility Sampled: Sequoyah NP

NPDES Number: TN0026450

Collected By: Austin Bineger, Devin Bray

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

Delivered By (Circle One):

FedEx UPS Bus Client

Other (specify):_____

General Comments:
took samples from outfall at 0600, and from Intake at 0630.

Field Identification / Sample Description	Grab/Comp.	Collection Date/Time		Container Number & Volume Collected	Flow (MGD)	Rain Event? (Mark as Appropriate)				Project # 8207 Laboratory Use				
	---	Start	End	---	---	Yes	If Yes, Inches	No	Trace	ETS Log Number	Arrival Temp. (°C)	By	Time ET	Appearance
SQN-101-TOX	Comp	8-16-12 0700 ET	8-17-12 0600 ET	2(2.5gal)	1747.57 MGD	X	.11			120817.06	2.2 / 2.2°C	JH	1338	*
SQN-INT-TOX	Comp	8-16-12 0715 ET	8-17-12 0615 ET	1(2.5 gal)		X	.11			120817.09	2.4 °C	JH	1338	*

Sample Custody – Fill In From Top Down

* Custody seals intact samples received in good condition. TRC absent in all samples

Relinquished By (Signature):	Date/Time	Received By (Signature):	Date/Time
Austin Bineger TVA	8-17-12 0930 ET	BR Skiles SONIC	08-17-12 09:30 ET
BR Skiles SONIC	08-17-12 1338 ET	JH ETS	08-17-12 1338 ET

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.

Whole Effluent Sample Receipt Log

*Sample temperature performed using Sample Receiving Thermometer: SN 6338

Date Received	Time Received	Received by	Received from	*Sample Temp. (°C)	Project number	Sample number	Sample name and description	State	Comments
08-17-12	0950	K. Keenan	Fed - Ex	0.6	8215	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: *Pimephales promelas*

Client: Tennessee Valley Authority
Facility: Sequoyah Nuclear Plant
NPDES #: TN0020168
Project #: 8207

County: Rhea
Outfall: 101

Dilution preparation information:						*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:		*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:	3C
Organism source:	ATOX BATCH Pp 08-13-12	*Artemia* CHM number:	CHM652
		Drying information for weight determination:	
Transfer bowl information:	pH = 7.60 S.U. Temperature = 25.1 °C	Date / Time in oven:	08-21-12 1200
		Initial oven temperature:	60 °C
Average transfer volume:	0.1209 mL	Date / Time out of oven:	08-22-12 1200
		Final oven temperature:	60 °C
		Total drying time:	24-HOURS

Daily feeding and renewal information:

Day	Date	Morning feeding		Afternoon feeding		Test initiation, renewal, or termination		Sample numbers used		MHSW batch used
		Time	Analyst	Time	Analyst	Time	Analyst	Outfall 101	Intake	
0	08-14-12			1500	JH	1200	JH	120813.01	120813.02	08-12-12
1	08-15-12	0700	JH	1300	JH	1100	JH	120813.01	120813.02	08-12-12
2	08-16-12	0715	JH	1315	JH	1100	JH	120815.10	120815.11	08-14-12
3	08-17-12	0700	JH	1300	JH	1100	JH	120815.10	120815.11	08-14-12
4	08-18-12	0915	JS	1515	JH	1115	JH	120817.08	120817.09	08-16-12
5	08-19-12	0815	JH	1415	JH	1103	JH	120817.08	120817.09	08-16-12
6	08-20-12	0700	JH	1300	JH	1100	JH	120817.08	120817.09	08-16-12
7	08-21-12					1106	JH			

Control information:		Acceptance criteria	*Summary of test endpoints:*	
% Mortality:	0%	≤ 20%	7-day LC_{50}	> 100%
Average weight per initial larvae:	0.584		NOEC	100%
Average weight per surviving larvae:	0.584	≥ 0.25mg/larvae	LOEC	> 100%
			ChV	>100%
			IC_{25}	>100%

Independent Review by Kelley E. Keenan Initials: KK

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

Survival and Growth Data

Day	CONTROL				10.8%				21.6%			
	A	B	C	D	E	F	G	H	I	J	K	L
0	10	10	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10	10	10	10
3	10	10	10	10	10	10	10	10	10	10	10	10
4	10	10	10	10	10	10	10	10	10	10	10	10
5	10	10	10	10	10	10	10	10	10	10	10	10
6	10	10	10	10	10	10	10	10	10	10	10	10
7	10	10	10	10	10	10	10	10	10	10	10	10
A = Pan weight (mg) Tray color code:: Light Pink Analyst: MHF Date: 08.06.12	14.47	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: JLB Date: 08.27.12	20.30	19.73	20.16	18.68	19.45	20.55	20.54	19.87	20.33	18.54	21.93	21.83
C = Larvae weight (mg) = B – A Hand calculated. Analyst:	5.83	6.15	5.92	5.44	5.35	6.69	6.86	6.49	6.08	5.59	6.26	6.86
Weight per initial number of larvae (mg) = C / Initial number of larvae Hand calculated. Analyst:	0.583	0.615	0.592	0.544	0.535	0.669	0.686	0.649	0.608	0.559	0.626	0.686
Average weight per initial number of larvae (mg)	0.584				0.635				0.620			
Percent reduction from control (%)							-8.87				-6.27	

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:

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

Survival and Growth Data

Day	43.2%				86.4%				100%			
	M	N	O	P	Q	R	S	T	U	V	W	X
0	10	10	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10	10	10	10
3	10	10	10	10	10	10	10	10	10	10	10	10
4	10	10	10	10	10	10	10	10	10	10	10	10
5	10	10	10	10	10	10	10	10	10	10	10	10
6	10	10	10	10	10	10	10	10	10	10	10	10
7	10	10	10 ZSM	10	10	10	10	10	10	10	10	10
A = Pan weight (mg) Tray color code:: Light Pink Analyst: MHF 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: JJB Date: 08-27-12	19.32	19.23	19.62	20.45	18.78	19.42	19.42	21.42	18.82	20.43	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:	0.582	0.563	0.487	0.614	0.614	0.555	0.563	0.690	0.532	0.673	0.506	0.571
Average weight per initial number of larvae (mg)	0.562		3.87.		0.606		-3.87.		0.571		2.27.	
Percent reduction from control (%)												

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:

Species: ***Pimephales promelas***
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	8 2dFg	10	10	10
A = Pan weight (mg) Tray color code:: Light Pink Analyst: MRF Date: 08-06-12	13.84	14.78	14.71	14.24
B = Pan + Larvae weight (mg) Analyst: JLB Date: 08-27-12	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:	0.537	0.569	0.551	0.687
Average weight per initial number of larvae (mg)	0.586			
Percent reduction from control (%)		-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:

Independent Review by Kelley Emerson

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

Environmental Testing Solutions, Inc.

***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

Project number: 8207

Concentration (%)	Replicate	Initial number of larvae	Final number of larvae	A = Pan weight (mg)	B = Pan + Larvae weight (mg)	Larvae weight (mg) = A - B	Not for Compliance Assessment, Internal Laboratory QC: Weight / Surviving number of larvae (mg)	Not for Compliance Assessment, Internal Laboratory QC: Mean weight / Surviving number of larvae (mg)	Not for Compliance Assessment, Internal Laboratory QC: Coefficient of variation (Mean weight per surviving number of larvae) (%)	Weight / Initial number of larvae (mg)	Mean survival (%)	Mean weight / Initial number of larvae (mg)	Coefficient of variation (Mean weight per initial number of larvae) (%)	Percent reduction from control (%)
Control	A	10	10	14.47	20.30	5.83	0.583	0.584	5.1	0.583	100.0	0.584	5.1	Not applicable
	B	10	10	13.58	19.73	6.15	0.615			0.615				
	C	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				
10.8%	E	10	10	14.10	19.45	5.35	0.535	0.635	10.7	0.535	100.0	0.635	10.7	-8.8
	F	10	10	13.86	20.55	6.69	0.669			0.669				
	G	10	10	13.68	20.54	6.86	0.686			0.686				
	H	10	10	13.38	19.87	6.49	0.649			0.649				
21.6%	I	10	10	14.25	20.33	6.08	0.608	0.620	8.5	0.608	100.0	0.620	8.5	-6.2
	J	10	10	12.95	18.54	5.59	0.559			0.559				
	K	10	10	15.67	21.93	6.26	0.626			0.626				
	L	10	10	14.97	21.83	6.86	0.686			0.686				
43.2%	M	10	10	13.50	19.32	5.82	0.582	0.562	9.6	0.582	100.0	0.562	9.6	3.8
	N	10	10	13.60	19.23	5.63	0.563			0.563				
	O	10	10	14.75	19.62	4.87	0.487			0.487				
	P	10	10	14.31	20.45	6.14	0.614			0.614				
86.4%	Q	10	10	12.64	18.78	6.14	0.614	0.606	10.3	0.614	100.0	0.606	10.3	-3.8
	R	10	10	13.87	19.42	5.55	0.555			0.555				
	S	10	10	13.79	19.42	5.63	0.563			0.563				
	T	10	10	14.52	21.42	6.90	0.690			0.690				
100%	U	10	10	13.50	18.82	5.32	0.532	0.571	12.9	0.532	100.0	0.571	12.9	2.2
	V	10	10	13.70	20.43	6.73	0.673			0.673				
	W	10	10	13.37	18.43	5.06	0.506			0.506				
	X	10	10	14.50	20.21	5.71	0.571			0.571				
100% Intake	Y	10	8	13.84	19.21	5.37	0.671	0.620	11.2	0.537	95.0	0.586	11.7	-0.4
	Z	10	10	14.78	20.47	5.69	0.569			0.569				
	AA	10	10	14.71	20.22	5.51	0.551			0.551				
	BB	10	10	14.24	21.11	6.87	0.687			0.687				

Outfall 101:
Dunnett's MSD value: 0.0994
PMSD: 17.0

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:
Dunnett's MSD value: 0.0726
PMSD: 12.4

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.

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

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

Environmental Testing Solutions, Inc.

Statistical Analyses

Larval Fish Growth and Survival Test-7 Day Growth

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 2012	Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	Non-treated				

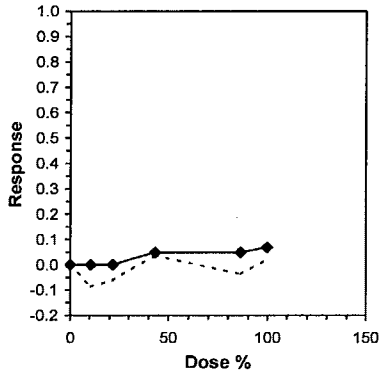
Conc-%	1	2	3	4
D-Control	0.5830	0.6150	0.5920	0.5440
10.8	0.5350	0.6690	0.6860	0.6490
21.6	0.6080	0.5590	0.6260	0.6860
43.2	0.5820	0.5630	0.4870	0.6140
86.4	0.6140	0.5550	0.5630	0.6900
100	0.5320	0.6730	0.5060	0.5710
Intake	0.5370	0.5690	0.5510	0.6870

			Transform: Untransformed					1-Tailed			Isotonic	
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
Intake	0.5860	1.0043	0.5860	0.5370	0.6870	11.706	4					

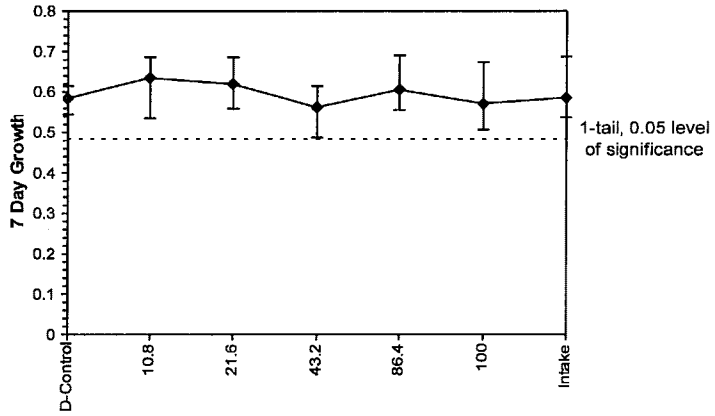
Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					0.98195		0.884		0.03805	-0.4693
Bartlett's Test indicates equal variances (p = 0.82)					2.21405		15.0863			
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**	**MSDu**	**MSDp**	**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



Independent Review by Kelley E. Keenan Initials:

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

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

Environmental Testing Solutions, Inc.

Statistical Analyses

Larval Fish Growth and Survival Test-7 Day Growth

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 2012	Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	Non-treated				

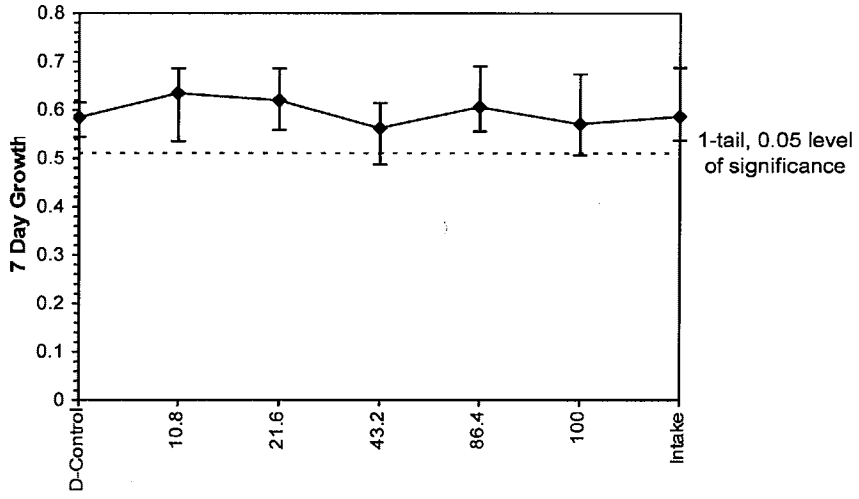
Conc-%	1	2	3	4
D-Control	0.5830	0.6150	0.5920	0.5440
10.8	0.5350	0.6690	0.6860	0.6490
21.6	0.6080	0.5590	0.6260	0.6860
43.2	0.5820	0.5630	0.4870	0.6140
86.4	0.6140	0.5550	0.5630	0.6900
100	0.5320	0.6730	0.5060	0.5710
Intake	0.5370	0.5690	0.5510	0.6870

			Transform: Untransformed						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 Treatments vs D-Control	0.07258	0.12439	1.2E-05	0.00279	0.94881	1, 6

Dose-Response Plot



Independent Review by Kelley E. Keenan Initials: KK

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

Species: ***Pimephales promelas*** **Date:** 08.14.12

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

Daily Chemistry:

Concentration	Parameter	Day 0 Analyst JB	Day 0 Analyst JB	Day 1 Analyst JB	Day 1 Analyst JB	Day 2 Analyst JB	Day 2 Analyst MW
CONTROL Non-treated	pH (S.U.)	7.66	7.49	7.43	7.59	7.55	7.54
	DO (mg/L)	7.7	7.9	7.7	7.8	7.9	7.9
	Conductivity (µmhos/cm)	306		313		310	
	*Alkalinity (mg $CaCO_3$/L)	62				62	
	*Hardness (mg $CaCO_3$/L)	92				88	
	*Temperature (°C)	24.7	24.6	24.9	24.7	24.8	24.7
10.8%	pH (S.U.)	7.62	7.44	7.44	7.52	7.45	7.52
	DO (mg/L)	7.7	7.9	8.0	7.8	7.9	7.9
	Conductivity (µmhos/cm)	297		294		294	
	*Temperature (°C)	24.7	24.4	25.0	24.7	24.8	24.6
21.6%	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	7.8
	Conductivity (µmhos/cm)	280		283		280	
	*Temperature (°C)	24.7	24.4	25.0	24.6	24.8	24.6
43.2%	pH (S.U.)	7.61	7.42	7.45	7.50	7.51	7.50
	DO (mg/L)	7.7	7.8	8.0	7.9	8.0	7.8
	Conductivity (µmhos/cm)	254		255		255	
	*Temperature (°C)	24.7	24.4	25.0	24.6	24.8	24.8
86.4%	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	7.8
	Conductivity (µmhos/cm)	203		203		194	
	*Temperature (°C)	24.7	24.3	25.6	24.6	24.8	24.6
100%	pH (S.U.)	7.60	7.42	7.42	7.54	7.53	7.49
	DO (mg/L)	7.7	7.8	8.0	8.1	8.1	7.9
	Conductivity (µmhos/cm)	183		183		186	
	*Alkalinity (mg $CaCO_3$/L)	72				70	
	*Hardness (mg $CaCO_3$/L)	72				71	
	*TR chlorine (mg/L)	<0.10				<0.10	
	*Temperature (°C)	24.8	24.4	25.0	24.7	25.0	24.6
100% Intake	pH (S.U.)	7.61	7.42	7.44	7.50	7.52	7.50
	DO (mg/L)	7.7	7.9	8.0	8.0	8.2	8.0
	Conductivity (µmhos/cm)	183		186		185	
	*Alkalinity (mg $CaCO_3$/L)	68				68	
	*Hardness (mg $CaCO_3$/L)	72				74	
	*TR chlorine (mg/L)	<0.10				<0.10	
	*Temperature (°C)	25.0	24.4	24.9	24.7	25.0	24.6
		Initial	Final	Initial	Final	Initial	Final

(Analyst identified for each day, performed pH, D.O. and conductivity measurements only.)

*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: JB.

Independent Review by Kelley E. Keenan Initials: KK

Species: ***Pimephales promelas***

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

Concentration	Parameter	Day 3 Analyst KW	Day 3 Analyst JB	Day 4 Analyst JB	Day 4 Analyst JB	Day 5 Analyst JB	Day 5 Analyst JB	Day 6 Analyst JB	Day 6 Analyst JB
CONTROL Non-treated	pH (S.U.)	7.49	7.49	7.60	7.45	7.67	7.57	7.44	7.36
	DO (mg/L)	7.6	7.6 (7.8)	7.6	7.8	7.6	7.8	7.6	8.0
	Conductivity (µmhos/cm)	302		315		310		323	
	*Alkalinity (mg $CaCO_3$/L)			62					
	*Hardness (mg $CaCO_3$/L)			88					
	*Temperature (°C)	24.8	24.7	24.8	24.6	24.7	25.1	24.7	24.6
10.8%	pH (S.U.)	7.57	7.43	7.52	7.45	7.51	7.55	7.55	7.37
	DO (mg/L)	8.0	7.6	7.9	7.8	8.0	7.8	7.8	8.0
	Conductivity (µmhos/cm)	285		285		285		298	
	*Temperature (°C)	24.9	24.9	24.8	24.6	24.7	25.0	24.8	24.3
21.6%	pH (S.U.)	7.59	7.43	7.52	7.33	7.52	7.55	7.55	7.33
	DO (mg/L)	7.9	7.6	7.9	7.6	8.0	7.8	7.8	8.0
	Conductivity (µmhos/cm)	273		272		273		282	
	*Temperature (°C)	24.9	24.9	24.8	24.5	24.7	24.8	24.9	24.4
43.2%	pH (S.U.)	7.59	7.42	7.51	7.37	7.51	7.52	7.56	7.34
	DO (mg/L)	7.9	7.6	7.9	7.6	8.0	7.8	7.8	8.0
	Conductivity (µmhos/cm)	249		248		246		259	
	*Temperature (°C)	24.9	24.6	24.8	24.5	24.7	24.8	24.9	24.4
86.4%	pH (S.U.)	7.50	7.42	7.45	7.34	7.45	7.52	7.53	7.31
	DO (mg/L)	8.0	7.6	7.8	7.7	8.0	7.8	7.8	7.9
	Conductivity (µmhos/cm)	192		196		196		205	
	*Temperature (°C)	24.9	24.8	24.8	24.7	24.7	24.6	24.9	24.5
100%	pH (S.U.)	7.57	7.49	7.44	7.38	7.44	7.57	7.54	7.32
	DO (mg/L)	8.0	7.7	7.8	7.7	8.0	8.0	7.8	7.9
	Conductivity (µmhos/cm)	181		179		177		183	
	*Alkalinity (mg $CaCO_3$/L)			72					
	*Hardness (mg $CaCO_3$/L)			74					
	*TR chlorine (mg/L)			< 0.10					
	*Temperature (°C)	25.0	24.8	25.0	24.7	24.8	24.7	24.9	24.5
100% Intake	pH (S.U.)	7.50	7.48	7.43	7.39	7.43	7.54	7.54	7.33
	DO (mg/L)	8.1	7.9	7.9	7.9	8.0	8.0	7.8	8.0
	Conductivity (µmhos/cm)	182		181		176		184	
	*Alkalinity (mg $CaCO_3$/L)			70					
	*Hardness (mg $CaCO_3$/L)			72					
	*TR chlorine (mg/L)			< 0.10					
	*Temperature (°C)	25.0	24.7	25.0	24.7	24.7	24.7	24.9	24.7
		Initial	Final	Initial	Final	Initial	Final	Initial	Final

Day (Analyst identified for each day, performed pH, D.O. and conductivity measurements only.)

*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: JB

Independent Review by Kelley E. Keenan Initials: KK

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

ETS Environmental Testing Solutions, Inc.

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

Daily Chemical Analyses

Project number: 8207

Concentration	Parameter	Day 0		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control	pH (SU)	7.66	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		313		310		302		315		310		323	
	Alkalinity (mg/L $CaCO_3$)	62				62				62					
	Hardness (mg/L $CaCO_3$)	92				88				88					
	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
10.8%	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
	DO (mg/L)	7.7	7.9	8.0	7.8	7.9	7.9	8.0	7.6	7.9	7.8	8.0	7.8	7.8	8.0
	Conductivity (µmhos/cm)	297		294		294		285		285		285		298	
	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
21.6%	pH (SU)	7.62	7.44	7.44	7.47	7.51	7.50	7.59	7.43	7.52	7.33	7.52	7.55	7.55	7.33
	DO (mg/L)	7.7	7.9	8.0	7.8	7.9	7.8	7.9	7.6	7.9	7.6	8.0	7.8	7.8	8.0
	Conductivity (µmhos/cm)	280		283		280		273		272		273		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
43.2%	pH (SU)	7.61	7.42	7.45	7.50	7.51	7.50	7.59	7.42	7.51	7.37	7.51	7.52	7.56	7.34
	DO (mg/L)	7.7	7.8	8.0	7.9	8.0	7.8	7.9	7.6	7.9	7.6	8.0	7.8	7.8	8.0
	Conductivity (µmhos/cm)	254		255		255		249		248		246		259	
	Temperature (°C)	24.7	24.4	25.0	24.6	24.8	24.8	24.9	24.6	24.8	24.5	24.7	24.8	24.9	24.4
86.4%	pH (SU)	7.60	7.39	7.45	7.51	7.51	7.48	7.58	7.42	7.45	7.34	7.45	7.52	7.53	7.31
	DO (mg/L)	7.6	7.8	8.0	7.9	8.0	7.8	8.0	7.6	7.8	7.7	8.0	7.8	7.8	7.9
	Conductivity (µmhos/cm)	203		203		194		192		196		196		205	
	Temperature (°C)	24.7	24.3	25.0	24.6	24.8	24.6	24.9	24.8	24.8	24.7	24.7	24.6	24.9	24.5
100%	pH (SU)	7.60	7.42	7.42	7.54	7.53	7.49	7.57	7.49	7.44	7.38	7.44	7.57	7.54	7.32
	DO (mg/L)	7.7	7.8	8.0	8.1	8.1	7.9	8.0	7.7	7.8	7.7	8.0	8.0	7.8	7.9
	Conductivity (µmhos/cm)	183		183		186		181		179		177		183	
	Alkalinity (mg/L $CaCO_3$)	72				70				72					
	Hardness (mg/L $CaCO_3$)	72				71				74					
	Total Residual Chlorine (mg/L)	<0.10				<0.10				<0.10					
	Temperature (°C)	24.8	24.4	25.0	24.7	25.0	24.6	25.0	24.8	25.0	24.7	24.8	24.7	24.9	24.5
100% Intake	pH (SU)	7.61	7.42	7.44	7.50	7.52	7.50	7.58	7.48	7.43	7.39	7.43	7.54	7.54	7.33
	DO (mg/L)	7.7	7.9	8.0	8.0	8.2	8.0	8.1	7.9	7.9	7.9	8.0	8.0	7.8	8.0
	Conductivity (µmhos/cm)	183		186		185		182		181		176		184	
	Alkalinity (mg/L $CaCO_3$)	68				68				70					
	Hardness (mg/L $CaCO_3$)	72				74				72					
	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: _____

ETS Environmental Testing Solutions, Inc.

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

Client: Tennessee Valley Authority
Facility: Sequoyah Nuclear Plant
NPDES #: TN0026450
Project #: 8207

County: Hamilton
Outfall: 101

Dilution preparation information:						*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 source information:											*Test information:*	
Organism age:	< 24-hours old										Randomizing template color:	GOLD
Date and times organisms were born between:	08-14-12 0620 TO 0930										Incubator number and shelf location:	2B2
Culture board:	08-07-12 A											
Replicate number:	1	2	3	4	5	6	7	8	9	10	YWT batch:	08-08-12
Culture board cup number:	12	13	20	21	22	28	31	33	34	35		
Transfer vessel information:	pH = 7.71 S.U. Temperature = 24.9 °C										*Selenastrum* batch:	07-31-12
Average transfer volume (mL):	0.0327 mL											

Daily renewal information:

Day	Date	Test initiation and feeding, renewal and feeding, or termination time	MHSW batch used	Sample numbers used Outfall 101	Sample numbers used Intake	Analyst
0	08-14-12	1148	08-12-12	120813.01	120813.02	JH
1	08-15-12	1050	08-12-12	120813.01	120813.02	JH
2	08-16-12	1049	08-14-12	120815.10	120815.11	JH
3	08-17-12	1050	08-14-12	120815.10	120815.11	JH
4	08-18-12	1052	08-16-12	120817.08	120817.09	JH
5	08-19-12	1049	08-16-12	120817.08	120817.09	JH
6	08-20-12	1048	08-16-12	120817.08	120817.09	JH
7	08-21-12	1053				JH

Control information:	Control-1	Control-2	Acceptance criteria	*Summary of test endpoints:*	
% of Male Adults:	0%	0%	≤ 20%	7-day LC_{50}	>100%
% Adults having 3rd Broods:	100%	100%	≥ 80%	NOEC	100%
% Mortality:	0%	0%	≤ 20%	LOEC	>100%
Mean Offspring/Female:	31.2	31.3	≥ 15.0 offspring/female	ChV	>100%
% CV:	6.27%	5.67%	< 40.0 %	IC_{25}	>100%

Independent Review by Kelley E. Keenan Initials: KK

ETS Environmental Testing Solutions, Inc.

Species: *Ceriodaphnia dubia*
Client: TVA / Sequoyah Nuclear Plant, Outfall 101 **Date:** 08·14·12

CONTROL-1

Survival and Reproduction Data

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

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

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	31.2

CONC: **10.8%**

Survival and Reproduction Data

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	5	6	4	4	6	6	4	6	5	5
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	13	12	11	12	12	10	13	12	12	12
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	18	16	18	17	17	19	17	16	14	15
Total young produced		36	34	33	33	35	35	34	34	31	32
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

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:	0%
Mean Offspring/Female:	33.7
% Reduction from Control-1:	-8.0%

Independent Review by Kelley E. Keenan Initials: KK

ETS Environmental Testing Solutions, Inc.

Species: *Ceriodaphnia dubia*
Client: TVA / Sequoyah Nuclear Plant, Outfall 101 **Date:** 08-14-12

CONC: **21.6%** ***Survival and Reproduction Data***

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	5	5	5	5	6	5	5	4	4	4
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	13	11	12	10	10	13	13	13	11	13
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	18	15	16	16	14	19	17	16	17	13
Total young produced		36	31	33	31	30	37	35	33	32	30
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

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:	0%
Mean Offspring/Female:	32.8
% Reduction from Control-1:	-5.17

CONC: **43.2%** ***Survival and Reproduction Data***

Day		Replicate number 1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	6	5	5	4	5	5	6	5	4	5
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	13	12	12	12	11	11	12	14	12	12
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	18	17	17	15	15	15	19	15	18	18
Total young produced		37	34	34	31	31	31	37	34	34	35
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

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:	0%
Mean Offspring/Female:	33.8
% Reduction from Control-1:	-8.37

ETS Environmental Testing Solutions, Inc.

Species: *Ceriodaphnia dubia*

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

CONC: 86.4% ***Survival and Reproduction Data***

Day		Replicate number									
		1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	5	7	5	5	4	5	6	5	6	6
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	13	12	12	11	12	12	14	12	13	13
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	16	15	19	18	19	16	14	18	17	18
Total young produced		34	34	36	34	35	33	34	35	36	37
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

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:	0%
Mean Offspring/Female:	34.8
% Reduction from Control-1:	-11.5%

CONC: 100% ***Survival and Reproduction Data***

Day		Replicate number									
		1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	6	7	5	6	5	5	5	6	6	6
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	14	12	13	12	12	14	13	13	13	13
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	18	18	19	16	15	19	17	20	18	19
Total young produced		38	37	37	34	32	38	35	39	37	38
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

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:	0%
Mean Offspring/Female:	36.5
% Reduction from Control-1:	-17.0%

Independent Review by Kelley E. Keenan Initials: KK

ETS Environmental Testing Solutions, Inc.

Species: *Ceriodaphnia dubia*
Client: TVA / Sequoyah Nuclear Plant, Outfall 101 **Date:** 08.14.12

CONTROL-2 ***Survival and Reproduction Data***

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

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

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	31.3

CONC: 100% Intake ***Survival and Reproduction Data***

Day		Replicate number									
		1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	6	4	6	5	5	7	5	5	4	6
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	11	12	12	13	10	14	12	12	13	11
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	16	13	15	15	18	15	16	15	19	17
Total young produced		33	29	33	33	33	36	33	32	36	34
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

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:	0%
Mean Offspring/Female:	33.2
% Reduction from Control-2:	-6.1%

Independent Review by Kelley E. Keenan Initials: KK

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

ETS Environmental Testing Solutions, Inc.

Verification of *Ceriodaphnia* Reproduction Totals

Control-1

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	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%

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	5	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	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	5	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%

Day	Replicate number										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	6	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%

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

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

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

Environmental Testing Solutions, Inc.

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 (offspring/female)	Coefficient of variation (%)	Percent reduction from control (%)
	1	2	3	4	5	6	7	8	9	10				
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
PMSD: 6.5

Intake:
Dunnett's MSD value: 1.459
PMSD: 4.7

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 (90^{th} 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.

File: sqn101_081412data.xlsx
Table populated from associated "Verification of Ceriodaphnia Reproduction Totals" spreadsheet.
Spreadsheet entered by: J. Sumner
Reviewed by:

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

Environmental Testing Solutions, Inc.

Statistical Analyses

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	8/14/2012	Test ID:	CdFRCR	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 2012	Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	CD-Ceriodaphnia dubia
Comments:	Non-treated				

Conc-%	1	2	3	4	5	6	7	8	9	10
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	37.000	34.000	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

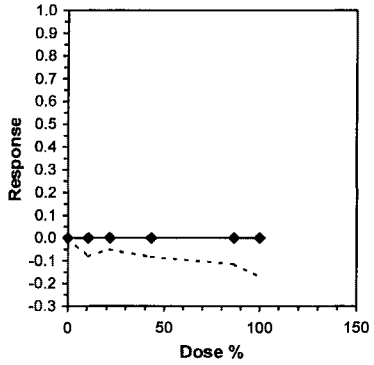
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control-1	31.200	0.9968	31.200	28.000	34.000	6.193	10	*		33.800	1.0000
Control-2	31.300	1.0000	31.300	29.000	34.000	5.645	10				
10.8	33.700	1.0767	33.700	31.000	36.000	4.435	10	140.00	75.00	33.800	1.0000
21.6	32.800	1.0479	32.800	30.000	37.000	7.578	10	122.00	75.00	33.800	1.0000
43.2	33.800	1.0799	33.800	31.000	37.000	6.660	10	136.50	75.00	33.800	1.0000
86.4	34.800	1.1118	34.800	33.000	37.000	3.532	10	151.00	75.00	33.800	1.0000
100	36.500	1.1661	36.500	32.000	39.000	5.954	10	150.50	75.00	33.800	1.0000
Intake	33.200	1.0607	33.200	29.000	36.000	5.991	10				

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.05)	0.98421	0.895	-0.0927	-0.4597
Bartlett's Test indicates equal variances (p = 0.35)	5.58769	15.0863		
The control means are not significantly different (p = 0.91)	0.12078	2.10092		

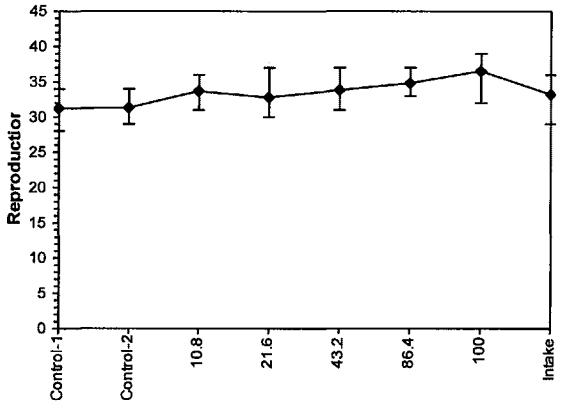
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1
Treatments vs Control-1				

Linear Interpolation (200 Resamples)

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



Dose-Response Plot



Independent Review by Kelley E. Keenan Initials:

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

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

ETS Environmental Testing Solutions, Inc.

Statistical Analyses

Analysis used for PMSD calculation only.

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	8/14/2012	Test ID:	CdFRCR	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 2012	Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	CD-Ceriodaphnia dubia
Comments:	Non-treated				

Conc-%	1	2	3	4	5	6	7	8	9	10
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	37.000	34.000	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: Untransformed						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	-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
100	36.500	1.1661	36.500	32.000	39.000	5.954	10	-5.995	2.287	2.021
Intake	33.200	1.0607	33.200	29.000	36.000	5.991	10			

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.05)	0.98421	0.895	-0.0927	-0.4597
Bartlett's Test indicates equal variances (p = 0.35)	5.58769	15.0863		
The control means are not significantly different (p = 0.91)	0.12078	2.10092		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control-1	100	>100		1	2.02145	0.06479	32.12	3.90741	7.9E-06	5, 54

Independent Review by Kelley E. Keenan Initials: KK

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

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

ETS Environmental Testing Solutions, Inc.

Statistical Analyses

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	8/14/2012	Test ID:	CdFRCR	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 2012	Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	CD-Ceriodaphnia dubia
Comments:	Non-treated				

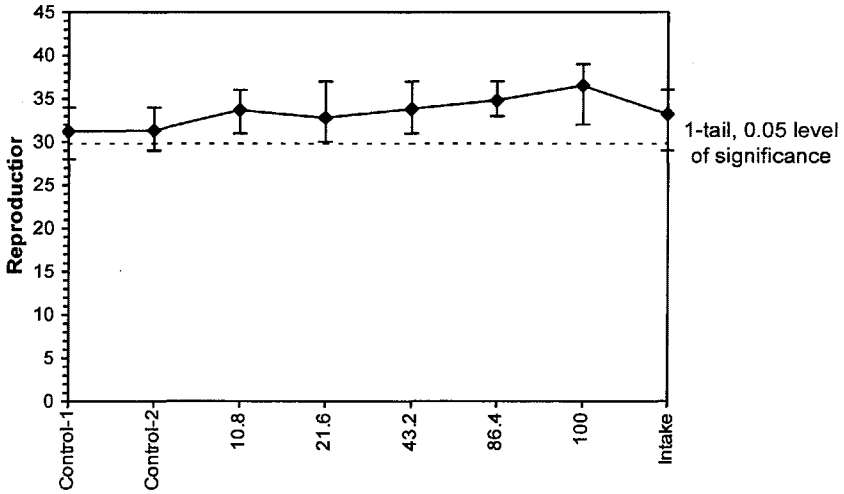
Conc-%	1	2	3	4	5	6	7	8	9	10
Control-1	30.000	33.000	29.000	33.000	31.000	28.000	34.000	32.000	30.000	32.000
Control-2	30.000	34.000	34.000	31.000	32.000	29.000	32.000	31.000	29.000	31.000
10.8	36.000	34.000	33.000	33.000	35.000	35.000	34.000	34.000	31.000	32.000
21.6	36.000	31.000	33.000	31.000	30.000	37.000	35.000	33.000	32.000	30.000
43.2	37.000	34.000	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: Untransformed						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 Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.91798	0.905	-0.1715	0.33113
F-Test indicates equal variances (p = 0.73)	1.2669	6.54109		
The control means are not significantly different (p = 0.91)	0.12078	2.10092		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	1.45886	0.04661	18.05	3.53889	0.03657	1, 18
Treatments vs Control-2						

Dose-Response Plot



Independent Review by Kelley E. Keenan Initials:

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

Species: *Ceriodaphnia dubia* **Date:** 08.14.12

Client: TVA / Sequoyah Nuclear Plant, Outfall 101

Daily Chemistry:

		Day (Analyst identified for each day, performed pH, D.O. and conductivity measurements only.)					
		0		1		2	
	Analyst	JJB	JJB	JJB	JJB	JJB	MW
Concentration	**Parameter**						
CONTROL	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
	Conductivity (µmhos/cm)	306		313		310	
	*Alkalinity (mg $CaCO_3$/L)	62				62	
	*Hardness (mg $CaCO_3$/L)	92				88	
	*Temperature (°C)	24.7	25.1	24.9	25.0	24.9	25.2
10.8%	pH (S.U.)	7.62	7.44	7.44	7.58	7.45	7.59
	DO (mg/L)	7.7	7.8	8.0	8.0	7.9	8.1
	Conductivity (µmhos/cm)	297		294		294	
	*Temperature (°C)	24.7	24.9	24.9	25.2	24.9	25.0
21.6%	pH (S.U.)	7.62	7.43	7.44	7.59	7.51	7.59
	DO (mg/L)	7.7	7.8	8.0	8.1	7.9	8.0
	Conductivity (µmhos/cm)	280		283		280	
	*Temperature (°C)	24.7	24.9	24.9	25.0	24.9	25.0
43.2%	pH (S.U.)	7.61	7.44	7.45	7.61	7.51	7.59
	DO (mg/L)	7.7	7.9	8.0	8.1	8.0	8.0
	Conductivity (µmhos/cm)	254		255		255	
	*Temperature (°C)	24.7	24.8	25.0	24.9	25.0	25.0
86.4%	pH (S.U.)	7.60	7.43	7.45	7.61	7.51	7.58
	DO (mg/L)	7.6	7.9	8.0	8.2	8.0	8.0
	Conductivity (µmhos/cm)	203		203		194	
	*Temperature (°C)	24.8	25.0	25.0	24.9	25.0	25.1
100%	pH (S.U.)	7.60	7.44	7.42	7.63	7.53	7.57
	DO (mg/L)	7.7	7.9	8.0	8.2	8.1	7.9
	Conductivity (µmhos/cm)	183		183		186	
	*Alkalinity (mg $CaCO_3$/L)	72				70	
	*Hardness (mg $CaCO_3$/L)	72				71	
	*TR chlorine (mg/L)	<0.10				<0.10	
	*Temperature (°C)	24.9	25.0	25.0	24.9	25.0	24.9
100% Intake	pH (S.U.)	7.61	7.45	7.44	7.64	7.52	7.57
	DO (mg/L)	7.7	8.1	8.0	8.2	8.2	8.0
	Conductivity (µmhos/cm)	183		186		185	
	*Alkalinity (mg $CaCO_3$/L)	68				68	
	*Hardness (mg $CaCO_3$/L)	72				74	
	*TR chlorine (mg/L)	<0.10				<0.10	
	*Temperature (°C)	25.0	24.9	25.0	25.1	25.1	24.9
		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: JJ

Independent Review by Kelley E. Keenan Initials: KK

Species: *Ceriodaphnia dubia*

Client: TVA / Sequoyah Nuclear Plant, Outfall 101 **Date:** 08.14.12

Concentration	Parameter	Day 3		Day 4		Day 5		Day 6	
	Analyst	KW	SJB	JB	JB	SJB	JB	JB	JB
CONTROL	pH (S.U.)	7.49	7.58	7.60	7.53	7.67	7.57	7.44	7.28
	DO (mg/L)	7.6	8.0	7.6	8.0	7.6	7.8	7.6	8.2
	Conductivity (µmhos/cm)	302		315		310		323	
	*Alkalinity (mg $CaCO_3$/L)	08.13.12		62		08.14.12		08.13.12	
	*Hardness (mg $CaCO_3$/L)	JR		68		JR		JR	
	*Temperature (°C)	24.9	25.2	24.8	25.0	24.7	25.0	24.7	25.1
10.8%	pH (S.U.)	7.57	7.58	7.52	7.54	7.51	7.56	7.55	7.29
	DO (mg/L)	8.0	7.9	7.9	8.0	8.0	7.8	7.8	8.2
	Conductivity (µmhos/cm)	285		285		285		298	
	*Temperature (°C)	25.0	25.1	24.8	25.1	24.6	24.8	24.8	25.0
21.6%	pH (S.U.)	7.59	7.60	7.52	7.54	7.52	7.56	7.55	7.30
	DO (mg/L)	7.9	7.9	7.9	8.1	8.0	7.9	7.8	8.2
	Conductivity (µmhos/cm)	273		272		273		282	
	*Temperature (°C)	25.0	25.1	24.8	25.0	24.7	24.8	24.8	25.0
43.2%	pH (S.U.)	7.59	7.58	7.51	7.54	7.51	7.56	7.56	7.30
	DO (mg/L)	7.9	7.9	7.9	8.1	8.0	7.9	7.8	8.2
	Conductivity (µmhos/cm)	249		248		246		259	
	*Temperature (°C)	25.0	24.8	24.8	24.8	24.7	24.8	24.8	25.3
86.4%	pH (S.U.)	7.58	7.61	7.45	7.53	7.45	7.55	7.53	7.28
	DO (mg/L)	8.0	7.9	7.8	8.1	8.0	7.9	7.8	8.2
	Conductivity (µmhos/cm)	192		196		196		205	
	*Temperature (°C)	25.1	25.1	24.8	24.8	24.7	24.9	24.8	25.2
100%	pH (S.U.)	7.57	7.61	7.44	7.54	7.44	7.55	7.54	7.29
	DO (mg/L)	8.0	7.9	7.8	8.1	8.0	7.9	7.8	8.3
	Conductivity (µmhos/cm)	181		179		177		183	
	*Alkalinity (mg $CaCO_3$/L)			72					
	*Hardness (mg $CaCO_3$/L)			74					
	*TR chlorine (mg/L)			<0.10					
	*Temperature (°C)	25.1	24.8	25.0	24.8	24.8	25.0	24.9	25.2
100% Intake	pH (S.U.)	7.58	7.58	7.43	7.56	7.43	7.56	7.54	7.30
	DO (mg/L)	8.1	8.0	7.9	8.2	8.0	8.0	7.8	8.2
	Conductivity (µmhos/cm)	182		181		176		184	
	*Alkalinity (mg $CaCO_3$/L)			70					
	*Hardness (mg $CaCO_3$/L)			72					
	*TR chlorine (mg/L)			<0.10					
	*Temperature (°C)	25.0	24.7	24.9	24.7	24.8	24.7	24.9	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, 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: JR.

Independent Review by Kelley E. Keenan Initials: KK

Independent Review by Kelley E. Keenan Initials: KK

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

ETS Environmental Testing Solutions, Inc.

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

Daily Chemical Analyses

Project number: 8207

Concentration	Parameter	Day 0		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control	pH (SU)	7.66	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	
	Alkalinity (mg/L $CaCO_3$)	62				62				62					
	Hardness (mg/L $CaCO_3$)	92				88				88					
	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
10.8%	pH (SU)	7.62	7.44	7.44	7.58	7.45	7.59	7.57	7.58	7.52	7.54	7.51	7.56	7.55	7.29
	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
	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	25.1	24.6	24.8	24.8	25.0
21.6%	pH (SU)	7.62	7.43	7.44	7.59	7.51	7.59	7.59	7.60	7.52	7.54	7.52	7.56	7.55	7.30
	DO (mg/L)	7.7	7.8	8.0	8.1	7.9	8.0	7.9	7.9	7.9	8.1	8.0	7.9	7.8	8.2
	Conductivity (µmhos/cm)	280		283		280		273		272		273		282	
	Temperature (°C)	24.7	24.9	24.9	25.0	24.9	25.0	25.0	25.1	24.8	25.0	24.7	24.8	24.8	25.0
43.2%	pH (SU)	7.61	7.44	7.45	7.61	7.51	7.59	7.59	7.58	7.51	7.54	7.51	7.56	7.56	7.30
	DO (mg/L)	7.7	7.9	8.0	8.1	8.0	8.0	7.9	7.9	7.9	8.1	8.0	7.9	7.8	8.2
	Conductivity (µmhos/cm)	254		255		255		249		248		246		259	
	Temperature (°C)	24.7	24.8	25.0	24.9	25.0	25.0	25.0	24.8	24.8	24.8	24.7	24.8	24.8	25.3
86.4%	pH (SU)	7.60	7.43	7.45	7.61	7.51	7.58	7.58	7.61	7.45	7.53	7.45	7.55	7.53	7.28
	DO (mg/L)	7.6	7.9	8.0	8.2	8.0	8.0	8.0	7.9	7.8	8.1	8.0	7.9	7.8	8.2
	Conductivity (µmhos/cm)	203		203		194		192		196		196		205	
	Temperature (°C)	24.8	25.0	25.0	24.9	25.0	25.1	25.1	25.1	24.8	24.8	24.7	24.9	24.8	25.2
100%	pH (SU)	7.60	7.44	7.42	7.63	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		181		179		177		183	
	Alkalinity (mg/L $CaCO_3$)	72				70				72					
	Hardness (mg/L $CaCO_3$)	72				71				74					
	Total Residual Chlorine (mg/L)	<0.10				<0.10				<0.10					
	Temperature (°C)	24.9	25.0	25.0	24.9	25.0	24.9	25.1	24.8	25.0	24.8	24.8	25.0	24.9	25.2
100% Intake	pH (SU)	7.61	7.45	7.44	7.64	7.52	7.57	7.58	7.58	7.43	7.56	7.43	7.56	7.54	7.30
	DO (mg/L)	7.7	8.1	8.0	8.2	8.2	8.0	8.1	8.0	7.9	8.2	8.0	8.0	7.8	8.2
	Conductivity (µmhos/cm)	183		186		185		182		181		176		184	
	Alkalinity (mg/L $CaCO_3$)	68				68				70					
	Hardness (mg/L $CaCO_3$)	72				74				72					
	Total Residual Chlorine (mg/L)	<0.10				<0.10				<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

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

ETS Environmental Testing Solutions, Inc.

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

Species: *Pimephales promelas*

Client: Tennessee Valley Authority
Facility: Sequoyah Nuclear Plant
NPDES #: TN0020168
Project #: 8257

County: Rhea
Outfall: 101

Dilution preparation information:						*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:		*Test information:*	
Organism age:	20-22 HOURS OLD	Randomizing template:	BLUE
Date and times organisms were born between:	08-13-12 1600	Incubator number and shelf location:	3B
Organism source:	ATOX BATCH P, 08-13-12	*Artemia* CHM number:	CHM652
		Drying information for weight determination:	
Transfer bowl information:	pH = 7.60 S.U. Temperature = 25.1 °C	Date / Time in oven:	08-21-12 1200
		Initial oven temperature:	60°C
Average transfer volume:	0.1209 ml	Date / Time out of oven:	08-22-12 1200
		Final oven temperature:	60°C
		Total drying time:	24 HOURS

Daily feeding and renewal information:

Day	Date	Morning feeding		Afternoon feeding		Test initiation, renewal, or termination		Sample numbers used		MHSW batch used
		Time	Analyst	Time	Analyst	Time	Analyst	Outfall 101	Intake	
0	08-14-12			1500	JH	1213	JH	120813.01	120813.02	08-12-12
1	08-15-12	0700	JH	1300	JH	1115	JH	120813.01	120813.02	08-12-12
2	08-16-12	0715	JH	1315	JH	1114	JH	120815.10	120815.11	08-14-12
3	08-17-12	0700	JH	1300	JH	1115	JH	120815.10	120815.11	08-14-12
4	08-18-12	0915	JH	1515	JH	1127	JH	120817.08	120817.09	08-16-12
5	08-19-12	0815	JH	1415	JH	1115	JH	120817.08	120817.09	08-16-12
6	08-20-12	0700	JH	1300	JH	1114	JH	120817.08	120817.09	08-16-12
7	08-21-12					1122	JH			

Control information:		Acceptance criteria
% Mortality:	07.	≤ 20%
Average weight per initial larvae:	0.535	
Average weight per surviving larvae:	0.535	≥ 0.25mg/larvae

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

Independent Review by Kelley E. Keenan Initials: KK

Species: ***Pimephales promelas***
Client: **TVA / Sequoyah Nuclear Plant, Outfall 101, UV-treated** **Date:** 08-14-12

Survival and Growth Data

Day	CONTROL				10.8%				21.6%			
	A	B	C	D	E	F	G	H	I	J	K	L
0	10	10	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10	10	10	10
3	10	10	10	10	10	10	10	10	10	10	10	10
4	10	10	10	10	10	10	10	10	10	10	10	10
5	10	10	10	10	10	10	10	10	10	10	10	10
6	10	10	10	10	10	10	10	10	10	10	10	10
7	10	10 ISM	10	10	10	10	10	10	10	10	10	10
A = Pan weight (mg) Tray color code:: Light Blue Analyst: MHF Date: 08-06-12	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: JCD Date: 08-27-12	17.98	19.28	21.36	20.16	20.06	20.21	20.57	16.78	20.34	18.43	19.53	18.93
C = Larvae weight (mg) = B – A Hand calculated. Analyst:	5.10	4.88	5.87	5.53	6.73	5.59	6.31	5.94	5.99	5.24	5.47	5.82
Weight per initial number of larvae (mg) = C / Initial number of larvae Hand calculated. Analyst:	0.510	0.488	0.587	0.553	0.673	0.559	0.631	0.594	0.599	0.524	0.547	0.582
Average weight per initial number of larvae (mg)	0.535				0.614				0.563			
Percent reduction from control (%)							- 14.97.				-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:

Independent Review by Kelley E. Keenan Initial

Species: ***Pimephales promelas***
Client: **TVA / Sequoyah Nuclear Plant, Outfall 101, UV-treated** **Date:** 08-14-12

Survival and Growth Data

Day	43.2%				86.4%				100%			
	M	N	O	P	Q	R	S	T	U	V	W	X
0	10	10	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10	10	10	10
3	10	10	10	10	10	10	10	10	10	10	10	10
4	10	10	10	10	10	10	10	10	10	10	10	10
5	10	10	10	10	10	10	10	9 ISM	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 ISM	10	10	10	10 ISM
A = Pan weight (mg) Tray color code:: Light Blue Analyst: MPF Date: 08-06-12	14.08	13.47	13.53	13.17	13.27	13.69	13.96	14.82	14.33	12.73	13.24	12.76
B = Pan + Larvae weight (mg) Analyst: JLB Date: 08-27-12	20.00	18.63	19.01	19.05	18.36	18.96	19.47	19.30	19.83	18.38	18.50	17.70
C = Larvae weight (mg) = B – A Hand calculated. Analyst: JLB	5.92	5.16	5.48	5.88	5.09	5.27	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: JLB	0.592	0.516	0.548	0.588	0.509	0.527	0.551	0.448	0.550	0.565	0.526	0.494
Average weight per initial number of larvae (mg) / Percent reduction from control (%)	0.561		-5.07.		0.509		4.87.		0.534		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:

Species: ***Pimephales promelas***
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 ISM								
A = Pan weight (mg) Tray color code:: Light Blue Analyst: MHC Date: 08-06-12	15.22	14.61	14.37	14.39								
B = Pan + Larvae weight (mg) Analyst: JLB Date: 08-27-12	21.43	20.34	20.84	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:	0.621	0.573	0.647	0.482								
Average weight per initial number of larvae (mg)	0.581											
Percent reduction from control (%)	-6.77											

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:

Independent Review by Kelley E. Keenan 1/10/13

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

Environmental Testing Solutions, Inc.

***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

Project number: 8207

							Not for Compliance Assessment, Internal Laboratory QC							
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 from control (%)**
Control	A	10	10	12.88	17.98	5.10	0.510	0.535	8.3	0.510	100.0	0.535	8.3	Not applicable
	B	10	10	14.40	19.28	4.88	0.488			0.488				
	C	10	10	15.49	21.36	5.87	0.587			0.587				
	D	10	10	14.63	20.16	5.53	0.553			0.553				
10.8%	E	10	10	13.33	20.06	6.73	0.673	0.614	8.0	0.673	100.0	0.614	8.0	-14.9
	F	10	10	14.62	20.21	5.59	0.559			0.559				
	G	10	10	14.26	20.57	6.31	0.631			0.631				
	H	10	10	12.84	18.78	5.94	0.594			0.594				
21.6%	I	10	10	14.35	20.34	5.99	0.599	0.563	6.0	0.599	100.0	0.563	6.0	-5.3
	J	10	10	13.19	18.43	5.24	0.524			0.524				
	K	10	10	14.06	19.53	5.47	0.547			0.547				
	L	10	10	13.11	18.93	5.82	0.582			0.582				
43.2%	M	10	10	14.08	20.00	5.92	0.592	0.561	6.4	0.592	100.0	0.561	6.4	-5.0
	N	10	10	13.47	18.63	5.16	0.516			0.516				
	O	10	10	13.53	19.01	5.48	0.548			0.548				
	P	10	10	13.17	19.05	5.88	0.588			0.588				
86.4%	Q	10	10	13.27	18.36	5.09	0.509	0.521	4.5	0.509	97.5	0.509	8.6	4.8
	R	10	10	13.69	18.96	5.27	0.527			0.527				
	S	10	10	13.96	19.47	5.51	0.551			0.551				
	T	10	9	14.82	19.30	4.48	0.498			0.448				
100%	U	10	10	14.33	19.83	5.50	0.550	0.534	5.8	0.550	100.0	0.534	5.8	0.1
	V	10	10	12.73	18.38	5.65	0.565			0.565				
	W	10	10	13.24	18.50	5.26	0.526			0.526				
	X	10	10	12.76	17.70	4.94	0.494			0.494				
100% Intake	Y	10	10	15.22	21.43	6.21	0.621	0.581	12.5	0.621	100.0	0.581	12.5	-8.7
	Z	10	10	14.61	20.34	5.73	0.573			0.573				
	AA	10	10	14.37	20.84	6.47	0.647			0.647				
	BB	10	10	14.39	19.21	4.82	0.482			0.482				

Outfall 101:
Dunnett's MSD value: 0.0685
PMSD: 12.8

MSD = Minimum Significant Difference
PMSD = Percent Minimum Significant Difference
PMSD is a measure of test precision. The PMSD is the minimum percent difference between the control and treatment that can be declared statistically significant in a whole effluent toxicity test.

Intake:
Dunnett's MSD value: 0.0826
PMSD: 15.5

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.

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

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

Environmental Testing Solutions, Inc.

Statistical Analyses

Larval Fish Growth and Survival Test-7 Day Growth

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 2012	Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	UV-treated				

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

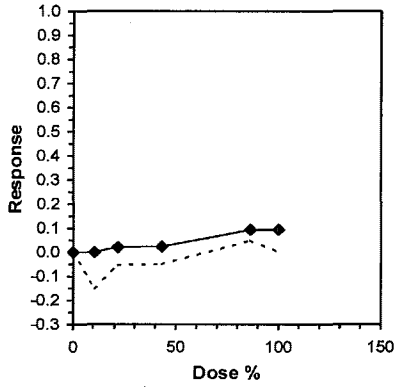
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	0.5345	1.0000	0.5345	0.4880	0.5870	8.269	4				0.5744	1.0000
10.8	0.6143	1.1492	0.6143	0.5590	0.6730	7.973	4	-2.807	2.410	0.0685	0.5744	1.0000
21.6	0.5630	1.0533	0.5630	0.5240	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 normal distribution (p > 0.01)	0.94963	0.884	-0.1675	-1.1562
Bartlett's Test indicates equal variances (p = 0.97)	0.84084	15.0863		

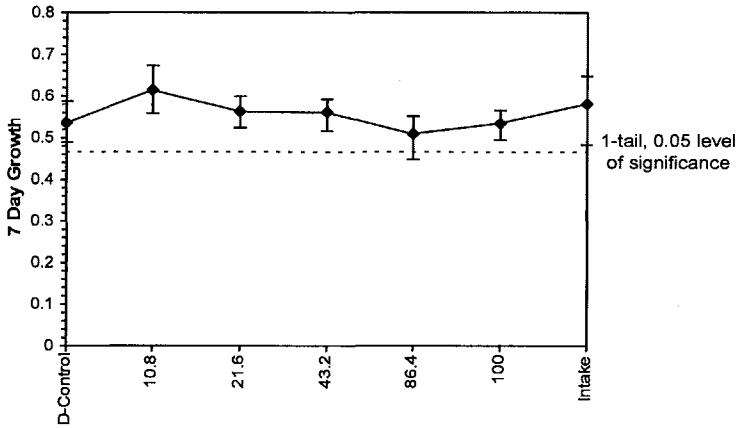
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs D-Control	100	>100		1	0.06848	0.12811	0.00527	0.00161	0.02854	5, 18

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	59.875			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Dose-Response Plot



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

Independent Review by Kelley E. Keenan Initials: _____

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

Environmental Testing Solutions, Inc.

Statistical Analyses

Larval Fish Growth and Survival Test-7 Day Growth

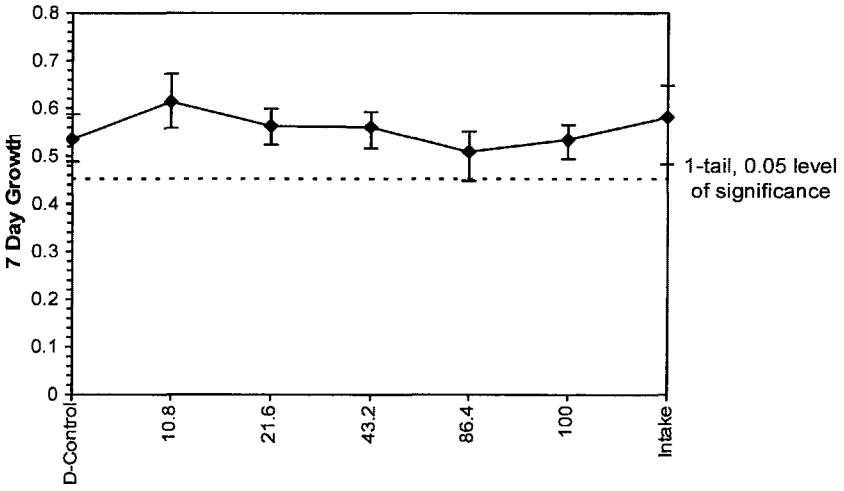
Start Date:	8/14/2012	Test ID:	PpFRCR	Sample ID:	TVA / SQN 101 - Intake
End Date:	8/21/2012	Lab ID:	ETS-Envir. Testing Sol.	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	August 2012	Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	PP-Pimephales promelas
Comments:	UV-treated				

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: Untransformed					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 Treatments vs D-Control	0.0826	0.15453	0.00428	0.00361	0.31833	1, 6

Dose-Response Plot



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

Independent Review by Kelley E. Keenan Initials: _____

Species: ***Pimephales promelas*** **Date:** 08-14-12

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

Daily Chemistry:

		Day (Analyst identified for each day, performed pH, D.O. and conductivity measurements only.)					
		0		1		2	
	Analyst	JSB	JSB	JSB	JSB	JSB	KLN
Concentration	Parameter						
CONTROL UV-treated	pH (S.U.)	7.65	7.49	7.50	7.59	7.62	7.53
	DO (mg/L)	7.8	7.8	7.9	7.8	7.9	7.9
	Conductivity (µmhos/cm)	302		309		302	
	*Alkalinity (mg $CaCO_3$/L)	62		[illegible]		61	
	*Hardness (mg $CaCO_3$/L)	84		[illegible]		84	
	*Temperature (°C)	24.8	24.7	24.8	24.7	24.8	24.9
10.8%	pH (S.U.)	7.66	7.48	7.50	7.56	7.63	7.52
	DO (mg/L)	7.9	7.8	7.9	7.8	7.9	7.8
	Conductivity (µmhos/cm)	294		298		293	
	*Temperature (°C)	24.9	24.5	24.8	24.7	24.9	25.0
21.6%	pH (S.U.)	7.66	7.47	7.50	7.52	7.62	7.52
	DO (mg/L)	7.9	7.7	7.9	7.9	7.9	7.8
	Conductivity (µmhos/cm)	281		284		280	
	*Temperature (°C)	24.9	24.8	24.8	24.7	24.9	24.8
43.2%	pH (S.U.)	7.66	7.45	7.49	7.54	7.62	7.52
	DO (mg/L)	7.9	7.7	7.9	7.9	8.0	7.9
	Conductivity (µmhos/cm)	255		258		257	
	*Temperature (°C)	24.9	24.7	24.8	24.7	24.9	24.8
86.4%	pH (S.U.)	7.63	7.43	7.48	7.56	7.59	7.50
	DO (mg/L)	7.9	7.7	7.9	7.9	8.1	7.9
	Conductivity (µmhos/cm)	204		207		207	
	*Temperature (°C)	24.9	24.7	24.9	24.7	24.9	24.8
100%	pH (S.U.)	7.62	7.43	7.48	7.54	7.59	7.49
	DO (mg/L)	8.0	7.7	7.8	7.9	8.3	7.9
	Conductivity (µmhos/cm)	186		188		186	
	*Alkalinity (mg $CaCO_3$/L)	[illegible] 70				70	
	*Hardness (mg $CaCO_3$/L)	72				72	
	*TR chlorine (mg/L)	<0.10				<0.10	
	*Temperature (°C)	25.0	24.6	25.0	24.6	25.1	24.7
100% Intake	pH (S.U.)	7.60	7.42	7.48	7.55	7.57	7.53
	DO (mg/L)	8.1	7.7	8.0	7.9	8.2	8.0
	Conductivity (µmhos/cm)	186		191		184	
	*Alkalinity (mg $CaCO_3$/L)	70				70	
	*Hardness (mg $CaCO_3$/L)	71				72	
	*TR chlorine (mg/L)	<0.10				<0.10	
	*Temperature (°C)	25.1	24.6	25.0	24.6	25.0	24.9
		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: JSB. Total residual chlorine was performed on non-treated Outfall 101 and Intake samples.

Independent Review by Kelley E. Keenan Initials: KK

Species: ***Pimephales promelas***

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

Concentration	Parameter	Day 3 Analyst		Day 4 Analyst		Day 5 Analyst		Day 6 Analyst	
		KM	JB	JB	JB	JB	JB	JB	JB
CONTROL UV-treated	pH (S.U.)	7.59	7.47	7.56	7.40	7.59	7.61	7.62	7.34
	DO (mg/L)	8.0	7.8	8.0	7.6	8.1	7.9	7.9	7.8
	Conductivity (µmhos/cm)	303		299		298		316	
	*Alkalinity (mg $CaCO_3$/L)	08-17-12		61		08-14-12		08-20-12	
	*Hardness (mg $CaCO_3$/L)			84					
	*Temperature (°C)	24.9	24.7	24.9	24.8	24.8	24.6	24.9	24.5
10.8%	pH (S.U.)	7.62	7.45	7.58	7.41	7.57	7.57	7.61	7.34
	DO (mg/L)	8.0	7.8	8.0	7.6	7.9	7.8	7.9	7.8
	Conductivity (µmhos/cm)	291		285		282		292	
	*Temperature (°C)	25.0	24.7	25.0	24.8	24.8	24.7	24.9	24.5
21.6%	pH (S.U.)	7.63	7.45	7.56	7.46	7.57	7.58	7.61	7.34
	DO (mg/L)	8.0	7.8	7.9	7.8	8.0	7.8	7.9	7.9
	Conductivity (µmhos/cm)	277		271		274		283	
	*Temperature (°C)	25.1	24.8	25.0	24.8	24.9	24.7	25.0	24.6
43.2%	pH (S.U.)	7.62	7.45	7.55	7.41	7.54	7.58	7.61	7.33
	DO (mg/L)	8.0	7.8	7.9	7.8	8.0	7.8	7.9	7.9
	Conductivity (µmhos/cm)	255		246		249		256	
	*Temperature (°C)	25.1	24.8	25.0	24.6	24.9	24.8	25.0	24.6
86.4%	pH (S.U.)	7.61	7.45	7.50	7.38	7.49	7.57	7.59	7.33
	DO (mg/L)	8.1	7.7	8.0	7.5	7.9	7.8	7.9	7.9
	Conductivity (µmhos/cm)	204		197		198		207	
	*Temperature (°C)	25.1	24.6	25.0	24.7	24.9	24.8	25.0	24.3
100%	pH (S.U.)	7.61	7.42	7.50	7.41	7.47	7.55	7.59	7.31
	DO (mg/L)	8.1	7.8	8.1	7.5	8.0	7.8	8.0	7.9
	Conductivity (µmhos/cm)	182		178		181		187	
	*Alkalinity (mg $CaCO_3$/L)			08-17-12 124 (10)					
	*Hardness (mg $CaCO_3$/L)			72					
	*TR chlorine (mg/L)			<0.10					
	*Temperature (°C)	25.1	24.6	25.1	24.7	25.0	24.7	25.1	24.2
100% Intake	pH (S.U.)	7.61	7.43	7.47	7.42	7.46	7.58	7.59	7.32
	DO (mg/L)	8.1	7.8	8.1	7.7	8.0	7.9	7.9	8.0
	Conductivity (µmhos/cm)	182		178		178		189	
	*Alkalinity (mg $CaCO_3$/L)			70					
	*Hardness (mg $CaCO_3$/L)			72					
	*TR chlorine (mg/L)			<0.10					
	*Temperature (°C)	25.1	24.6	24.9	24.5	24.8	24.7	25.1	24.5
		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, 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: JB. Total residual chlorine was performed on non-treated Outfall 101 and Intake samples.

Independent Review by Kelley E. Keenan Initials: KK

Independent Review by Kelley E. Keenan 11/15/12

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

ETS
Environmental Testing Solutions, Inc.

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

Daily Chemical Analyses

Project number: 8207

Concentration	Parameter	Day 0		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control	pH (SU)	7.65	7.49	7.50	7.59	7.62	7.53	7.59	7.47	7.56	7.40	7.59	7.61	7.62	7.34
	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	7.8
	Conductivity (µmhos/cm)	302		309		302		303		299		298		316	
	Alkalinity (mg/L $CaCO_3$)	62				61				61					
	Hardness (mg/L $CaCO_3$)	84				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	24.5
10.8%	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	7.34
	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	7.8
	Conductivity (µmhos/cm)	294		298		293		291		285		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	24.5
21.6%	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	7.34
	DO (mg/L)	7.9	7.7	7.9	7.9	7.9	7.8	8.0	7.8	7.9	7.8	8.0	7.8	7.9	7.9
	Conductivity (µmhos/cm)	281		284		280		277		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	24.6
43.2%	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	7.33
	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	7.9
	Conductivity (µmhos/cm)	255		258		257		255		246		249		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	24.6
86.4%	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	7.33
	DO (mg/L)	7.9	7.7	7.9	7.9	8.1	7.9	8.1	7.7	8.0	7.5	7.9	7.8	7.9	7.9
	Conductivity (µmhos/cm)	204		207		207		204		197		198		207	
	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	24.3
100%	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	7.31
	DO (mg/L)	8.0	7.7	7.8	7.9	8.3	7.9	8.1	7.8	8.1	7.5	8.0	7.8	8.0	7.9
	Conductivity (µmhos/cm)	186		188		186		182		178		181		187	
	Alkalinity (mg/L $CaCO_3$)	70				70				70					
	Hardness (mg/L $CaCO_3$)	72				72				72					
	*Total Residual Chlorine (mg/L)	<0.10				<0.10				<0.10					
	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	24.2
100% Intake	pH (SU)	7.60	7.42	7.48	7.55	7.57	7.53	7.61	7.43	7.47	7.42	7.46	7.58	7.59	7.32
	DO (mg/L)	8.1	7.7	8.0	7.9	8.2	8.0	8.1	7.8	8.1	7.7	8.0	7.9	7.9	8.0
	Conductivity (µmhos/cm)	186		191		184		182		178		178		189	
	Alkalinity (mg/L $CaCO_3$)	70				70				70					
	Hardness (mg/L $CaCO_3$)	71				72				72					
	*Total Residual Chlorine (mg/L)	<0.10				<0.10				<0.10					
	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	24.5

*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:

ETS Environmental Testing Solutions, Inc.

Alkalinity (SM 2320 B)

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

Analyst	JJB
Date analyzed	08.18.12

Titrate samples to pH = 4.5 S.U.

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_2CO_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
5.1	INR 484	INSS 1018	0.0	12.1	12.1	0.0207	10.3

Blk corr: 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%)
08.14.12	MHSW	100	21.7	27.7	6.0	10.3	S 62	
↓	Duplicate (B)	↓	27.7	33.7	6.0	↓	D 62	JJB 08.18.12

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	100	27.7	38.5	10.8	10.3	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)
08.10.12	MHSW	100	38.5	44.5	6.0	10.3	62
08.12.12	1	↓	0.0	6.0	6.0	↓	62
08.13.12 A	Salt SW	↓	6.0	17.3	11.3	↓	120
08.13.12 B	↓	↓	17.3	28.3	11.0	↓	110
08.17.12	↓	↓	28.3	39.2	10.9	↓	110
	Lake Line	50	39.2	45.7	6.5	(2)	130
08.12.12	MHSW 1	100	0.0	6.0	6.0	↓	62
08.14.12	↓ 2	↓	6.0	11.9	5.9	↓	61
08.16.12	↓ 3	↓	11.9	17.8	5.9	↓	61

Reviewed by: KLM Date reviewed: 08.19.12

ETS Environmental Testing Solutions, Inc.

Alkalinity (SM 2320 B)

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

Analyst	JSB
Date analyzed	08.18.12

Titrate samples to pH = 4.5 S.U.

Time initiated	
Time completed	JSB 08.18.12

Titrant normality and multiplier determination:

pH of Deionized water = 4.5 S.U.	Titrant reference number	Normality check standard number	Begin ml	End ml	Total ml (E)	Normality (N) of H_2SO_4 = (5 ml Na_2CO_3 x 0.05)/E = 0.25/E (acceptable range = 0.0180 - 0.0220)	pH Factor or Multiplier = (N x 50000)/ 100 ml sample = N x 500
							JSB 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%)
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	
↓	Duplicate (B)	↓	30.8	34.3	3.5	↓ ↓	D 72	JSB 08.18.12

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	50	30.8	39.0	8.2	(z) 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 measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg $CaCO_3$/L)
120815.10	TVASQN 101 2	50	39.0	42.4	3.4	(z) 10.3	76
120817.08	↓ 3	↓	42.4	45.9	3.5	↓ ↓	72
120815.02	TVASQN INT 1	↓	0.0	3.3	3.3	↓ ↓	68
120815.11	2	↓	3.3	6.6	3.3	↓ ↓	68
120819.09	↓ 3	↓	6.6	10.0	3.4	↓ ↓	70
120813.01	TVASQN 101 UU 1	↓	10.0	13.4	3.4	↓ ↓	70
120815.10	↓ 2	↓	13.4	16.8	3.4	↓ ↓	70
120817.08	↓ 3	↓	16.8	20.2	3.4	↓ ↓	70
120813.02	TVASQN INT UU 1	↓	20.2	23.6	3.4	↓ ↓	70

Reviewed by: KLN Date reviewed: 08.19.12

ETS Environmental Testing Solutions, Inc.

Alkalinity (SM 2320 B)

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

Analyst: JB

Date analyzed: 08.16.12

Titrate samples to pH = 4.5 S.U.

Time initiated:

Time completed: JB 08.18.12

Titrant normality and multiplier determination:

pH of ~~Deionized~~ water = 4.5 S.U.	~~Titrant~~ reference number	Normality check standard number	Begin ml	End ml	Total ml (E)	Normality (*N*) of H_2SO_4 = (5 ml Na_2CO_3 x 0.05)/E = 0.25/E (acceptable range = 0.0180 - 0.0220)	pH Factor or Multiplier = (*N* x 50000)/ 100 ml sample = *N* x 500
							JB 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%)
INSS 1037	100	100	23.6	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	TVA SQN INTUV 2	50	33.1	36.5	3.4	(2) 10.3	S 70	
↓	Duplicate (B)	50	36.5	39.9	3.4	↓ ↓	D 70	JB 08.18.12

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	50	36.5	44.7	8.2	(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%)
70	100	100.0%

Sample measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Alkalinity (mg $CaCO_3$/L)
120817.09	TVA SQN INTUV 3	50	44.7	48.1	3.4	(2) 10.3	70
120814.01	Fishwood 1	100	0.6	1.0	0.4	↓	4.1
120816.01	↓ 2	↓	1.0	4.4	3.4		35
120818.01	↓ 3	↓	4.4	7.9	3.5	↓	36
							JB 08.18.12

Reviewed by: [signature]

Date reviewed: 08.19.12

ETS Environmental Testing Solutions, Inc.

Total Hardness (SM 2340 C)

RL = 1.0 mg $CaCO_3$/L

Analyst	JB
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	0.0	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	12.2	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
08.14.12	MHSW	50	12.2	16.7	4.5	19.6	S 88	
↓	Duplicate (B)	50	16.7	21.2	4.5	↓	D 88	JB 08.18.12

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	50	16.7	23.2	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 measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Hardness (mg $CaCO_3$/L)
TV = ND	Blank (should be = 0 mg $CaCO_3$/L)	50	0.0	0.0	0.0	19.6	ND
08.16.12	MHSW	↓	23.2	27.7	4.5	↓	88
08.12.12	↓	↓	27.7	32.4	4.7	↓	92
	Spruce Pine	↓	32.4	33.5	1.1	↓	22
08-12-12	MHSUV 1	↓	33.5	37.8	4.3	↓	84
08-14-12	↓ 2	↓	37.8	42.1	4.3	↓	84
08-16-12	↓ 3	↓	42.1	46.4	4.3	↓	84
120813.01	TVASQW 101 1	↓	0.0	3.7	3.7	↓	72
120815.10	↓ 2	↓	3.7	7.3	3.6	↓	71
120817.08	↓ 3	↓	7.3	11.1	3.8	↓	74

Note: If 1 ml of titrant is used, sample must be diluted. Reviewed by: KW Date reviewed 08.19.12

ETS Environmental Testing Solutions, Inc.

Total Hardness (SM 2340 C)

RL = 1.0 mg $CaCO_3$/L

Analyst	JJB
Date analyzed	08.18.12

Time initiated / Time completed: JJB 08.18.12

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
						JJB 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	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
120813.02	TVASQWINT 1	50	13.0	16.7	3.7	19.6	S 72	
↓	Duplicate (B)	↓	16.7	20.4	3.7	↓	D 72	JJB 08.18.12

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	50	16.7	22.4	5.7	19.6	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 measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Hardness (mg $CaCO_3$/L)
TV = ND	Blank (should be = 0 mg $CaCO_3$/L)						JJB 08.18.12
120815.11	TVA SQW INT 2	50	22.4	26.2	3.8	19.6	74
120817.09	↓ 3	↓	26.2	29.9	3.7	↓	72
120813.01	TVASQWIOIUU 1		29.9	33.6	3.7		72
120815.10	↓ 2		33.6	37.3	3.7		72
120817.08	↓ 3		37.3	41.0	3.7		72
120813.02	TVASQWINTUU 1		41.0	44.6	3.6		71
120815.11	↓ 2		44.6	48.3	3.7		72
120817.09	↓ 3		0.0	3.7	3.7		72
120814.01	FOXWOOD 1	↓	3.7	5.8	2.1	↓	41

Note: If >15ml of titrant is used, sample must be diluted. Reviewed by: KLM Date reviewed 08/19/12

ETS Environmental Testing Solutions, Inc.

Total Hardness (SM 2340 C)

RL = 1.0 mg $CaCO_3$/L

Analyst	JJB
Date analyzed	08.18.12

Time initiated

Time completed JJB 08.18.12

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
						JJB 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	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	
	Duplicate (B)						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%)
		JJB 08.18.12

Sample measurements:

Sample number	Sample ID	Sample volume (ml)	Begin ml	End ml	Total ml	Multiplier	Hardness (mg $CaCO_3$/L)
TV = ND	Blank (should be = 0 mg $CaCO_3$/L)						JJB 08.18.12
12OB16.01	Fokwood 2	50	7.7	11.0	3.3	19.6	65
12OB18.01	↓ 3	↓	11.0	15.5	4.5	↓	88
							JJB 08.18.12

Note: If > 15ml of titrant is used, sample must be diluted. Reviewed by: KM Date reviewed 08 19 12

ETS Environmental Testing Solutions, Inc.

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

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

Analyst	JJB	Iodide reagent:	INR 516
Date analyzed	08.14.12	Acid reagent:	INR 517

Calibration:

	0.10 mg/L	1.00 mg/L	Slope
Reference standard number	INSS 1064	INSS 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 number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (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]} x 100 (acceptable range = ± 10%)
120814.02	ENGELHARD	yellow, clear	S <0.00272	
↓	Duplicate		D <0.00159	JJB 08.14.12

Sample measurements:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)
	Reagent Blank		<0.00786
120814.01	FOXWOOD	pale yellow, clear particles	<0.00181
120813.01	TVA SQN 101	no color, clear	<0.00372
120813.02	↓ INTAKE	no color, clear	<0.00285
			JJB 08.14.12

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

Laboratory control standard:

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

Reviewed by	
Date reviewed	08.14.12

ETS Environmental Testing Solutions, Inc.

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

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

Analyst	JB	Iodide reagent:	INR 516
Date analyzed	08.16.12	Acid reagent:	INR 517

Calibration:

	0.10 mg/L	1.00 mg/L	Slope
Reference standard number	INSS 1064	INSS 1064	-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 number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INSS 1064	0.50	0.532	106.4%

Duplicate sample precision:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)	%RPD = {(S - D) /[(S+D)/2]} x 100 (acceptable range = ± 10%)
120816.02	ENGELHARD	yellow, clear	S <0.00128	
↓	Duplicate		D <0.00125	JB 08.16.12

Sample measurements:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)
	Reagent Blank		<0.00766
120816.03	PASQUOTANK	no color, clear	<0.00361
120816.04	MCGUIRE 001	no color, clear	0.0143
120816.01	FOXWOOD	pale yellow, clear	<0.00414
120815.10	TVA SQN 101	no color, clear	<0.00134
120815.11	↓ INTAKE	no color, clear, particles	<0.00153
			JB 08.16.12

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

Laboratory control standard:

Reference standard number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (acceptable range = 90 to 110%)
INSS 1064	0.50	0.465	93.0%

Reviewed by
Date reviewed 08-16-12

ETS
Environmental Testing Solutions, Inc.

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

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

Analyst	JB	Iodide reagent:	INR 51C
Date analyzed	08.18.12	Acid reagent:	INR 517

Calibration:

	0.10 mg/L	1.00 mg/L	Slope
Reference standard number	INSS 1064	INSS 1064	-46.8%

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 number	True value (TV) (mg/L)	Measured value (MV) (mg/L)	% RS = MV / TV x 100 (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]} x 100 (acceptable range = ± 10%)
120818.02	ENGELHARD	yellow, clear	S <0.00138	
1	Duplicate		D <0.00179	JB 08.18.12

Sample measurements:

Sample number	Sample ID	Sample characteristics	Residual chlorine (mg/L)
	Reagent Blank		<0.00671
120818.03	PASQUOTANK	no color, clear	<0.00339
120818.01	FOXWOOD	pale yellow, clear	<0.00434
120817.06	TVA SQN 101	no color, clear	<0.00386
120817.09	↓ INTAKE	no color, clear, particles	<0.00358
			JB 08.18.12

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

Laboratory control standard:

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

Reviewed by	MW
Date reviewed	08-18-12

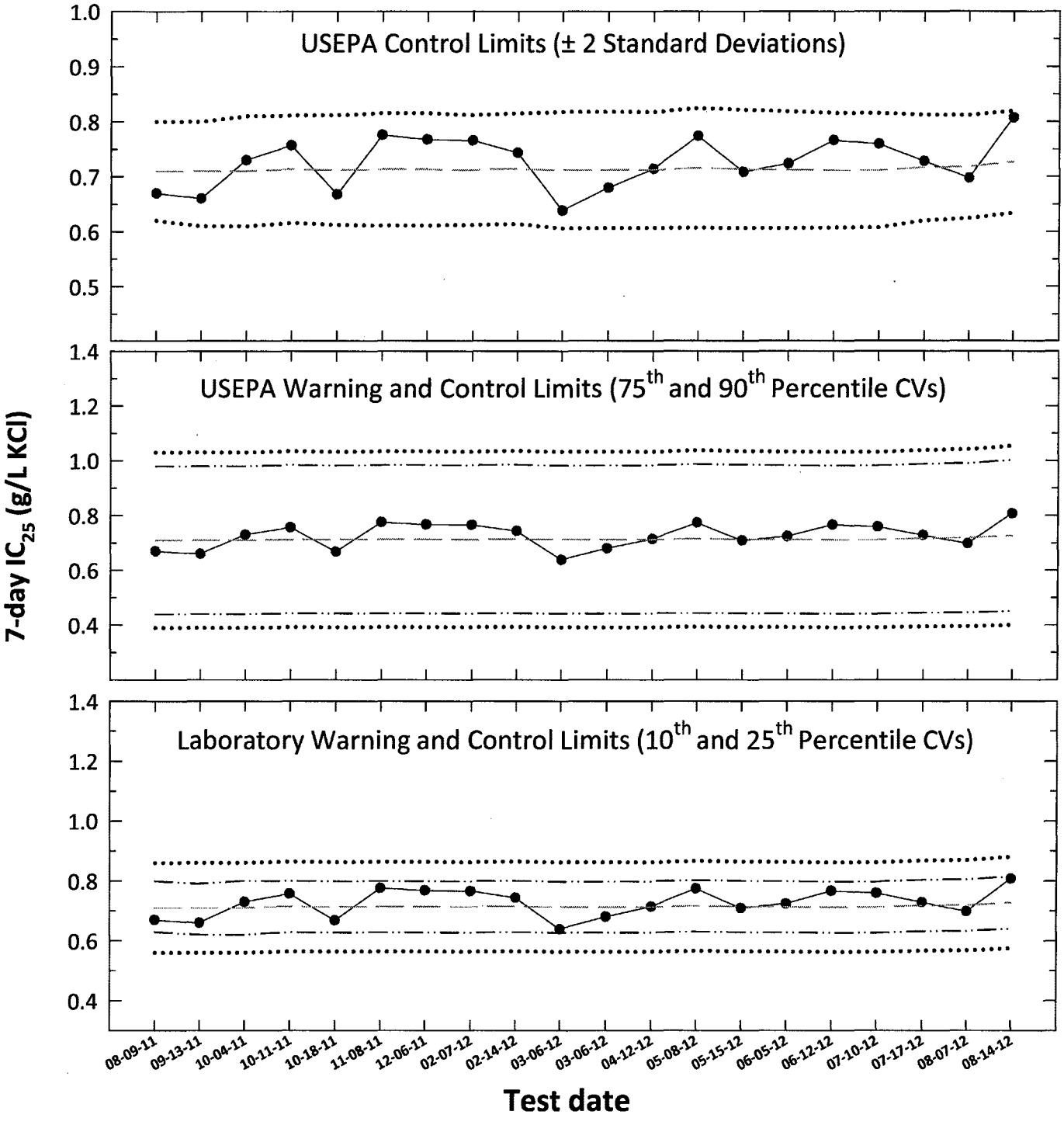
Sequoyah Nuclear Plant Biomonitoring
August 14 – 21, 2012

Appendix D

Reference Toxicant Test and
Control Chart

Environmental Testing Solutions, Inc.

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



Test date

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

Central Tendency (mean IC_{25})

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

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

Graphs generated from associated excel spreadsheet.
Excel spreadsheet entered by: J. Sumner
Reviewed by:

Independent Review by Kelley E. Keenan Initials:

Environmental Testing Solutions, Inc.

Pimephales promelas
Chronic Reference Toxicant Control Chart

Test number	Test date	7-day IC_{25} (g/L KCl)	CT (g/L KCl)	S	State and USEPA Control Limits CT - 2S	CT + 2S	$S_{A.10}$	Laboratory Warning Limits CT - $S_{A.10}$	CT + $S_{A.10}$	$S_{A.25}$	Laboratory Control Limits CT - $S_{A.25}$	CT + $S_{A.25}$	$S_{A.75}$	USEPA Warning Limits CT - $S_{A.75}$	CT + $S_{A.75}$	$S_{A.90}$	USEPA Control Limits CT - $S_{A.90}$	CT + $S_{A.90}$	CV
1	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	0.08	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	0.80	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	0.08
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 IC_{25} = 7-day 25% inhibition concentration. An estimation of the concentration of potassium chloride that would cause a 25% reduction in Pimephales growth for the test population.

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

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

Laboratory Control and Warning Limits

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

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

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

USEPA Control and Warning Limits

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

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

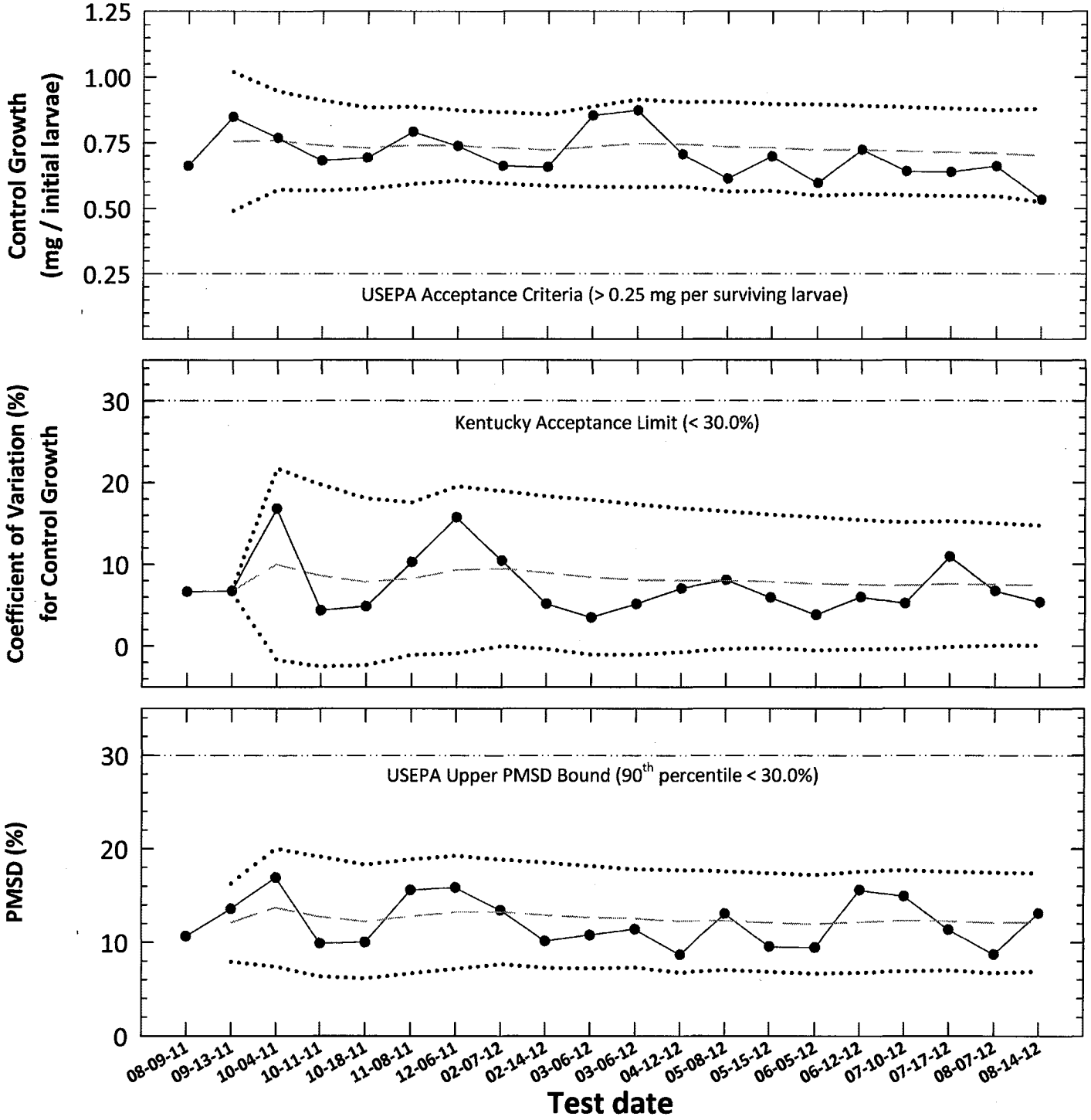
CV = Coefficient of variation of the IC_{25} values.

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

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

Environmental Testing Solutions, Inc.

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)

Independent Review by Kelley E. Keenan Initials: KK

Graphs generated from associated excel spreadsheet.
Excel spreadsheet entered by: J. Sumner
Reviewed by: _____

ETS Environmental Testing Solutions, Inc.

Precision of Endpoint Measurements

Pimephales promelas
Chronic Reference Toxicant Data

Test number	Test date	Control Survival (%)	Control Mean Growth (mg/larvae)	CT for Control Growth (mg/larvae)	CV (%)	CT for Control Growth CV (%)	MSD	PMSD (%)	CT for PMSD (%)
1	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 (10^{th} percentile) = 3.5%.
Upper CV bound determined by USEPA (90^{th} 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 (10^{th} percentile) = 12%.
Upper PMSD bound determined by USEPA (90^{th} 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.

Independent Review by Kelley E. Keenan Initials:

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

ETS Environmental Testing Solutions, Inc.

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

PpKClCR Test Number: 255

Dilution preparation information:						*Comments:*
KCl Stock INSS number:		INSS 1089				
Stock preparation:		50 g KCl/L: Dissolve 50 g KCl in 1-L Milli-Q water.				
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 information:		*Test information:*	
Organism age:	20.42 HOURS OLD	Randomizing template:	PURPLE
Date and times organisms were born between:	08-13-12 1600	Incubator number and shelf location:	3D
Organism source:	ATOX BATCH Pp 08-13-12	*Artemia* CHM number:	CHM 652
		Drying information for weight determination:	
Transfer vessel information:	pH = 7.60 S.U. Temperature = 25.1 °C	Date / Time in oven:	08-21-12 1200
		Initial oven temperature:	60°C
Average transfer volume:	0.1209 mL	Date / Time out of oven:	08-22-12 1200
		Final oven temperature:	60°C
		Total drying time:	24-HOURS

Daily feeding and renewal information:

Day	Date	Morning feeding		Afternoon feeding		Test initiation, renewal, or termination		MHSW batch used
		Time	Analyst	Time	Analyst	Time	Analyst	
0	08-14-12	—	—	1500	JH	1225	JH	08-12-12
1	08-15-12	0700	JH	1300	JH	1125	JH	08-12-12
2	08-16-12	0715	JH	1315	JH	1125	JH	08-14-12
3	08-17-12	0700	JH	1300	JH	1127	JH	08-14-12
4	08-18-12	0915	JH	1515	JH	1138	JH	08-16-12
5	08-19-12	0815	JH	1415	JH	1126	JH	08-16-12
6	08-20-12	0700	JH	1300	JH	1125	JH	08-16-12
7	08-21-12					1138	JH	

Control information:		Acceptance criteria
% Mortality:	0%	≤ 20%
Average weight per initial larvae:	0.533	
Average weight per surviving larvae:	0.533	≥ 0.25 mg/larvae

Summary of test endpoints:	
7-day LC_{50}	898.26
NOEC	600
LOEC	750
ChV	670.8
IC_{25}	807.5

ETS Environmental Testing Solutions, Inc.

Species: ***Pimephales promelas***

PpKClCR Test Number: 755

Survival and Growth Data

Day	Control				450 mg KCl/L				600 mg KCl/L			
	A	B	C	D	E	F	G	H	I	J	K	L
0	10	10	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10	10	10	10
3	10	10	10	10	10	10	10	10	10	10	10	10
4	10	10	10	10	10	10	10	10	q[1d]	q[1d]	10	10
5	10	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	10	10	10	10	10	9	9	10	10
A = Pan weight (mg) Tray color code:: Purple Analyst: MHF 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: JLB Date: 08.27.12	19.27	18.53	20.40	19.24	19.66	19.19	20.81	21.50	18.50	20.32	19.40	19.62
C = Larvae weight (mg) = B – A Hand calculated. Analyst:	5.64	5.07	5.51	5.11	5.78	5.76	6.27	6.48	4.69	5.63	5.78	6.20
Weight per initial number of larvae (mg) = C / Initial number of larvae Hand calculated. Analyst:	0.564	0.507	0.551	0.511	0.578	0.576	0.627	0.648	0.469	0.563	0.578	0.620
Average weight per initial number of larvae (mg)	0.533				0.607		-13.97.		0.558		-4.57.	
Percent reduction from control (%)												

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:

ETS Environmental Testing Solutions, Inc.

Species: ***Pimephales promelas***

PpKClCR Test Number: 255

Survival and Growth Data

Day	750 mg KCl/L				900 mg KCl/L				1050 mg KCl/L			
	M	N	O	P	Q	R	S	T	U	V	W	X
0	10	10	10	10	10	10	10	10	10	10	10	10
1	10	10	10	10	8 2d	7 3d	7 3d	6 4d	3 7d	4 6d	4 6d	4 6d
2	10	10	9 1d	10	8	7	7	6	3	3 1d	4	4
3	10	9 1d	9	10	8	6 1d	7	6	3	3	4	3 1d
4	10	9	9	9 1d	7	6	7	5	2	2	3	3
5	10	9	9	9	7	6	7	5	1 1d	2	2 1d	2 1d
6	10	9	9	9	6 1d	6	7	5	1	2	1 1d	1 1d
7	8 2d	9	9	9	5 1d	6	7	5	1	2 4d	0 1d	0 1d
A = Pan weight (mg) Tray color code:: Purple Analyst: MHF 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: JJS Date: 08.27.12	17.89	19.24	18.31	17.98	17.69	17.28	16.23	17.30	13.36	14.76	— k	
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	— m	
Weight per initial number of larvae (mg) = C / Initial number of larvae Hand calculated. Analyst:	0.477	0.468	0.453	0.512	0.310	0.356	0.405	0.319	0.051	0.158	0	0
Average weight per initial number of larvae (mg)	0.478		10.5%		0.348		34.8%		0.052		90.2%	
Percent reduction from control (%)												

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:

Independent Review by Kelley E. Keenan

Environmental Testing Solutions, Inc.

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

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

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

Concentration (mg/L KCl)	Replicate	Initial number of larvae	Final number of larvae	A = Pan weight (mg)	B = Pan + Larvae weight (mg)	Larvae weight (mg) = A - B	Weight / Surviving number of larvae (mg)	Mean weight/ Surviving number of larvae (mg)	Coefficient of variation (Mean weight per surviving number of larvae) (%)	Weight / Initial number of larvae (mg)	Mean survival (%)	Mean weight/ Initial number of larvae (mg)	Coefficient of variation (%)	Percent reduction from control (%)
Control	A	10	10	13.63	19.27	5.64	0.564	0.533	5.4	0.564	100.0	0.533	5.4	Not applicable
	B	10	10	13.46	18.53	5.07	0.507			0.507				
	C	10	10	14.89	20.40	5.51	0.551			0.551				
	D	10	10	14.13	19.24	5.11	0.511			0.511				
450	E	10	10	13.88	19.66	5.78	0.578	0.607	5.9	0.578	100.0	0.607	5.9	-13.9
	F	10	10	13.43	19.19	5.76	0.576			0.576				
	G	10	10	14.54	20.81	6.27	0.627			0.627				
	H	10	10	15.02	21.50	6.48	0.648			0.648				
600	I	10	9	13.81	18.50	4.69	0.521	0.586	8.2	0.469	95.0	0.558	11.4	-4.5
	J	10	9	14.69	20.32	5.63	0.626			0.563				
	K	10	10	13.62	19.40	5.78	0.578			0.578				
	L	10	10	13.42	19.62	6.20	0.620			0.620				
750	M	10	8	13.12	17.89	4.77	0.596	0.547	7.9	0.477	87.5	0.478	5.2	10.5
	N	10	9	14.56	19.24	4.68	0.520			0.468				
	O	10	9	13.78	18.31	4.53	0.503			0.453				
	P	10	9	12.86	17.98	5.12	0.569			0.512				
900	Q	10	5	14.59	17.69	3.10	0.620	0.607	4.4	0.310	57.5	0.348	12.4	34.8
	R	10	6	13.72	17.28	3.56	0.593			0.356				
	S	10	7	12.18	16.23	4.05	0.579			0.405				
	T	10	5	14.11	17.30	3.19	0.638			0.319				
1050	U	10	1	12.85	13.36	0.51	0.510	0.650	30.5	0.051	7.5	0.052	142.6	90.2
	V	10	2	13.18	14.76	1.58	0.790			0.158				
	W	10	0	0.00	0.00	0.00	0.000			0.000				
	X	10	0	0.00	0.00	0.00	0.000			0.000				

Dunnett's MSD value: 0.0699 MSD = Minimum Significant Difference
PMSD: 13.1 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%.

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

ETS Environmental Testing Solutions, Inc.

Statistical Analyses

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	8/14/2012	Test ID:	PpKClCR	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-02-013	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

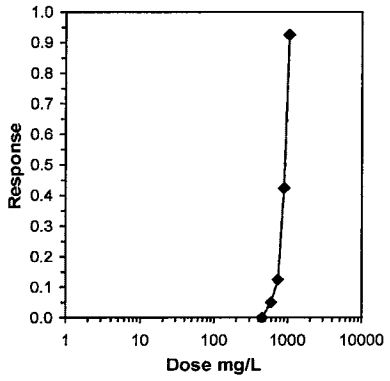
			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
D-Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4			0	40
450	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	4	18.00	10.00	0	40
600	0.9500	0.9500	1.3305	1.2490	1.4120	7.072	4	14.00	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 normal distribution (p > 0.01)	0.93302	0.884	0.39148	0.28113
Equality of variance cannot be confirmed				

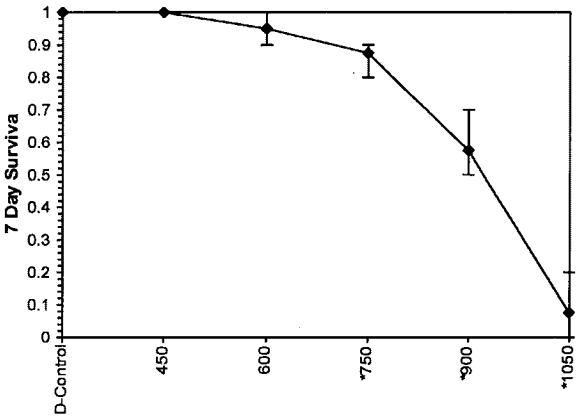
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	600	750	670.82	
Treatments vs D-Control				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%	902.19	867.55	938.21
20.0%	909.49	869.16	951.70
Auto-7.5%	898.26	863.27	934.67



Dose-Response Plot



Independent Review by Kelley E. Keenan Initials:

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

Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	8/14/2012	Test ID:	PpKClCR	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-02-013	Test Species:	PP-Pimephales promelas
Comments:					

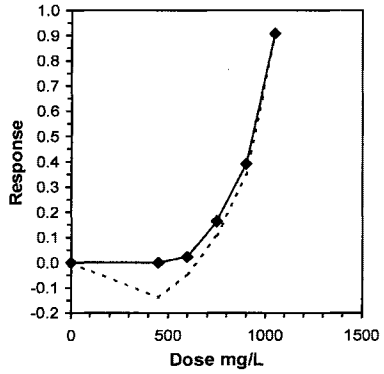
Conc-mg/L	1	2	3	4
D-Control	0.5640	0.5070	0.5510	0.5110
450	0.5780	0.5760	0.6270	0.6480
600	0.4690	0.5630	0.5780	0.6200
750	0.4770	0.4680	0.4530	0.5120
900	0.3100	0.3560	0.4050	0.3190
1050	0.0510	0.1580	0.0000	0.0000

			Transform: Untransformed					1-Tailed			Isotonic	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
D-Control	0.5333	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

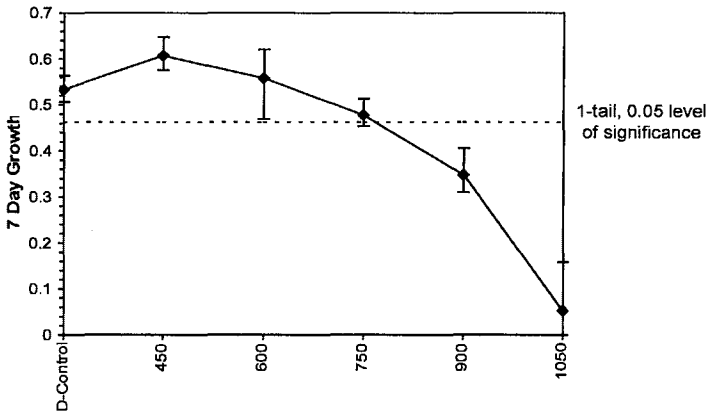
Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					0.94603		0.805		-0.6553	0.58729
Bartlett's Test indicates equal variances (p = 0.40)					1.85289		9.21035			
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Dunnett's Test Treatments vs D-Control	600	>600			0.06992	0.13112	0.00569	0.00206	0.11571	2, 9

Linear Interpolation (200 Resamples)

Point	mg/L	SD	95% CL(Exp)		Skew
IC05	629.55	44.05	422.75	677.99	-1.2511
IC10	683.02	39.17	471.16	745.11	-1.6458
IC15	736.48	32.27	546.98	788.00	-2.5024
IC20	774.58	14.39	725.29	814.40	0.0156
IC25	807.48	14.81	763.34	852.44	0.1502
IC40	902.72	14.24	850.75	928.37	-0.5101
IC50	931.69	9.08	905.24	958.94	0.1578



Dose-Response Plot



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

ETS
Environmental Testing Solutions, Inc.

Species: ***Pimephales promelas*** PpKClCR Test Number: 255

Daily Chemistry:

		Day (Analyst identified for each day, performed pH, D.O. and conductivity measurements only.)					
		0		1		2	
	Analyst	JLB	JLB	JLB	MHF	MHF	MCN
Concentration	Parameter						
CONTROL	pH (S.U.)	7.66	7.44	7.43	7.29	7.55	7.50
	DO (mg/L)	7.7	7.9	7.7	7.9	7.9	7.9
	Conductivity (µmhos/cm)	306		313		310	
	*Alkalinity (mg $CaCO_3$/L)	62		[illegible]		62	
	*Hardness (mg $CaCO_3$/L)	92		[illegible]		88	
	*Temperature (°C)	24.8	24.4	24.8	24.6	24.8	24.5
450 mg KCl/L	pH (S.U.)	7.73	7.53	7.57	7.48	7.66	7.52
	DO (mg/L)	7.7	7.9	7.7	7.9	7.9	7.9
	Conductivity (µmhos/cm)	1070		1090		1070	
	*Temperature (°C)	24.8	24.2	24.7	24.7	24.8	24.5
600 mg KCl/L	pH (S.U.)	7.75	7.57	7.60	7.52	7.70	7.54
	DO (mg/L)	7.7	7.9	7.8	7.9	7.9	7.9
	Conductivity (µmhos/cm)	1330		1360		1350	
	*Temperature (°C)	24.8	24.3	24.6	24.7	24.8	24.7
750 mg KCl/L	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	7.9
	Conductivity (µmhos/cm)	1580		1610		1590	
	*Temperature (°C)	24.8	24.3	24.7	24.7	24.8	24.8
900 mg KCl/L	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	7.9
	Conductivity (µmhos/cm)	1850		1890		1860	
	*Temperature (°C)	24.7	24.3	24.6	24.7	24.8	24.7
1050 mg KCl/L	pH (S.U.)	7.81	7.63	7.68	7.63	7.78	7.57
	DO (mg/L)	7.8	7.9	7.8	8.0	7.9	7.8
	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 1.
Alkalinity and hardness performed by the analyst identified on the bench sheet specific for each analysis and transcribed to this bench sheet by: MHF

Independent Review by Kelley E. Keenan Initials: KK

ETS Environmental Testing Solutions, Inc.

Species: ***Pimephales promelas***

PpKClCR Test Number: 255

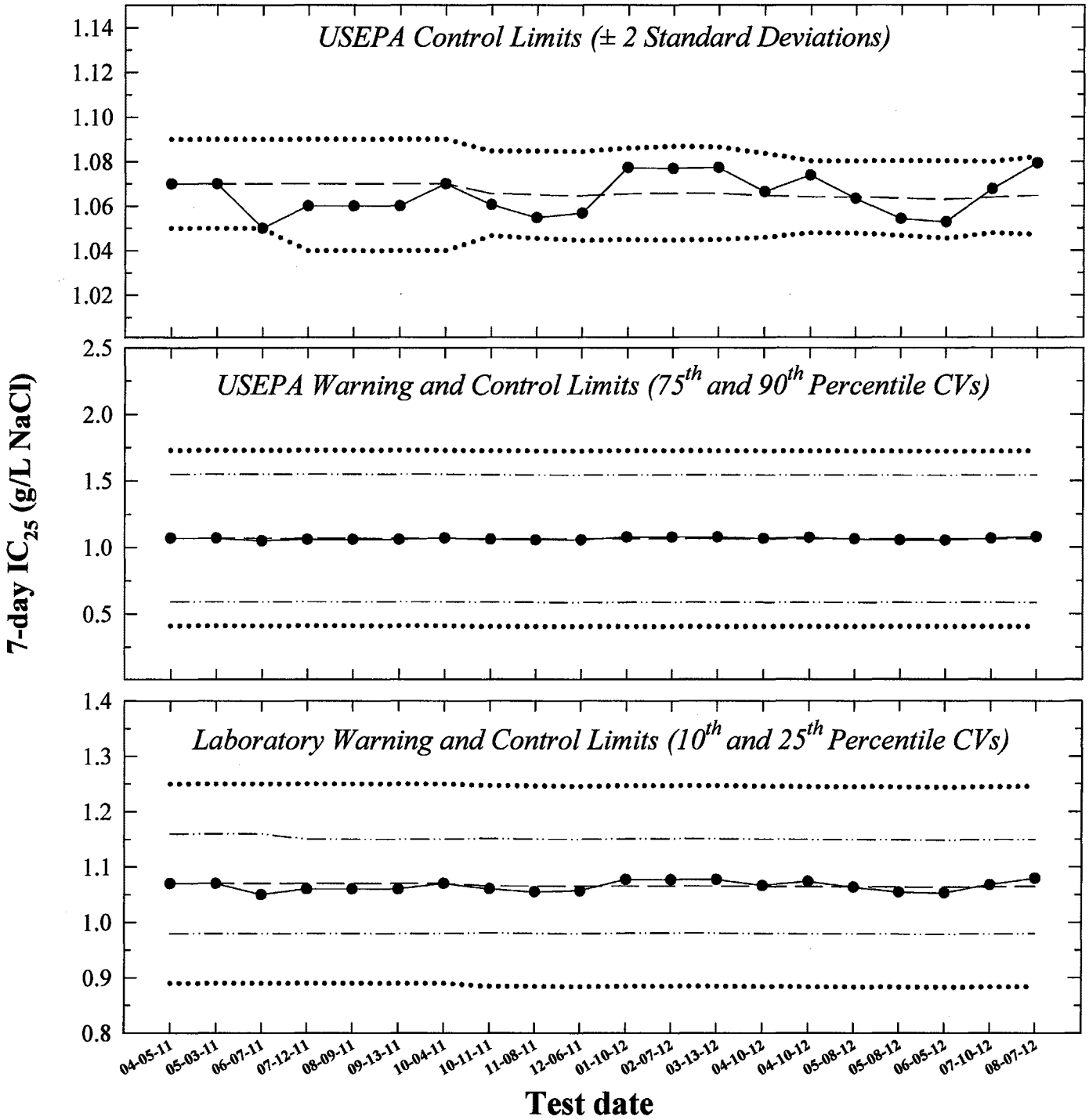
		Day (Analyst identified for each day, performed pH, D.O. and conductivity measurements only.)							
		3		4		5		6	
	Analyst	KLW	JJB	JJB	JJB	JJB	JJB	JJB	JJB
Concentration	**Parameter**								
CONTROL	**pH** (S.U.)	7.49	7.37	7.60	7.37	7.67	7.47	7.44	7.16
	DO (mg/L)	7.6	7.6	7.6	7.5	7.6	7.5	7.6	7.5
	Conductivity (µmhos/cm)	302		315		310		323	
	***Alkalinity** (mg $CaCO_3$/L)	[illegible]		62		[illegible]		[illegible]	
	***Hardness** (mg $CaCO_3$/L)			68					
	***Temperature** (°C)	24.9	24.6	24.8	24.4	24.6	24.7	24.8	24.4
450 mg KCl/L	**pH** (S.U.)	7.66	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
	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
600 mg KCl/L	**pH** (S.U.)	7.70	7.57	7.70	7.51	7.74	7.69	7.71	7.56
	DO (mg/L)	7.6	7.5	7.6	7.4	7.6	7.5	7.6	7.5
	Conductivity (µmhos/cm)	1310		1310		1310		1370	
	***Temperature** (°C)	25.0	24.5	24.8	24.2	24.6	24.8	24.9	24.7
750 mg KCl/L	**pH** (S.U.)	7.70	7.60	7.74	7.52	7.77	7.71	7.75	7.51
	DO (mg/L)	7.7	7.5	7.6	7.3	7.6	7.5	7.7	7.6
	Conductivity (µmhos/cm)	1560		1560		1560		1600	
	***Temperature** (°C)	25.0	24.5	24.8	24.6	24.6	24.7	24.9	24.7
900 mg KCl/L	**pH** (S.U.)	7.70	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
	Conductivity (µmhos/cm)	1800		1820		1800		1860	
	***Temperature** (°C)	25.0	24.5	24.9	24.6	24.6	24.6	24.8	24.5
1050 mg KCl/L	**pH** (S.U.)	7.73	7.63	7.79	7.54	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
	Conductivity (µmhos/cm)	2020		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: JH

Independent Review by Kelley E. Keenan Initials:

Environmental Testing Solutions, Inc.

Ceriodaphnia dubia
Chronic Reference Toxicant Control Chart



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

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

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

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

Independent Review by Kelley E. Keenan Initials: KK

Graphs generated from associated excel spreadsheet.
Excel spreadsheet entered by: J. Sumner
Reviewed by:

ETS
Environmental Testing Solutions, Inc.

Ceriodaphnia dubia
Chronic Reference Toxicant Control Chart

Test number	Test date	7-day IC_{25} (g/L NaCl)	CT (g/L NaCl)	S	State and USEPA Control Limits CT - 2S	State and USEPA Control Limits CT + 2S	$S_{A.10}$	Laboratory Warning Limits CT - $S_{A.10}$	Laboratory Warning Limits CT + $S_{A.10}$	$S_{A.25}$	Laboratory Control Limits CT - $S_{A.25}$	Laboratory Control Limits CT + $S_{A.25}$	$S_{A.75}$	USEPA Warning Limits CT - $S_{A.75}$	USEPA Warning Limits CT + $S_{A.75}$	$S_{A.90}$	USEPA Control Limits CT - $S_{A.90}$	USEPA Control Limits CT + $S_{A.90}$	CV
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 IC_{25}** = 7-day 25% inhibition concentration. An estimation of the concentration of sodium chloride that would cause a 25% reduction in *Ceriodaphnia* reproduction for the test population.

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

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

Laboratory Control and Warning Limits

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

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

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

USEPA Control and Warning Limits

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

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

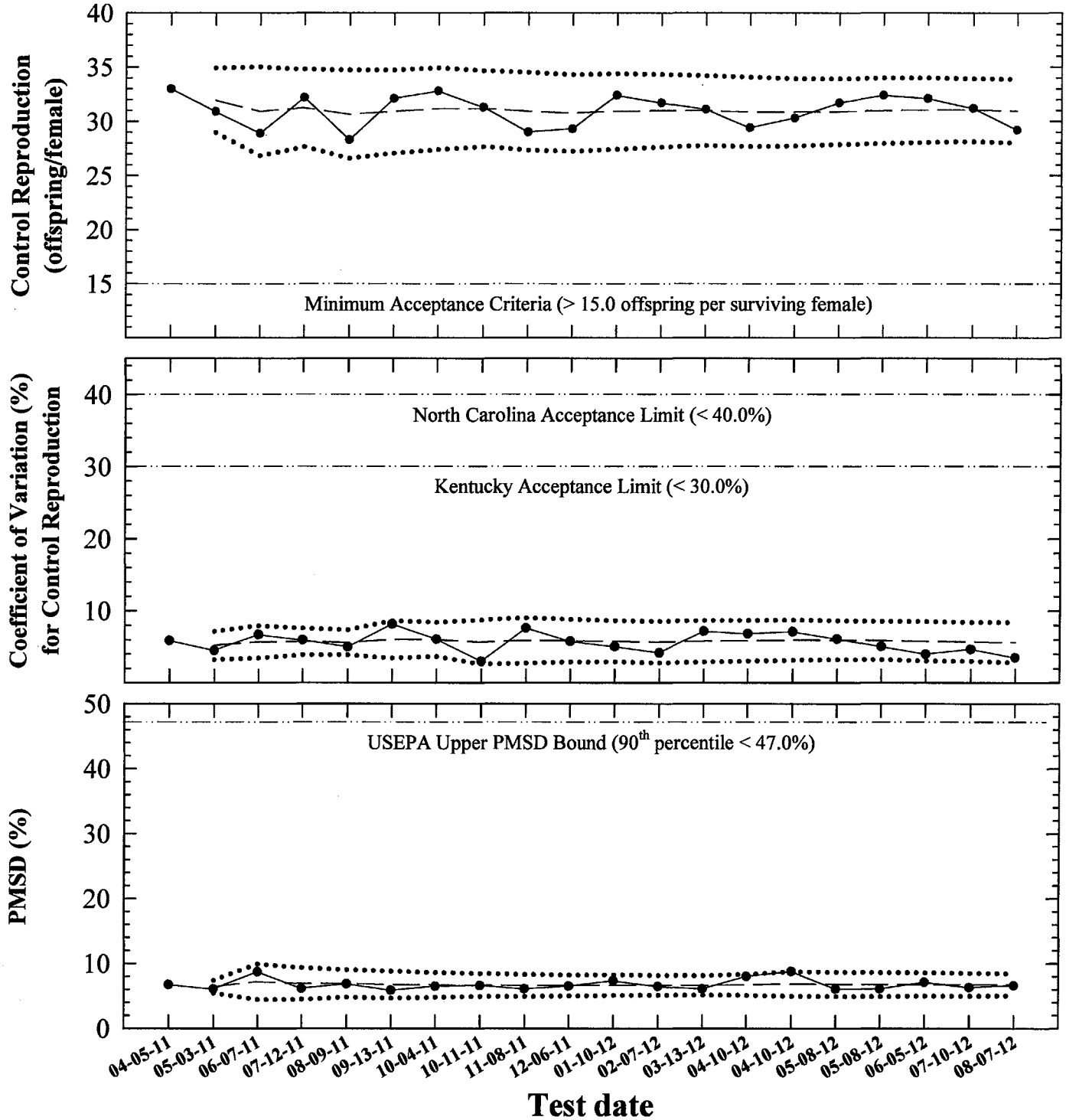
CV = Coefficient of variation of the IC_{25} values.

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

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

Environmental Testing Solutions, Inc.

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)

Independent Review by Kelley E. Keenan Initials:

Graphs generated from associated excel spreadsheet.
Excel spreadsheet entered by: J. Sumner
Reviewed by:

Environmental Testing Solutions, Inc.

Precision of Endpoint Measurements

Ceriodaphnia dubia
Chronic Reference Toxicant Data

Test number	Test date	Control Survival (%)	Control Mean Reproduction (offspring/female)	CT for Control Mean Reproduction (offspring/female)	CV (%)	CT for Control Reproduction CV (%)	MSD	PMSD (%)	CT for PMSD (%)
1	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.

Independent Review by Kelley E. Keenan Initials:

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

ETS Environmental Testing Solutions, Inc.

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

CdNaClCR #: 138

Dilution preparation information:						*Comments:*
NaCl Stock INSS number:		INSS 1076				
Stock preparation:		100 g NaCl/L: Dissolve 50 g NaCl in 500 mL Milli-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-hours old										Randomizing template color:	GOLD
Date and times organisms were born between:	08-07-12 0945 TO 1030										Incubator number and shelf location:	281
Culture board:	07-31-12 A											
Replicate number:	1	2	3	4	5	6	7	8	9	10	YWT batch:	06-19-12
Culture board cup number:	1	2	8	9	10	11	19	20	22	32		
Transfer vessel information:	pH = 7.67 S.U. Temperature = 24.9 °C										*Selenastrum* batch:	07-31-12
Average transfer volume (mL):	0.0327 mL											

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	JH
1	08-08-12	0946	08-03-12 A	JH
2	08-09-12	0945	08-03-12 B	JH
3	08-10-12	0945	08-03-12 B	JH
4	08-11-12	0950	08-08-12	JH
5	08-12-12	0945	08-08-12	JH
6	08-13-12	0945	08-08-12	JH
7	08-14-12	0958		JH

Control information:		Acceptance criteria	*Summary of test endpoints:*	
% of Male Adults:	0%	≤ 20%	7-day LC_{50}	>1400
% Adults having 3rd Broods:	100%	≥ 80%	NOEC	1000
% Mortality:	0%	≤ 20%	LOEC	1200
Mean Offspring/Female:	29.2	≥ 15.0 offspring/female	ChV	1095.5
% CV:	3.5%	< 40.0 %	IC_{25}	1079.3

Independent Review by Kelley E. Keenan Initials: KK

ETS Environmental Testing Solutions, Inc.

Species: *Ceriodaphnia dubia* **CdNaClCR #:** 138

CONTROL ***Survival and Reproduction Data***

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

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

Concentration:	
% Mortality:	0%
Mean Offspring/Female:	29.2

600 mg NaCl/L ***Survival and Reproduction Data***

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

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:	0%
Mean Offspring/Female:	30.2
% Reduction from Control:	-3.47

Species: ***Ceriodaphnia dubia*** **CdNaClCR #:** 138

800 mg NaCl/L ***Survival and Reproduction Data***

Day		Replicate number									
		1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	5	5	4	4	4	5	4	6	6	5
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	11	11	10	11	10	12	10	13	12	10
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	14	14	14	13	13	16	15	17	13	14
Total young produced		30	30	28	28	27	33	29	36	31	29
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

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:	0%
Mean Offspring/Female:	30.1
% Reduction from Control:	-3.1%

1000 mg NaCl/L ***Survival and Reproduction Data***

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

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:	0%
Mean Offspring/Female:	28.4
% Reduction from Control:	2.7%

Independent Review by Kelley E. Keenan Initials:

ETS Environmental Testing Solutions, Inc.

Species: ***Ceriodaphnia dubia*** **CdNaClCR #:** 138

1200 mg NaCl/L ***Survival and Reproduction Data***

Day		Replicate number									
		1	2	3	4	5	6	7	8	9	10
1	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
2	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
3	Young produced	0	0	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
4	Young produced	3	1	2	2	3	2	1	3	3	3
	Adult mortality	L	L	L	L	L	L	L	L	L	L
5	Young produced	7	0	6	4	5	8	5	6	9	5
	Adult mortality	L	L	L	L	L	L	L	L	L	L
6	Young produced	0	9	0	0	0	0	0	0	0	0
	Adult mortality	L	L	L	L	L	L	L	L	L	L
7	Young produced	4	6	5	3	5	2	7	4	4	5
Total young produced		14	16	13	9	13	12	13	13	16	13
Final Adult Mortality		L	L	L	L	L	L	L	L	L	L

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:	0%
Mean Offspring/Female:	13.2
% Reduction from Control:	54.8

1400 mg NaCl/L ***Survival and Reproduction Data***

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

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:	0%
Mean Offspring/Female:	6.0
% Reduction from Control:	79.5%

ETS
Environmental Testing Solutions, Inc.

Verification of *Ceriodaphnia* Reproduction Totals

Control

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

1000 mg NaCl/L

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

600 mg NaCl/L

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

1200 mg NaCl/L

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

800 mg NaCl/L

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

1400 mg NaCl/L

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

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

Environmental Testing Solutions, Inc.

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: CdNaClCR #138

Test dates: August 07-14, 2012

Concentration (mg/L NaCl)	Replicate number										Survival (%)	Average reproduction (offspring/female)	Coefficient of variation (%)	Percent reduction from control (%)
	1	2	3	4	5	6	7	8	9	10				
Control	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: 1.929

PMSD: 6.6

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 (90^{th} 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: _____

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	8/7/2012	Test ID:	CdNaClCR	Sample ID:	REF-Ref Toxicant
End Date:	8/14/2012	Lab ID:	ETS-Envir. Testing Sol.	Sample Type:	NACL-Sodium chloride
Sample Date:		Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-mg/L	1	2	3	4	5	6	7	8	9	10
D-Control	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

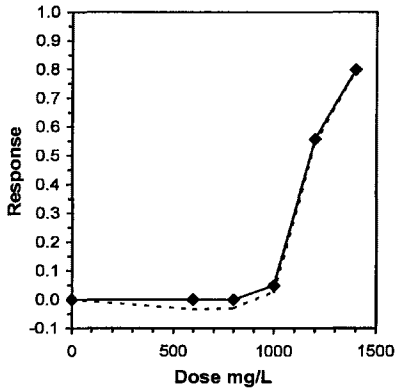
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
D-Control	29.200	1.0000	29.200	28.000	31.000	3.537	10			29.833	1.0000
600	30.200	1.0342	30.200	28.000	33.000	6.005	10	121.00	75.00	29.833	1.0000
800	30.100	1.0308	30.100	27.000	36.000	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 distribution (p <= 0.01)	1.17686	1.035	0.53863	0.89662
Bartlett's Test indicates equal variances (p = 0.14)	8.40619	15.0863		

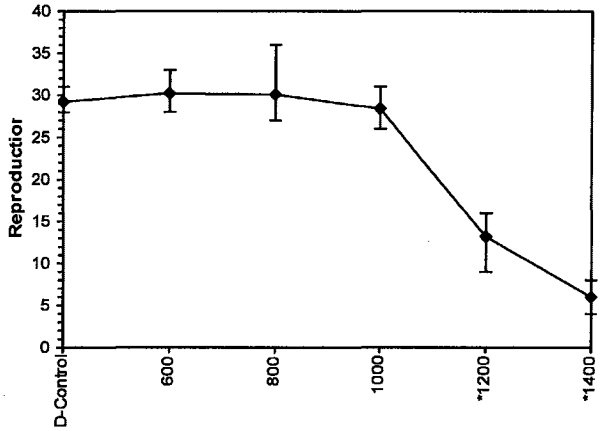
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	1000	1200	1095.45	
Treatments vs D-Control				

Linear Interpolation (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
IC20	1059.65	7.19436	1041.68	1071.64	-0.3336
IC25	1079.28	6.83735	1063.08	1090.45	-0.3157
IC40	1138.16	6.71529	1123.99	1148.74	-0.2616
IC50	1177.41	7.42545	1162.25	1189.63	-0.2048



Dose-Response Plot



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

Independent Review by Kelly E. Keenan Initials:

ETS
Environmental Testing Solutions, Inc.

Statistical Analyses

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	8/7/2012	Test ID:	CdNaCICR	Sample ID:	REF-Ref Toxicant
End Date:	8/14/2012	Lab ID:	ETS-Envir. Testing Sol.	Sample Type:	NACL-Sodium chloride
Sample Date:		Protocol:	FWCHR-EPA-821-R-02-013	Test Species:	CD-Ceriodaphnia dubia
Comments:	**Used for PMSD calculation 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

			Transform: Untransformed						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 variances (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 Treatments vs D-Control	1000	1200	1095.45		1.92879	0.06605	1109.51	3.55741	1.6E-38	5, 54

File: CdNaCICR_080712.xlsx
Entered by: J. Sumner
Reviewed by: _____

Independent Review by Kelley E. Keenan Initials: _____

ETS Environmental Testing Solutions, Inc.

Species: ***Ceriodaphnia dubia*** **CdNaClCR #:** 138

Daily Chemistry:

		Day (Analyst identified for each day, performed pH, D.O. and conductivity measurements only.)					
		0		1		2	
	Analyst	JLB	MHf JLB	MHf JLB	MHf	MHf	MHf
Concentration	Parameter						
CONTROL	pH (S.U.)	7.65	7.62	7.60	7.62	7.60	7.61
	DO (mg/L)	7.7	8.0	7.6	8.0	7.9	7.7
	Conductivity (µmhos/cm)	307		321		301	
	*Alkalinity (mg $CaCO_3$/L)	61		[illegible]		62	
	*Hardness (mg $CaCO_3$/L)	87				87	
	*Temperature (°C)	24.9	25.1	24.9	24.9	24.6	25.2
600 mg NaCl/L	pH (S.U.)	7.76	7.71	7.68	7.76	7.73	7.67
	DO (mg/L)	7.7	8.0	7.9	8.0	8.0	7.7
	Conductivity (µmhos/cm)	1330		1410		1340	
	*Temperature (°C)	24.9	25.1	25.0	24.8	24.7	25.0
800 mg NaCl/L	pH (S.U.)	7.76	7.71	7.70	7.77	7.77	7.69
	DO (mg/L)	7.7	8.0	7.9	8.1	8.0	7.7
	Conductivity (µmhos/cm)	1700		1790		1710	
	*Temperature (°C)	24.9	25.0	25.0	24.8	24.7	25.0
1000 mg NaCl/L	pH (S.U.)	7.77	7.72	7.72	7.78	7.79	7.70
	DO (mg/L)	7.7	8.0	8.0	8.1	8.0	7.7
	Conductivity (µmhos/cm)	2070		2110		2050	
	*Temperature (°C)	25.0	25.0	25.0	25.0	24.7	25.0
1200 mg NaCl/L	pH (S.U.)	7.77	7.74	7.73	7.80	7.80	7.72
	DO (mg/L)	7.7	8.0	8.0	8.1	8.1	7.7
	Conductivity (µmhos/cm)	2410		2500		2430	
	*Temperature (°C)	25.0	25.2	25.0	25.2	24.7	25.1
1400 mg NaCl/L	pH (S.U.)	7.78	7.73	7.72	7.80	7.81	7.72
	DO (mg/L)	7.8	8.1	8.1	8.1	8.1	7.7
	Conductivity (µmhos/cm)	2630		2820		2710	
	*Temperature (°C)	25.0	25.1	25.0	25.0	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: MH.

Independent Review by Kelley E. Keenan Initials:

ETS Environmental Testing Solutions, Inc.

Species: ***Ceriodaphnia dubia***

CdNaClCR #: 138

		Day (Analyst identified for each day, performed pH, D.O. and conductivity measurements only.)							
		3		4		5		6	
	Analyst	MW	JLB	JLB	JLB	JLB	MHF	MHF	JLB
Concentration	**Parameter**								
CONTROL	pH (S.U.)	7.77	7.55	7.65	7.65	7.65	7.58	7.63	7.41
	DO (mg/L)	7.7	8.0	7.7	8.0	7.6	7.9	7.8	7.9
	Conductivity (µmhos/cm)	809		307		303		311	
	*Alkalinity (mg $CaCO_3$/L)			62					
	*Hardness (mg $CaCO_3$/L)			87					
	*Temperature (°C)	24.9	25.2	24.9	24.9	24.8	25.1	24.7	24.9
600 mg NaCl/L	pH (S.U.)	7.72	7.72	7.72	7.82	7.80	7.75	7.70	7.67
	DO (mg/L)	7.7	8.0	8.0	7.8	7.9	7.9	7.8	8.0
	Conductivity (µmhos/cm)	1350		1330		1340		1340	
	*Temperature (°C)	24.9	25.2	24.8	25.0	24.8	24.8	24.7	24.9
800 mg NaCl/L	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	8.0	7.9	8.0	7.9	7.8	7.9
	Conductivity (µmhos/cm)	1720		1710		1730		1750	
	*Temperature (°C)	24.9	25.1	25.0	25.0	24.7	24.8	24.7	24.9
1000 mg NaCl/L	pH (S.U.)	7.77	7.77	7.83	7.87	7.88	7.78	7.80	7.72
	DO (mg/L)	7.7	8.0	8.0	7.8	7.9	8.0	7.9	7.9
	Conductivity (µmhos/cm)	2040		2030		2040		2110	
	*Temperature (°C)	24.9	25.0	25.0	25.1	24.7	24.9	24.7	25.1
1200 mg NaCl/L	pH (S.U.)	7.77	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
	Conductivity (µmhos/cm)	2410		2406		2440		2500	
	*Temperature (°C)	24.9	25.0	25.0	25.1	24.7	24.9	24.7	25.1
1400 mg NaCl/L	pH (S.U.)	7.77	7.80	7.85	7.91	7.91	7.81	7.83	7.79
	DO (mg/L)	7.7	8.0	8.1	7.9	7.9	8.0	7.9	8.1
	Conductivity (µmhos/cm)	2730		2720		2740		2850	
	*Temperature (°C)	25.0	25.0	24.9	25.1	24.8	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: ____.

Independent Review by Kelley E. Keenan Initials:

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

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

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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:

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

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
pH	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 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

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

TN0026450	101 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	10	01	To	12	10	31

MAJOR
(SUBR 01)
F - FINAL
DIFFUSER DISCHARGE
EFFLUENT

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********	36.0	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	********	********	**	********	********	25.4	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	********	********	**	********	********	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. DAILY MAX**	MGD	********	********	********	****		CONTI NUOUS	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 NUOUS	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
Paul R. Simmons Sequoyah Plant Manager	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.	Sequoyah Plant Manager	423	843-6502	12	11	10
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

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

No 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)*

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)*

TN0026450	101 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	10	01	To	12	10	31

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

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	Monitoring Not Required	********	********	23			
TRP3B 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MINIMUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	Monitoring Not Required	********	********	23			
TRP6C 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MIMINUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
Paul R. Simmons Sequoyah Plant Manager	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.	Sequoyah Plant Manager SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-6502	12	11	10
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

Toxicity was not sampled in October 2012.

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

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

TN0026450	103 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	10	01	To	12	10	31

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

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	********	********	**	7	********	8	12	0	19 / 31	GRAB
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
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	Req. Mon. MO AVG	Req. Mon DAILY MX	MGD	********	********	********	**		SEE PERMIT	RCORDR
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
Paul R. Simmons Sequoyah Plant Manager	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.	Sequoyah Plant Manager SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-6502	12	11	10
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	110 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	10	01	To	12	10	31

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

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	**	********	********	REPORT DAILY MX	DEG C		CONTIN UOUS	CALCTD
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 Z 0 INSTREAM MONITORING	PERMIT REQUIREMENT	********	********	**	********	********	30.5 DAILY MX	DEG C		CONTIN UOUS	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 UOUS	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 UOUS	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 UOUS	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
Paul R. Simmons Sequoyah Plant Manager	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.	Sequoyah Plant Manager SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-6502	12	11	10
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

No Discharge this Period

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

Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	110 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	10	01	To	12	10	31

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

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

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

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
Paul R. Simmons Sequoyah Plant Manager	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.	Sequoyah Plant Manager SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-6502	12	11	10
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

No Discharge this Period

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	118 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	10	01	To	12	10	31

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

*** NO DISCHARGE XX ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
OXYGEN, DISSOLVED (DO)	SAMPLE MEASUREMENT	********	********	**		********	********	19			
00300 1 0 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										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
Paul R. Simmons Sequoyah Plant Manager	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.	Sequoyah Plant Manager SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-6502	12	11	10
TYPED OR PRINTED			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.

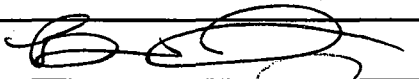
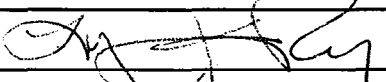
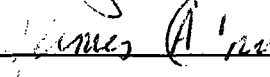
REVIEW/CONCURRENCE SHEET

DOCUMENT NAME: SEQUOYAH NUCLEAR PLANT – October 2012 DMR

ORGANIZATION: Environmental

DOCUMENT PREPARED BY: Brad Love

DATE: 11/09/2012

CONCURRENCES				
Name	R V	C N	Signature - Comment	Date
B.M. Love	X			11/9/12
L.M. Koby	X			11/10/12
J.A. Cross		X		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,

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

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

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Sincerely,

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

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
pH	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.

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

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

TN0026450	101 G
PERMIT NUMBER	DISCHARGE NUMBER

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

MAJOR
(SUBR 01)
F - FINAL
DIFFUSER DISCHARGE
EFFLUENT

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
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 NUOUS	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 NUOUS	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 NUOUS	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 NUOUS	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										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
John T. Carlin Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Site Vice President	423	843-7001	12	12	14
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

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

No 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
September 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)*
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(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)*

TN0026450	101 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

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

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

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	Monitoring Not Required	********	********	23			
TRP3B 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MINIMUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	Monitoring Not Required	********	********	23			
TRP6C 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MIMINUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
John T. Carlin Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Site Vice President SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-7001	12	12	14
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
Toxicity was not sampled in November 2012.

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

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

TN0026450	103 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

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

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

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	********	********	**	7	********	8	12	0	13 / 30	GRAB
00400 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	**	6 MINIMUM	********	9 MAXIMUM	SU		THREE/ WEEK	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	********	********	**	********	8	10	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	********	********	**	********	<6	<6	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	1.254	1.685	03	********	********	********	**	0	30 / 30	RCORDR
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	Req. Mon. MO AVG	Req. Mon DAILY MX	MGD	********	********	********	**		SEE PERMIT	RCORDR
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
John T. Carlin Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Site Vice President	423	843-7001	12	12	14
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

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

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

TN0026450	110 G
PERMIT NUMBER	DISCHARGE NUMBER

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

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

*** NO DISCHARGE [XX] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	**	********	********	REPORT DAILY MX	DEG C		CONTIN UOUS	CALCTD
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 Z 0 INSTREAM MONITORING	PERMIT REQUIREMENT	********	********	**	********	********	30.5 DAILY MX	DEG C		CONTIN UOUS	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 UOUS	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 UOUS	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 UOUS	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
John T. Carlin Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Site Vice President	423	843-7001	12	12	14
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
No Discharge this Period

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	110 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

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

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

*** NO DISCHARGE [XX] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING AVERAGE	QUANTITY OR LOADING MAXIMUM	QUANTITY OR LOADING UNITS	QUALITY OR CONCENTRATION MINIMUM	QUALITY OR CONCENTRATION AVERAGE	QUALITY OR CONCENTRATION MAXIMUM	QUALITY OR CONCENTRATION UNITS	NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
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										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
No Discharge this Period

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	118 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

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

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

*** NO DISCHARGE [XX] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
OXYGEN, DISSOLVED (DO)	SAMPLE MEASUREMENT	********	********	**		********	********	19			
00300 1 0 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										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
John T. Carlin Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Site Vice President	423	843-7001	12	12	14
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
During this reporting period, there has been no flow from the Dredge Pond other than that resulting from rainfall.

S58 130107 800 – NPDES CORRESPONDENCE

January 7, 2013

*Ms. Chris*tina 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
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

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

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Sincerely,

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

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 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

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

TN0026450	101 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	12	01	To	12	12	31

MAJOR
(SUBR 01)
F - FINAL
DIFFUSER DISCHARGE
EFFLUENT

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING AVERAGE	QUANTITY OR LOADING MAXIMUM	QUANTITY OR LOADING UNITS	QUALITY OR CONCENTRATION MINIMUM	QUALITY OR CONCENTRATION AVERAGE	QUALITY OR CONCENTRATION MAXIMUM	QUALITY OR CONCENTRATION UNITS	NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********	27.6	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	********	********	**	********	********	15.4	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	********	********	**	********	********	3	04	0	31 / 31	CALCTD
00016 1 1 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	********	********	**5 DAILY MX**	DEG. C.		CONTI NUOUS	CALCTD
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	********	1534	03	********	********	********	**	0	31 / 31	RCORDR
50050 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	**Req. Mon. DAILY MAX**	MGD	********	********	********	****		CONTI NUOUS	RCORDR
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	********	********	**	********	0.020	0.037	19	0	14 / 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	********	1	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										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
John T. Carlin Site Vice President	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	Site Vice President SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	843-7001	13	01	07
TYPED OR PRINTED			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 0.051mg/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
September 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
12/12/2012	0	0	11	12/12/2012	0	11	1-ISV-24-1234		WAW
12/18/2012	0	0	24.6	12/18/2012	0	24.6	1-25-545		CR

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

ATTN: Brad Love

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

TN0026450	101 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	12	01	To	12	12	31

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

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	Monitoring Not Required	********	********	23			
TRP3B 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MINIMUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	Monitoring Not Required	********	********	23			
TRP6C 1 0 EFFLUENT GROSS	PERMIT REQUIREMENT	********	********	****	43.2 MIMINUM	********	********	PERCENT		SEMI ANNUAL	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
Toxicity was not sampled in December 2012.

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

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

TN0026450	103 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	12	01	To	12	12	31

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

*** NO DISCHARGE ☐ ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	********	********	**	7	********	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	Req. Mon DAILY MX	MGD	********	********	********	**		SEE PERMIT	RCORDR
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

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

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	110 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From	12	12	01	To	12	12	31

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

*** NO DISCHARGE [XX] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	**	********	********	REPORT DAILY MX	DEG C		CONTIN UOUS	CALCTD
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	********	********	**	********	********		04			
00010 Z 0 INSTREAM MONITORING	PERMIT REQUIREMENT	********	********	**	********	********	30.5 DAILY MX	DEG C		CONTIN UOUS	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 UOUS	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 UOUS	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 UOUS	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
No Discharge this Period

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	110 T
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	12	01	To	12	12	31

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

*** NO DISCHARGE [XX] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

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

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

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
No Discharge this Period

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
Name TVA - SEQUOYAH NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE 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)*

TN0026450	118 G
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
From	12	12	01	To	12	12	31

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

*** NO DISCHARGE [XX] ***

Form Approved.
OMB No. 2040-0004

NOTE: Read instructions before completing this form.

PARAMETER		QUANTITY OR LOADING AVERAGE	QUANTITY OR LOADING MAXIMUM	QUANTITY OR LOADING UNITS	QUALITY OR CONCENTRATION MINIMUM	QUALITY OR CONCENTRATION AVERAGE	QUALITY OR CONCENTRATION MAXIMUM	QUALITY OR CONCENTRATION UNITS	NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
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										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
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TYPED OR PRINTED			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.

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	C N	Signature - Comment	Date
B.M. Love	X			1/4/13 1/4/13
L.M. Koby	X			1/4/13
J.A. Cross		X		1/7/13

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.