



Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37379-2000

October 11, 2001

State of Tennessee
Department of Environment and Conservation
Division of Water Pollution Control
401 Church Street, 6th Floor Annex
Nashville, Tennessee 37243-1534

Attention: Ms. Evelyn Haskin, Enforcement & Compliance

Dear Ms. Haskin:

TENNESSEE VALLEY AUTHORITY - DISCHARGE MONITORING REPORT FOR
SEQUOYAH NUCLEAR PLANT (SQN)

Please find enclosed the Discharge Monitoring Report (DMR) of September 2001 for SQN. Please contact me at (423) 843-6700 if you have any questions or comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Diedre B. Nida".

Diedre B. Nida
Environmental Supervisor
Signatory Authority
for Richard T. Purcell
Vice President
Sequoyah Nuclear Plant

Enclosures: 2 (original & copy)
cc (Enclosure):

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

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

IE25

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

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

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16)

(17-19)

TN0026450
 PERMIT NUMBER

101 G
 DISCHARGE NUMBER

MAJOR

(SUBR 01)

F - FINAL

DIFFUSER DISCHARGE

EFFLUENT

*** NO DISCHARGE ☐ ***

Form Approved.

OMB No. 2040-0004

Approval expires 05-31-98

MONITORING PERIOD
 From

YEAR	MO	DAY
01	09	01

 To

YEAR	MO	DAY
01	09	30

 (20-21) (22-23) (24-25) (26-27) (28-29) (30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only (46-53) QUANTITY OR LOADING (54-61)			(4 Card Only (38-45) QUALITY OR CONCENTRATION (46-53) (54-61)				NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE, WATER DEG. CENTIGRADE 00010 Z 0 0 INSTREAM MONITORING	SAMPLE MEASUREMENT	*****	*****	**	*****	*****	28.5	(04)	0	30 / 30	MODEL
	PERMIT REQUIREMENT	*****	*****	****	*****	*****	30.5 DAILY MX	DEG. C.		SEE PERMIT	CK REQ
TEMPERATURE, WATER DEG. CENTIGRADE 00010 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	**	*****	*****	41.8	(04)	0	30 / 30	RCORDR
	PERMIT REQUIREMENT	*****	*****	****	*****	*****	REPORT DAILY MX	DEG. C.		SEE PERMIT	CK REQ
PH 00400 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	**	7.2	*****	7.5	(12)	0	8 / 30	GRAB
	PERMIT REQUIREMENT	*****	*****	****	6.0 MINIMUM	*****	9.0 MAXIMUM	SU		WEEKLY	GRAB
SOLIDS, TOTAL SUSPENDED 00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	**	*****	5	6	(19)	0	4 / 30	GRAB
	PERMIT REQUIREMENT	*****	*****	****	*****	30 MO AVG	100 DAILY MX	MG/L		WEEKLY	GRAB
OIL AND GREASE 00556 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	**	*****	<5	<5	(19)	0	4 / 30	GRAB
	PERMIT REQUIREMENT	*****	*****	****	*****	15 MO AVG	20 DAILY MX	MG/L		WEEKLY	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	1712	(03)	*****	*****	*****	**	0	30 / 30	RCORDR
	PERMIT REQUIREMENT	*****	REPORT DAILY MX	MGD	*****	*****	*****	****		CONTIN UOUS	RCORDR
CHLORINE, TOTAL RESIDUAL 50060 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	**	*****	<0.008	<0.020	(19)	0	45 / 30	GRAB
	PERMIT REQUIREMENT	*****	*****	****	*****	0.036	0.058 INST MAX	MG/L		WEEK- DAYS	CALCTD

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. §1001 AND 33 U.S.C. §1319. (Penalties under these statutes may include fines up to \$10,000 and or maximum imprisonment of between 6 months and 5 years.)	TELEPHONE		DATE		
Richard T. Purcell Site Vice President		423	843-6700	01	10	11
TYPED OR PRINTED		AREA CODE	NUMBER	YEAR	MO	DAY

Diedre B. Nida
 Environmental Supervisor

SIGNATURE OF PRINCIPAL EXECUTIVE
 OFFICER OR AUTHORIZED AGENT

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

No closed mode operation. The following injections occurred: 1. PCL-222(max. calc. conc. was 0.06 mg/L--limit 0.100mg/L) 2. CL-363(max. calc. conc. was 0.011 mg/L--limit 0.100mg/L) 3. PCL 222/401 (max. calc. conc. was 0.021 mg/L--limit 0.100mg/L) 4. H-130M(max. calc. conc. was 0.021 mg/L--limit 0.050mg/L)

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

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(INTEROFFICE SB-2A)
SODDY - DAISY TN 37384
 Facility TVA - SEQUOYAH NUCLEAR PLANT
 Location HAMILTON COUNTY

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16)

(17-19)

TN0026450

PERMIT NUMBER

101 G

DISCHARGE NUMBER

MAJOR

(SUBR 01)

F - FINAL

DIFFUSER DISCHARGE

EFFLUENT

*** NO DISCHARGE ☐ ***

Form Approved.

OMB No. 2040-0004

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MONITORING PERIOD
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PARAMETER (32-37)		(3 Card Only (46-53))			(4 Card Only (38-45))				NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TEMPERATURE - C, RATE OF CHANGE 82234 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	**	*****	*****	0.1	(04)	0	30 / 30	CALCTD
	PERMIT REQUIREMENT	*****	*****	****	*****	*****	2.0	DEG. C.			CALCTD
TEMP. DIFF. BETWEEN SAMP. & UPSTRM DEG.C 00016 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	**	*****	*****	2.4	(04)	0	30 / 30	CALCTD
	PERMIT REQUIREMENT	*****	*****	****	*****	*****	3.0	DEG. C.			CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
BORON, TOTAL 01022 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	**	<0.2	<0.2	<0.2	(19)	0	1 / 30	GRAB
	PERMIT REQUIREMENT	*****	*****	****	REPORT	REPORT	REPORT	MG/L			GRAB
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. §1001 AND 33 U.S.C. §1319. (Penalties under these statutes may include fines up to \$10,000 and or maximum imprisonment of between 6 months and 5 years.)	TELEPHONE		DATE			
Richard T. Purcell		423	843-6700	01	10	11	
Site Vice President		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		AREA CODE	NUMBER	YEAR	MO

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

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)
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(INTEROFFICE SB-2A)
SODDY - DAISY TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)
(2-16) (17-19)
TN0026450 101 T
PERMIT NUMBER DISCHARGE NUMBER

MAJOR (SUBR 01)
F - FINAL
DIFFUSER DISCHARGE
EFFLUENT

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

MONITORING PERIOD
From YEAR 01 MO 07 DAY 01 To YEAR 01 MO 09 DAY 30
(20-21) (22-23) (24-25) (26-27) (28-29) (30-31)

*** NO DISCHARGE ☐ ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only (46-53) QUANTITY OR LOADING (54-61)			(4 Card Only (38-45) QUALITY OR CONCENTRATION (46-53) (54-61)				NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
IC25 STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	*****	*****	**	>100	*****	*****	(23)	0	1 / 92	GRAB
TRP3B 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	43.9 MINIMUM	*****	*****	PERCENT		QUART- ERLY	GRAB
IC25 STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	*****	*****	**	>100	*****	*****	(23)	0	1 / 92	GRAB
TRP6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	43.9 MINIMUM	*****	*****	PERCENT		QUART- ERLY	GRAB
	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	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. §1001 AND 33 U.S.C. §1319. (Penalties under these statutes may include fines up to \$10,000 and or maximum imprisonment of between 6 months and 5 years.)	TELEPHONE		DATE		
Richard T. Purcell		423	843-6700	01	10	11
Site Vice President		AREA CODE	NUMBER	YEAR	MO	DAY
TYPED OR PRINTED	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT					

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
Toxicity composite samples were obtained from 8/26/01 @ 1048 thru 8/27/01 @ 0948 ;and 8/28/01 @ 0951 thru 8/29/01 @ 0853 ;and 8/30/01 @ 1430 thru 8/31/01 @ 1330.The toxicity report is attached to the September 2001 DMR.

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)
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SODDY - DAISY TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)
(2-16) (17-19)
TN0026450 103 G
PERMIT NUMBER DISCHARGE NUMBER

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

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

MONITORING PERIOD
From YEAR 01 MO 09 DAY 01 To YEAR 01 MO 09 DAY 30
(20-21) (22-23) (24-25) (26-27) (28-29) (30-31)

*** NO DISCHARGE ☐ ***

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PARAMETER (32-37)		QUANTITY OR LOADING (3 Cord Only (46-53) (54-61))			QUALITY OR CONCENTRATION (4 Cord Only (38-45) (46-53) (54-61))				NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	*****	*****	**	7.2	*****	8.9	(12)	0	12 / 30	GRAB
00400 1 0 0	PERMIT REQUIREMENT	*****	*****	**	6.0 MINIMUM	*****	9.0 MAXIMUM	SU		THREE/ WEEK	GRAB
EFFLUENT GROSS VALUE											
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	64	110	(26)	*****	7	11	(19)	0	4 / 30	GRAB
00530 1 0 0	PERMIT REQUIREMENT	380 MO AVG	1250 DAILY MX	LBS/DY	*****	30 MO AVG	100 DAILY MX	MG/L		WEEKLY	GRAB
EFFLUENT GROSS VALUE											
OIL AND GREASE	SAMPLE MEASUREMENT	<47	<50	(26)	*****	<5	<5	(19)	0	4 / 30	GRAB
00556 1 0 0	PERMIT REQUIREMENT	190 MO AVG	250 DAILY MX	LBS/DY	*****	15 MO AVG	20 DAILY MX	MG/L		WEEKLY	GRAB
EFFLUENT GROSS VALUE											
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	1.084	1.201	(03)	*****	*****	*****	**	0	30 / 30	TOTAL
50050 1 0 0	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	*****	*****	*****	**		DAILY	TOTAL
EFFLUENT GROSS VALUE											
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. §1001 AND 33 U.S.C. §1319. (Penalties under these statutes may include fines up to \$10,000 and or maximum imprisonment of between 6 months and 5 years.)	TELEPHONE		DATE		
Richard T. Purcell		423	843-6700	01	10	11
Site Vice President				YEAR	MO	DAY
TYPED OR PRINTED		AREA CODE	NUMBER			

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

Richard B. Nida
Environmental Supervisor

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

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR) (17-19)
TN0026450 107 G
PERMIT NUMBER DISCHARGE NUMBER

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

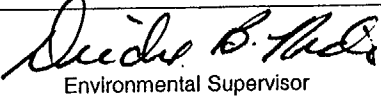
Form Approved.
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MONITORING PERIOD
From YEAR MO DAY To YEAR MO DAY
01 09 01 01 09 30
(20-21) (22-23) (24-25) (26-27) (28-29) (30-31)

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PARAMETER (32-37)		(3 Card Only (46-53) QUANTITY OR LOADING (54-61)			(4 Card Only (38-45) QUALITY OR CONCENTRATION (46-53) (54-61)				NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	*****	*****	**		*****		(12)			
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	6.0 MINIMUM	*****	9.0 MAXIMUM	SU		DAILY	GRAB
PHOSPHORUS, TOTAL (AS P)	SAMPLE MEASUREMENT	*****	*****	**		*****		(19)			
00665 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	*****	*****	1.0 DAILY MX	MG/L		DAILY	COMP-8
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*****	*****	**		*****		(19)			
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	*****	*****	30 DAILY MX	MG/L		DAILY	COMP-8
OIL AND GREASE	SAMPLE MEASUREMENT	*****	*****	**		*****		(19)			
00556 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	*****	*****	15 DAILY MX	MG/L		DAILY	GRAB
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT	*****	*****	**		*****		(19)			
01042 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	*****	*****	1.0 DAILY MX	MG/L		DAILY	COMP-8
IRON, TOTAL (AS FE)	SAMPLE MEASUREMENT	*****	*****	**		*****		(19)			
01045 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	*****	*****	1.0 DAILY MX	MG/L		DAILY	COMP-8
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			(03)				**			
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD				****		DAILY	CALCTD

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. §1001 AND 33 U.S.C. §1319. (Penalties under these statutes may include fines up to \$10,000 and or maximum imprisonment of between 6 months and 5 years.)	 Environmental Supervisor	TELEPHONE		DATE		
Richard T. Purcell			423	843-6700	01	10	11
Site Vice President			AREA CODE	NUMBER	YEAR	MO	DAY
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT					

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

No phosphate bearing chemicals were employed. No Discharge this Period

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)
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(INTEROFFICE SB-2A)
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Location HAMILTON COUNTY

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)
(2-16) (17-19)
TN0026450 110 G
PERMIT NUMBER DISCHARGE NUMBER

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

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

MONITORING PERIOD
From YEAR MO DAY To YEAR MO DAY
01 09 01 01 09 30
(20-21) (22-23) (24-25) (26-27) (28-29) (30-31)

*** NO DISCHARGE ☒ ***

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ATTN: Diedre B. Nida

PARAMETER (32-37)		(3 Card Only (46-53)) QUANTITY OR LOADING (54-61)			(4 Card Only (38-45)) QUALITY OR CONCENTRATION (46-53) (54-61)				NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	*****	*****	**		*****		(12)			
00400 1 0 0	PERMIT REQUIREMENT	*****	*****	***	6.0 MINIMUM	*****	9.0 MAXIMUM	SU		DAILY	GRAB
EFFLUENT GROSS VALUE											
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		(19)			
00530 1 0 0	PERMIT REQUIREMENT	*****	*****	***	*****	*****	30 DAILY MX	MG/L		DAILY	GRAB
EFFLUENT GROSS VALUE											
OIL AND GREASE	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		(19)			
00556 1 0 0	PERMIT REQUIREMENT	*****	*****	***	*****	*****	15 DAILY MX	MG/L		DAILY	GRAB
EFFLUENT GROSS VALUE											
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		(19)			
01042 1 0 0	PERMIT REQUIREMENT	*****	*****	***	*****	*****	1.0 DAILY MX	MG/L		DAILY	GRAB
EFFLUENT GROSS VALUE											
IRON, TOTAL (AS FE)	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		(19)			
01045 1 0 0	PERMIT REQUIREMENT	*****	*****	***	*****	*****	1.0 DAILY MX	MG/L		DAILY	GRAB
EFFLUENT GROSS VALUE											
PHOSPHORUS, TOTAL (AS P)	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		(19)			
00665 1 0 0	PERMIT REQUIREMENT	*****	*****	***	*****	*****	1.0 DAILY MX	MG/L		DAILY	GRAB
EFFLUENT GROSS VALUE											
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			(03)	*****	*****	*****	**			
50050 1 0 0	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	*****	*****	*****	***		DAILY	GRAB
EFFLUENT GROSS VALUE											

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. §1001 AND 33 U.S.C. §1319. (Penalties under these statutes may include fines up to \$10,000 and or maximum imprisonment of between 6 months and 5 years.)	TELEPHONE		DATE		
Richard T. Purcell		423	843-6700	01	10	11
Site Vice President		AREA CODE	NUMBER	YEAR	MO	DAY
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT				

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
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(INTEROFFICE SB-2A)
SODDY - DAISY TN 37384
Facility TVA - SEQUOYAH NUCLEAR PLANT
Location HAMILTON COUNTY

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)
(2-16) (17-19)

TN0026450 118 G
PERMIT NUMBER DISCHARGE NUMBER

MAJOR
(SUBR 01)

F - FINAL
WASTEWATER & STORM WATER
EFFLUENT

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

MONITORING PERIOD
From YEAR MO DAY To YEAR MO DAY
01 09 01 01 09 30
(20-21) (22-23) (24-25) (26-27) (28-29) (30-31)

*** NO DISCHARGE ☒ ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only (46-53))			(4 Card Only (38-45))				NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
OXYGEN, DISSOLVED (DO) 00300 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	**		*****	*****	(19)			
	PERMIT REQUIREMENT	*****	*****	****	2.0 DAILY MN	*****	*****	MG/L		TWICE/ WEEK	GRAB
SOLIDS, TOTAL SUSPENDED 00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		(19)			
	PERMIT REQUIREMENT	*****	*****	****	*****	*****	100 DAILY MX	MG/L		TWICE/ WEEK	GRAB
SOLIDS, SETTLEABLE 00545 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	**	*****	*****		(25)			
	PERMIT REQUIREMENT	*****	*****	****	*****	*****	1.0 DAILY MX	ML/L		ONCE/ MONTH	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT			(03)	*****	*****	*****	**			
	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	*****	*****	*****	*		ONCE/ BATCH	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. §1001 AND 33 U.S.C. §1319. (Penalties under these statutes may include fines up to \$10,000 and or maximum imprisonment of between 6 months and 5 years.)	TELEPHONE		DATE		
Richard T. Purcell		423	843-6700	01	10	11
Site Vice President		AREA CODE	NUMBER	YEAR	MO	DAY
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT				

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. No Discharge this Period

**TENNESSEE VALLEY AUTHORITY
TOXICITY TEST REPORT**

INTRODUCTION/EXECUTIVE SUMMARY

- 1) Facility/Discharger: Sequoyah Nuclear Plant/TVA Report Date: October 3, 2001
- 2) County/State: Hamilton/Tennessee 3) NPDES Permit #: TN0026450
- 4) Type of Facility: Nuclear-fueled electric generating plant
- 5) Design Flow (MGD): 1531.84
- 6) Receiving Stream: Tennessee River (TRM 483.65) 7) 1Q10: 3491
- 8) Outfall Tested: 101 9) Dates Sampled: 08/27-31/01
- 10) Average flows on day(s) sampled were collected (MGD): 1649, 1644, 1641
- 11) Pertinent site conditions: No unusual conditions reported.*
- 12) Test Dates: 08/28-09/04/01 13) Test Type: Short-term Chronic-definitive
- 14) Test Species: Fathead Minnows (*Pimephales promelas*)
Daphnids (*Ceriodaphnia dubia*)
- 15) Concentrations Tested (%): Outfall 101 10.98 22 43.9 72 100
Intake 100
- 16) Permit Limit Endpoint (%): Outfall 101 IC₂₅ = 43.9
- 17) Test Results (%): Outfall 101
Pimephales promelas: IC₂₅ > 100
Ceriodaphnia dubia: IC₂₅ > 100
- 18) Facility Contact: Diedre B. Nida 19) Phone #: (423) 843-6700
- 20) Consultant/Testing Lab Name: S&ME Inc.
- 21) Lab Contact: Leira S. Douthat Phone #: (865)-970-0003
- 22) TVA Contact: Cynthia L. Russell Phone #: (256) 386-2755
- 23) Notes: Samples collected from the Sequoyah Nuclear Plant Outfall 101 did not exhibit toxicity to either *Pimephales promelas* or *Ceriodaphnia dubia*. The resulting IC₂₅ values for both species were > 100 percent, permit limit = 43.9 percent.

*Production/operation data will be provided in the event toxicity exceeds permit limits/upon request.

Growth of fathead minnows exposed to intake samples was significantly less than the control based on Homoscedastic t-Test. Daphnids showed no effect when exposed to intake samples.

METHODS SUMMARY

Samples

- 1) Sampling Point: Outfall 101
- 2) Sample Type: Composite
- 3) Sample Information:

ID	Date/Time Collected (MM-DD/Time)	Date/Time Received (MM-DD/Time)	Arrival Temp. (°C)	Initial TRC* (mg/L)	Date/Time Used By (MM-DD/Time)
101	08/26/1048	08/27/0948	2.1	0.08	08/28/1300
	08/26/1130	08/27/1030	1.9	0.09	08/29/1355
Intake	08/26/1130	08/27/1030	1.9	0.09	08/28/1300
	08/26/1130	08/27/1030	1.9	0.09	08/29/1355
101	08/28/0951	08/29/0853	1.9	0.05	08/30/1255
	08/28/1011	08/29/0911	0.8	0.05	08/31/1245
Intake	08/28/1011	08/29/0911	0.8	0.05	08/30/1255
	08/28/1011	08/29/0911	0.8	0.05	08/31/1245
101	08/30/1429	08/31/1329	0.9	0.08	09/01/1240
	08/30/1502	08/31/1402	0.8	0.12	09/02/1320
Intake	08/30/1502	08/31/1402	0.8	0.12	09/03/1330
	08/30/1502	08/31/1402	0.8	0.12	09/01/1240
	08/30/1502	08/31/1402	0.8	0.12	09/02/1320
	08/30/1502	08/31/1402	0.8	0.12	09/03/1330

*Total residual chlorine.

- 4) Sample manipulation: Daily samples warmed to $25 \pm 1^\circ\text{C}$

Test Organisms

	<i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>
1) Source:	<u>In-house Culture</u>	<u>In-house Culture</u>
2) Age:	<u>< 24 hours</u>	<u>< 24 hours</u>

Test Method Summary (See Appendix A for additional information)

	<i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>
1) Test Conditions	<u>Static, renewal</u>	<u>Static, renewal</u>
2) Test Duration	<u>7 days</u>	<u>Until at least 60% of control females have 3 broods</u>
3) Dilution/Control Water	<u>Moderately hard water and trace minerals</u>	<u>25% Dilute minerals water and trace minerals</u>
4) Number Replicates	<u>4</u>	<u>10</u>
5) Animals per Replicate	<u>10</u>	<u>1</u>
6) Test Initiation (Date/Time)	<u>08/28/1245 EDT</u>	<u>08/28/1330 EDT</u>
7) Test Termination (Date/Time)	<u>09/04/1305 EDT</u>	<u>09/04/1415 EDT</u>
8) Test Temperature	Mean = <u>25.5°C</u> (<u>24.8 - 26.0°C</u>)	Mean = <u>25.6°C</u> (<u>24.9°C - 26.0°C</u>)
9) Physical/Chemical Measurements:	Hardness, alkalinity, total residual chlorine, and conductivity were measured at the laboratory in each 100 percent sample. Daily temperatures were measured in one replication per test concentration. Pre- and post-exposure test solutions were analyzed daily for pH and dissolved oxygen.	
10) Statistics:	Toxcalc software Version 5.0 was used for statistical analyses.	

TOXICITY TEST RESULTS (See Appendix C for Bench Sheets)

1) Results of a Pimephales promelas Chronic/ 7-d Toxicity Test
(Genus) (Species) (Type/Duration)

Conducted 08/28/01 - 09/04/01 Using Effluent From Outfall 101.
(mm/dd/yy) (mm/dd/yy) (number)

Test Solutions	Percent Surviving (time intervals used – days)						
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4*</u>	<u>5</u>	<u>6</u>	<u>7</u>
Control	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
10.98% Effluent	<u>100</u>	<u>100</u>	<u>98</u>	<u>98</u>	<u>98</u>	<u>98</u>	<u>98</u>
22% Effluent	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
44% Effluent	<u>100</u>	<u>98</u>	<u>98</u>	<u>98</u>	<u>98</u>	<u>98</u>	<u>98</u>
72% Effluent	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>98</u>	<u>98</u>	<u>98</u>
100% Effluent	<u>100</u>	<u>100</u>	<u>98</u>	<u>98</u>	<u>95</u>	<u>95</u>	<u>95</u>
Intake	<u>100</u>	<u>100</u>	<u>100</u>	<u>98</u>	<u>90</u>	<u>90</u>	<u>90</u>
*96-Hour LC ₅₀ Value: <u>> 100%</u>			Calculated TU Estimates [†] : <u>< 1.0 TUa</u>				
95% Confidence Limits Upper Limit <u>NA</u> Lower Limit <u>NA</u>			Permit Limit: <u>1.0 TUa</u>				

Test Solutions	IC ₂₅ Mean Dry Weight (mg) (Replication)				
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>Mean</u>
Control	<u>0.734</u>	<u>0.726</u>	<u>0.775</u>	<u>0.756</u>	<u>0.748</u>
10.98% Effluent	<u>0.725</u>	<u>0.701</u>	<u>0.739</u>	<u>0.766</u>	<u>0.733</u>
22% Effluent	<u>0.862</u>	<u>0.759</u>	<u>0.733</u>	<u>0.685</u>	<u>0.760</u>
44% Effluent	<u>0.669</u>	<u>0.803</u>	<u>0.723</u>	<u>0.650</u>	<u>0.711</u>
72% Effluent	<u>0.635</u>	<u>0.755</u>	<u>0.730</u>	<u>0.676</u>	<u>0.699</u>
100% Effluent	<u>0.665</u>	<u>0.629</u>	<u>0.794</u>	<u>0.651</u>	<u>0.685</u>
Intake	<u>0.498</u>	<u>0.727</u>	<u>0.595</u>	<u>0.687</u>	<u>0.627</u>
IC ₂₅ Value: <u>> 100%</u>			Calculated TU Estimates [†] : <u>< 1.0 TUc</u>		
95% Confidence Limits Upper Limit = <u>NA</u> Lower Limit = <u>NA</u>			Permit Limit: <u>1.0 TUc</u>		

[†]NOTE: TUa = 100/LC₅₀; TUc = 100/ IC₂₅

2) Results of a Ceriodaphnia dubia Chronic/ 7 day (3-brood) Toxicity Test
(Genus) (Species) (Type/Duration)

Conducted 08/28/01 - 09/04/01 Using Effluent From Outfall 101
(mm/dd/yy) (mm/dd/yy) (number)

Test Solutions	Percent Surviving (time intervals used – days)						
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4*</u>	<u>5</u>	<u>6</u>	<u>7</u>
Control	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
10.98% Effluent	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
22% Effluent	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
44% Effluent	<u>100</u>	<u>90</u>	<u>90</u>	<u>90</u>	<u>90</u>	<u>90</u>	<u>90</u>
72% Effluent	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
100% Effluent	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
Intake	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
*96-Hour LC ₅₀ Value: <u>> 100%</u> 95% Confidence Limits Upper Limit <u>NA</u> Lower Limit <u>NA</u>				Calculated TU Estimates [†] : <u>< 1.0 TU_a</u> Permit Limit: <u>1.0 TU_a</u>			

Test Solutions	Reproduction (# of young/female during test) Data Replicates										Mean
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	
Control	<u>43</u>	<u>42</u>	<u>24</u>	<u>36</u>	<u>32</u>	<u>36</u>	<u>27</u>	<u>23</u>	<u>27</u>	<u>44</u>	<u>33.4</u>
10.98% Effluent	<u>43</u>	<u>26</u>	<u>31</u>	<u>27</u>	<u>39</u>	<u>37</u>	<u>36</u>	<u>25</u>	<u>23</u>	<u>39</u>	<u>32.6</u>
22% Effluent	<u>27</u>	<u>44</u>	<u>28</u>	<u>38</u>	<u>40</u>	<u>28</u>	<u>35</u>	<u>33</u>	<u>34</u>	<u>41</u>	<u>34.8</u>
44% Effluent	<u>22</u>	<u>31</u>	<u>36</u>	<u>39</u>	<u>33</u>	<u>27</u>	<u>27</u>	<u>26</u>	<u>0</u>	<u>34</u>	<u>27.5</u>
72% Effluent	<u>28</u>	<u>32</u>	<u>27</u>	<u>34</u>	<u>25</u>	<u>30</u>	<u>37</u>	<u>33</u>	<u>33</u>	<u>29</u>	<u>30.8</u>
100% Effluent	<u>32</u>	<u>34</u>	<u>25</u>	<u>36</u>	<u>31</u>	<u>34</u>	<u>29</u>	<u>32</u>	<u>27</u>	<u>40</u>	<u>32.0</u>
Intake	<u>27</u>	<u>35</u>	<u>36</u>	<u>36</u>	<u>38</u>	<u>26</u>	<u>32</u>	<u>27</u>	<u>26</u>	<u>27</u>	<u>31.0</u>
IC ₂₅ Value: <u>> 100%</u> 95% Confidence Limits Upper Limit <u>NA</u> Lower Limit <u>NA</u>				Calculated TU Estimates [†] : <u>< 1.0 TU_c</u> Permit Limit: <u>1.0 TU_c</u>							

[†]NOTE: TU_a = 100/LC₅₀; TU_c = 100/ IC₂₅

REFERENCE TOXICANT TEST RESULTS (See Appendixes A and D)

Species	Date	Time	Duration	Toxicant	Results (LC ₅₀ /IC ₂₅)
<i>Pimephales promelas</i>	8/20/01	1300	7 days	KCl	0.804 mg/L KCl
<i>Ceriodaphnia dubia</i>	8/14/10	1350	7 days	NaCl	1207 mg/L NaCl

PHYSICAL/CHEMICAL SUMMARY

- 1) Analysis of Sequoyah Nuclear Plant Diffuser Discharge Concentrations of Total Residual Chlorine
- 2) Initial and Final Chemistry for Fathead Minnow 7-day and Daphnid 3-brood Chronic Tests.

See Summary Tables in Appendix B

SUMMARY/CONCLUSIONS

Samples collected from the Sequoyah Nuclear Plant Outfall 101 did not exhibit toxicity to either *Pimephales promelas* or *Ceriodaphnia dubia*. The resulting IC₂₅ values for both species were > 100 percent, permit limit = 43.9 percent.

Appendix A

ADDITIONAL TOXICITY TEST INFORMATION

SUMMARY OF METHODS

1) *Pimephales promelas*

Tests were conducted according to EPA/600/4-91/002 (July 1994) using four replicates, each containing ten test organisms, per treatment. Test vessels consisted of 500-mL polystyrene tumblers, each containing 250 mL of test solution. [2]

2) *Ceriodaphnia dubia*

Tests were conducted according to EPA/600/4-91/002 (July 1994) using ten replicates, each containing one test organism, per treatment. Test vessels consisted of 30-mL polystyrene cups, each containing 15 mL of test solution. [2]

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 S&ME laboratory instruments is recorded in calibration and maintenance log books.
- 3) Temperature was measured using a VWR Scientific digital NIST-traceable thermometer according to S&ME SOP [3]
- 4) Dissolved oxygen was measured using a YSI Dissolved Oxygen meter. The instrument was calibrated and readings were made according to EPA Method 120.1
- 5) The pH was measured using a VWR Scientific Symphony pH meter equipped with an Orion combination electrode. The instrument was calibrated and readings were made according to EPA Method 150.1
- 6) Conductance was measured using an Orion conductivity meter. The instrument was calibrated and readings were taken according to manufacturers instructions.
- 7) Alkalinity was measured using Standard Methods Titration Method 2320 B using 0.01 N HCl to an endpoint pH of 4.5.
- 8) Hardness was measured using Standard Methods EDTA Titrimetric Method 2340 C or EPA Method 130.2.
- 9) Total residual chlorine was determined using the DPD Ferrous Titrimetric Method with a Hach colorimetric kit.

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/600/4-91/002. [2] 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 NaCl/L or g KCl.
- 2) Standard Toxicant: Sodium Chloride and Potassium Chloride (NaCl and KCl crystalline)
- 3) Dilution Water Used: Moderately hard water for fathead minnows and 25 percent DMW water for the *Ceriodaphnia dubia*.
- 4) Statistics: Toxcalc software Version 5.0 was used for statistical analyses.

REFERENCES

- 1) NPDES Permit No. TN0026450.
- 2) Lewis, P. A., D. J. Klemm, J. M. Lazorchak, T. J. Norberg-King, W. H. Peltier, M. A. Heber. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, EPA/600/4-91/002 (July 1994).
- 3) S&ME Standard Operating Procedures. April, 2000.

Sequoyah Nuclear Plant Biomonitoring
August 28 – September 4, 2001



Appendix B

Discharge Concentrations of Chemicals Used to Control Growth of
Microbiologically Induced Bacteria and Asiatic Clams
and
Initial and Final Chemistry for Fathead Minnow 7-day and
Daphnid 3-brood Chronic Tests

Table B-1. Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Growth of Microbiologically Induced Bacteria and Asiatic Clams, During Toxicity Test Sampling, March 12, 1998-August 31, 2001

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

Table B-1 (continued). Sequoyah Nuclear Plant Diffuser (Outfall 101) Discharge Concentrations of Chemicals Used to Control Growth of Microbiologically Induced Bacteria and Asiatic Clams, During Toxicity Test Sampling, March 12, 1998-August 31, 2001

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			0.021
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			

Table B-2. Water Chemistry Mean Values and Ranges for Fathead Minnow and Daphnid Tests, Sequoyah Nuclear Plant (SQN),
August 28-September 4, 2001.

Test/ Sample ID	Temperature		Dissolved Oxygen		pH		Conductance	Alkalinity	Hardness	Total Residual
	Initial (°C)	Final (°C)	Initial (mg/L)	Final (mg/L)	Initial S.U.	Final S.U.	Initial (µmhos)	Initial mg/L CaCO ₃	Initial mg/L CaCO ₃	Chlorine (mg/L)
Fathead/ Control	25.6 (25.2-26.0)	25.2 (24.8-25.4)	6.9 (6.6-7.3)	5.7 (4.9-6.9)	8.3 (8.2-8.3)	7.8 (7.5-8.1)	316 (290-323)	69.0 (68-70)	95.0 (94-96)	-
Fathead/ 10.98%	25.5 (24.9-26.0)	25.4 (25.1-26.0)	7.0 (6.7-7.2)	6.0 (5.6-6.5)	8.2 (8.1-8.3)	7.8 (7.6-8.1)	308 (285-316)	-	-	-
Fathead/ 22.0 %	25.5 (25.0-26.0)	25.4 (24.9-26.0)	6.9 (6.3-7.1)	5.9 (5.4-6.2)	8.1 (8.1-8.2)	7.8 (7.6-8.0)	298 (281-312)	-	-	-
Fathead/ 44.0%	25.2 (24.4-26.0)	25.7 (25.3-25.9)	6.9 (6.3-7.2)	5.8 (4.6-6.3)	8.1 (8.0-8.2)	7.9 (7.7-8.0)	279 (272-290)	-	-	-
Fathead/ 72.0 %	25.3 (24.5-26.0)	25.5 (25.0-26.0)	6.9 (6.3-7.3)	5.8 (4.8-6.3)	8.1 (7.9-8.2)	7.8 (7.6-8.2)	235 (228-240)	-	-	-
Fathead/ 100.0 %	25.2 (24.3-26.0)	25.8 (25.4-26.0)	6.9 (6.7-7.3)	5.8 (4.6-6.4)	8.0 (7.8-8.2)	7.8 (7.6-8.0)	228 (208-251)	72.0 (68-76)	79.3 (76-82)	0.07* (0.05-0.08)
Fathead/ Intake	25.0 (24.1-26.0)	25.3 (24.9-26.0)	7.1 (6.8-7.5)	5.9 (4.6-6.5)	8.0 (7.8-8.2)	7.7 (7.6-7.8)	244 (230-253)	70.0 (66-76)	79.3 (78-80)	0.09* (0.05-0.12)
Daphnid/ Control	25.5 (25.1-26.0)	25.7 (25.0-26.0)	6.8 (6.3-7.4)	6.1 (5.7-6.9)	8.2 (8.0-8.3)	8.2 (7.8-8.4)	195 (192-198)	64.0 (64-64)	90.0 (90-90)	-
Daphnid/ 10.98	25.5 (25.1-26.0)	25.6 (25.1-26.0)	6.8 (6.4-7.2)	6.2 (5.5-7.9)	8.2 (8.2-8.2)	8.3 (8.1-8.4)	197 (194-199)	-	-	-
Daphnid/ 22.0 %	25.6 (24.9-26.0)	25.6 (25.1-26.0)	6.8 (6.4-7.1)	6.2 (5.6-7.0)	8.2 (8.2-8.3)	8.4 (8.0-8.4)	206 (199-214)	-	-	-
Daphnid/ 44.0 %	25.3 (24.8-26.0)	25.6 (25.3-26.0)	6.7 (6.3-7.3)	6.1 (5.7-6.7)	8.2 (8.1-8.3)	8.2 (7.9-8.4)	212 (200-220)	-	-	-
Daphnid/ 72.0 %	25.2 (24.3-26.0)	25.6 (25.3-26.0)	6.7 (6.3-7.1)	6.0 (5.5-6.8)	8.1 (8.0-8.2)	8.2 (7.9-8.4)	216 (206-231)	-	-	-
Daphnid/ 100.0 %	25.3 (24.3-26.0)	25.5 (25.1-26.0)	6.9 (6.7-7.3)	5.9 (5.5-6.5)	8.0 (7.8-8.2)	8.2 (8.0-8.4)	227 (208-251)	72.0 (68-76)	79.3 (76-82)	0.07* (0.05-0.08)
Daphnid/ Intake	24.9 (24.1-26.0)	25.4 (24.9-26.0)	7.0 (6.8-7.2)	6.0 (5.5-7.1)	8.0 (7.8-8.2)	8.1 (7.7-8.4)	244 (230-251)	70.0 (66-76)	79.3 (78-80)	0.09* (0.05-0.12)

* Total residual chlorine (TRC) analyses conducted by S&ME when samples arrived at the laboratory showed concentrations of 0.05-0.08 mg/L in Outfall 101 samples and 0.05-0.12 mg/L in intake samples. Upon detection of TRC, S&ME used an sodium arsenite reagent to correct for the interference of manganese or chromium. A few of the corrected values were higher than the initial TRC. This indicates that something else is interfering with the TRC analyses and/or manganese or chromium were in larger amounts than the interference test could compensate for. Other things that can react and read as chlorine are bromine, iodine, and ozone. Data is included with the test bench sheets.

Sequoyah Nuclear Plant Biomonitoring
August 28 - September 4, 2001



Appendix C

Chain of Custody Records and
Toxicity Bench Sheets

BIOMONITORING CHAIN OF CUSTODY RECORD

Page 1 of 1

Client: TVA

Project Name: SEQUOYAH NUCLEAR PLANT

P.O. Number: PO BOX 2000

Facility Sampled: SEQUOYAH NUCLEAR PLANT

VPDES Number: TN0026450

Collected By: WANDA ALLEN

S & ME, Inc.
1413 Topside Road, Louisville, TN 37777

Phone: 865-970-0003
Fax: 865-970-0004

FedEx UPS Bus Client

Other (specify): JOE BURKE

Field Identification / Sample Description	Grab/ Comp.	Ship. Temp. (°C)	Collection Date/Time (If grab, list date/time under "End")		Container Number & Volume Collected	Flow (MGD)	Rain Event? (Mark as Appropriate)				Laboratory Use				
			Start	End			Yes	If Yes, Inches	No	Trace	S&ME Log Number	Arrival Temp. (°C)	By	Time	Appearance
QN-DIS-101-TOX	comp	4°C	8/26/01 1048	8/27/01 0948	(1) 2.5 GAL				✓		01-272	2.1°C	B&D	1048	clear
QN-INT-TOX	comp	4°C	8/26/01 1130	8/27/01 1030	(1) 2.5 GAL				✓		01-273	1.9°C	B&D	1030	clear

Relinquished By (Signature):		Sample Custody - Fill In From Top Down		Received By (Signature):		Date/Time	
<u>Wanda Allen / Joe Burke</u>		<u>8/27/01 1400</u>		<u>Burke 1030</u>		<u>8/27/01 1030</u>	

Instructions: Clients should fill in all areas except those in the "Laboratory Use" block. Biomonitoring samples are preserved by storing them at 4°C and shipping them in ice. The hold time for each sample is 36 hours from the time of collection. Therefore, please collect and ship in such a way that the laboratory will receive the samples with ample time to initiate testing within that time frame. Samples shipped overnight on Friday via FedEx or UPS must be marked for Saturday delivery or they will not arrive until the following Monday.

BIOMONITORING CHAIN OF CUSTODY RECORD

Page 1 of 1Client: TVAProject Name: SEQUOYAH NUCLEAR PLANTP.O. Number: PO BOX 2000Facility Sampled: SEQUOYAH NUCLEAR PLANTNPDES Number: TN0026450Collected By: WANDA ALLEN

S & ME, Inc.

1413 Topside Road, Louisville, TN 37777

Phone: 865-970-0003

Fax: 865-970-0004

FedEx UPS Bus Client

Other (specify): JOE BURKE wfa 8/29/01

Field Identification / Sample Description	Grab/ Comp.	Ship. Temp. (°C)	Collection Date/Time (If grab, list date/time under "End")		Container Number & Volume Collected	Flow (MGD)	Rain Event? (Mark as Appropriate)				Laboratory Use				
			Start	End			Yes	If Yes, Inches	No	Trace	S&ME Log Number	Arrival Temp. (°C)	By	Time	Appearance
QN-DIS-101-TOX	comp	4°C	8/28/01 0951	8/29/01 0853	(1) 2.5 GAL				✓		01-275	1.9°C	BAD	1030	Clear
QN-INT-TOX	comp	4°C	8/28/01 1011	8/29/01 0911	(1) 2.5 GAL				✓		01-276	0.8°C	BAD	1031	Clear

Sample Custody - Fill In From Top Down

Relinquished By (Signature):	Date/Time	Received By (Signature):	Date/Time
<u>Wanda Allen</u>	<u>8/29/01 1030</u>	<u>Joe Burke</u>	<u>8/30/01 / 1030</u>

Instructions: Clients should fill in all areas except those in the "Laboratory Use" block. Biomonitoring samples are preserved by storing them at 4°C and shipping them in ice. The hold time for each sample is 36 hours from the time of collection. Therefore, please collect and ship in such a way that the laboratory will receive the samples with ample time to initiate testing within that time frame. Samples shipped overnight on Friday via FedEx or UPS must be marked for Saturday delivery or they will not arrive until the following Monday.

BIOMONITORING CHAIN OF CUSTODY RECORD

Page 1 of 1Client: TVAProject Name: SEQUOYAH NUCLEAR PLANTP.O. Number: PO BOX 2000Facility Sampled: SEQUOYAH NUCLEAR PLANTNPDES Number: TN0026450Collected By: WANDA ALLEN

S & ME, Inc.

1413 Topside Road, Louisville, TN 37777

Phone: 865-970-0003

Fax: 865-970-0004

FedEx UPS Bus Client

Other (specify): JOE BURKE wpa 8/31/01

Field Identification / Sample Description	Grab/ Comp.	Ship. Temp. (°C)	Collection Date/Time (If grab, list date/time under "End")		Container Number & Volume Collected	Flow (MGD)	Rain Event? (Mark as Appropriate)				Laboratory Use				
			Start	End			Yes	If Yes, Inches	No	Trace	S&ME Log Number	Arrival Temp. (°C)	By	Time	Appearance
QN-DIS-101-TOX	comp	4°C	8/30/01 1430/1429	8/31/01 1330/1329	(2) 2.5 GAL		✓	.14			01-277	0.9°C	BAD	1030	clear
QN-INT-TOX	comp	4°C	8/30/01 1502	8/31/01 1402	(1) 2.5 GAL		✓	.14			01-278	0.8°C	BAD	1030	clear

Sample Custody - Fill In From Top Down

Relinquished By (Signature):

Date/Time

Received By (Signature):

Date/Time

<u>Wanda Allen / R. Murphy</u>	<u>8/31/01 1455</u>	<u>Joe Burke</u>	<u>9/1/01 1000</u>

Instructions: Clients should fill in all areas except those in the "Laboratory Use" block. Biomonitoring samples are preserved by storing them at 4°C and shipping them in ice. The hold 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.

FATHEAD MINNOW TEST INFORMATION

Test Name: TVA- Sequovah Nuclear Plant

Test Conducted From: 9/29/01 (Day 0) To ^{Bio} 9/4/01 (Day 7)

Sites/Concentrations:

1. <u>Control</u>	4. <u>42%</u>
2. <u>10.95%</u>	5. <u>72%</u>
3. <u>22%</u>	6. <u>100%</u>
	<u>Triate</u>

Stock (if applicable): _____

Control Water Type (✓):

Moderately Hard Water + Trace Minerals ☒

Other (describe): _____ ☐

Dilution Water Type (✓):

Moderately Hard Water + Trace Minerals ☒

Other (describe): _____ ☐

Source of Test Larvae (✓):

S&ME lot # 01-181 ☐

Other (describe): _____ ☐

Date Larvae Hatched: 9/27/01 - 9/28/01 Hatch Time: 1400 - 1200 Initials: 330

Record of Minor Test Non-Conformity

Date: _____

Description of Non-Conformity: _____

Initials: _____

Date: _____

Description of Non-Conformity: _____

Initials: _____

Test Log sheets QA Reviewed By: Levi S. Dowd (Reviewer Initials) on 9/5/01 (Date)

Fathead Minnow Daily Test Information Logsheets

Test Name: TVA - Sequoyah

Test Dates: 8/25/01 - 9/4/01

Daily Test information		Temperature Information (25±1°C)		Feeding Information (feeding interval 6± 1h)		Test Initiation, Water Change, or Test Termination		Control Water Carboy No. and Additional comments	
Date and Initials	Incubator Temp. (°C)		Therm. No.	Fed 100 uL Brine Shrimp	Feeding time	Start Time	End Time	Carboy #	Date Prep.
	a.m.	p.m.							
Day 0 ^{B47} 8/25/01 8/25/01	25.6	25.4	4		am: — pm: 1530	1245	12 1310	4	8/27/01
Day 1 ^{D55} 8/26/01	25.5	25.1	4	✓	am: 0930 pm: 1530	1253	1350	4	8/27/01
Day 2 ^{B40} 8/28/01	25.2	25.1	4		am: 0930 pm: 1530	1220	1249	2	8/28/01
Day 3 ^{B47} 8/31/01	25.3	25.2	4		am: 0930 pm: 1530	1205	1235	2	8/28/01
Day 4 ^{B40} 8/31/01	25.4	25.3	4		am: 1000 pm: 1530	1150	1215	2	8/28/01
Day 5 ^{D55} 9/1/01	25.1	25.1	4	✓	am: 1030 pm: 1530	12:00	12:30	2	8/28/01
Day 6 ^{D55} 9/1/01	25.1	25.2	4	✓	am: 1100 pm: 1600	12:30	11:10	2	8/28/01
Day 7 ^{B40} 9/1/01	25.4	25.1	4			1305		—	—

Client: TVA-SEQUOYAH

Analysts:

DSG, BAD

Location: Soddy Daisy, Tennessee

Dates:

8/25/01 - 9/4/01

CUMULATIVE MORTALITY OF P. PROMELAS IN CHRONIC TEST

REPLICATE

DAY

CONC.	Initials	NO.	A	B	C	D
Mod. Hard	DSG	1	0	0	0	0
	BAD	2	0	0	0	0
	BAD	3	0	0	0	0
	BAD	4	0	0	0	0
	DSG	5	0	0	0	0
	DSG	6	0	0	0	0
	BAD	7	0	0	0	0
10.98% 25.00% Outfall	DSG	1	0	0	0	0
	BAD	2	0	0	0	0
	BAD	3	0	0	1	0
	RUN	4	0	0	2	1
	DSG	5	0	0	2	1
	DSG	6	0	0	2	1
	BAD	7	0	0	1	0
20% 39.20% Outfall	DSG	1	0	0	0	0
	BAD	2	0	0	0	0
	BAD	3	0	0	0	0
	RUN	4	0	0	0	0
	DSG	5	0	0	0	0
	DSG	6	0	0	0	0
	BAD	7	0	0	0	0
44% 40.00% Outfall	DSG	1	0	0	0	0
	BAD	2	0	0	1	0
	BAD	3	0	0	1	0
	RUN	4	0	0	1	0
	DSG	5	0	0	1	0
	DSG	6	0	0	1	0
	BAD	7	0	0	1	0
72% 80.00% Outfall	DSG	1	0	0	0	0
	BAD	2	0	0	0	0
	BAD	3	0	0	0	0
	RUN	4	0	0	0	0
	DSG	5	0	0	1	0
	DSG	6	0	0	1	0
	BAD	7	0	0	1	0

REPLICATE

DAY

CONC.	Initials	NO.	A	B	C	D
100% Outfall	DSG	1	0	0	0	0
	BAD	2	0	0	0	0
	BAD	3	0	0	0	0
	BAD	4	0	0	0	0
	DSG	5	0	0	0	0
	DSG	6	0	0	0	0
	BAD	7	0	0	0	0
100% Intake	DSG	1	0	0	0	0
	BAD	2	0	0	0	0
	BAD	3	0	0	0	0
	BAD	4	0	0	1	0
	DSG	5	3	0	1	0
	DSG	6	3	0	1	0
	BAD	7	7	0	1	0
		1				
		2				
		3				
		4				
		5				
		6				
		7				
		1				
		2				
		3				
		4				
		5				
		6				
		7				
		1				
		2				
		3				
		4				
		5				
		6				
		7				

*trunt in A rep DSG - runt dead on day 5.

*fish in intake are smaller than other concentrations - BAD

FATHEAD MINNOW SEVEN DAY TEST
RAW DATA
SURVIVAL AND GROWTH

Client: TVA - Sequoyah Nuclear Plant

Test Conducted By: SAO DSG

Date Weighed 9/5/01

Weights Conducted by: SAO DSG

Test Dates: 8/29/01-9/4/01

Oven Temp

(°C) 104

Comments: _____

Began drying (date/time) 9/4/01 11335

End of drying (date/time) 9/5/01 10930

QR - LSD 9/5/01

Exposure & Repl.		# Live Fish	# Original Fish	Pan	Groups Dry Weight		
Rep.	Tare Weight (mg)			Dry Weight Pan + Fish (mg)	(Pan + Fish minus Tare) (mg)	Mean Dry Weight (mg)	
Control	A	10	10	1250.78	1258.12	7.34	0.734
(Moderately Hard)	B	10	10	1262.09	1269.35	7.26	0.726
	C	10	10	1258.45	1266.20	7.75	0.775
	D	10	10	1263.62	1271.18	7.56	0.756
10.98%	A	10	10	1258.21	1265.46	7.25	0.725
Outfall 101	B	10	10	1262.02	1269.03	7.01	0.701
	C	10 ³⁺⁰ 9	10	1266.31	1273.70	7.39	0.729
	D	10	10	1256.94	1264.60	7.66	0.766
22.0%	A	10	10	1272.78	1281.40	8.62	0.862
Outfall 101	B	10	10	1263.67	1271.26	7.59	0.759
	C	10	10	1262.56	1269.89	7.33	0.733
	D	10	10	1272.94	1279.79	6.85	0.685
44%	A	10	10	1275.85	1282.54	6.69	0.669
Outfall 101	B	10	10	1273.65	1281.68	8.03	0.803
	C	10 ³⁺⁰ 9	10	1252.77	1260.00	7.23	0.723
	D	10	10	1262.54	1269.04	6.50	0.650
72%	A	10	10	1269.21	1275.56	6.35	0.635
Outfall 101	B	10	10	1254.46	1262.01	7.55	0.755
	C	10 ³⁺⁰ 9	10	1254.20	1261.50	7.30	0.730
	D	10	10	1267.89	1274.65	6.76	0.676
100%	A	10	10	1266.79	1273.44	6.65	0.665
Outfall 101	B	10	10	1251.71	1258.00	6.29	0.629
	C	10	10	1258.09	1266.03	7.94	0.794
	D	10 ³⁺⁰ 8	10	1265.50	1272.01	6.51	0.651

Larval Fish Growth and Survival Test-7 Day Growth

Start Date: 8/28/01 12:45 Test ID: Seq801fg Sample ID: TN0026450-NPDES Permit #
 End Date: 9/4/01 13:05 Lab ID: S&ME Inc. Sample Type: EFF3-Power Plant
 Sample Date: Protocol: EPAF 91-EPA Freshwater Test Species: PP-Pimephales promelas
 Comments:

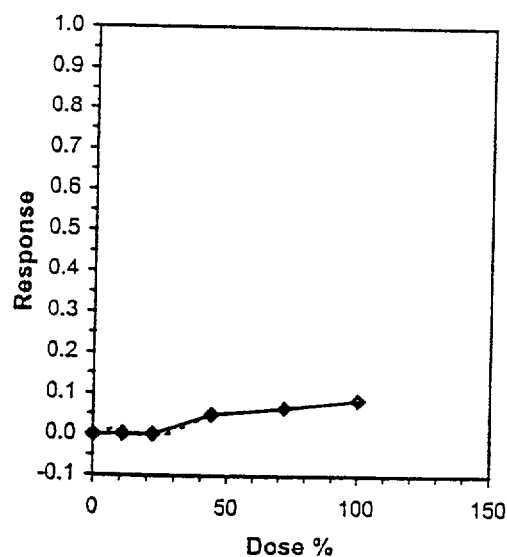
Conc-%	1	2	3	4
D-Control	0.7340	0.7260	0.7750	0.7560
10.98	0.7250	0.7010	0.7390	0.7660
22	0.8620	0.7590	0.7330	0.6850
44	0.6690	0.8030	0.7230	0.6500
72	0.6350	0.7550	0.7300	0.6760
100	0.6650	0.6290	0.7940	0.6510

Conc-%	Mean	N-Mean	Transform: Untransformed					t-Stat	1-Tailed Critical	MSD	Isotonic	
			Mean	Min	Max	CV%	N				Mean	N-Mean
D-Control	0.7478	1.0000	0.7478	0.7260	0.7750	2.963	4				0.7478	1.0000
10.98	0.7327	0.9799	0.7327	0.7010	0.7660	3.706	4	0.368	2.410	0.0982	0.7463	0.9980
22	0.7598	1.0160	0.7598	0.6850	0.8620	9.838	4	-0.294	2.410	0.0982	0.7463	0.9980
44	0.7113	0.9512	0.7113	0.6500	0.8030	9.636	4	0.895	2.410	0.0982	0.7113	0.9512
72	0.6990	0.9348	0.6990	0.6350	0.7550	7.714	4	1.196	2.410	0.0982	0.6990	0.9348
100	0.6848	0.9157	0.6848	0.6290	0.7940	10.854	4	1.545	2.410	0.0982	0.6848	0.9157

Auxiliary Tests

Auxiliary Tests					Statistic	Critical	Skew	Kurt		
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)					0.93411	0.884	0.76111	0.01623		
Bartlett's Test indicates equal variances ($p = 0.33$)					5.78713	15.0863				
Hypothesis Test (1-tail, 0.05)										
Dunnett's Test	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
	100	>100		1	0.09825	0.13139	0.00339	0.00332	0.43554	5, 18

Linear Interpolation (80 Resamples)				
Point	%	SD	95% CL(Exp)	Skew
IC05	46.029			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Larval Fish Growth and Survival Test-7 Day Growth

Start Date: 8/28/01 12:45 Test ID: Seq80IN1fg Sample ID: TN0026450-NPDES Permit #
 End Date: 9/4/01 13:05 Lab ID: S&ME Inc. Sample Type: EFF3-Power Plant
 Sample Date: Protocol: EPAF 91-EPA Freshwater Test Species: PP-Pimephales promelas
 Comments:

Conc.-%	1	2	3	4
D-Control	0.7340	0.7260	0.7750	0.7560
Intake	0.4980	0.7270	0.5950	0.6870

Conc.-%	Mean	N-Mean	Transform: Untransformed				N	t-Stat	1-Tailed	
			Mean	Min	Max	CV%			Critical	MSD
D-Control	0.7478	1.0000	0.7478	0.7260	0.7750	2.963	4			
*Intake	0.6267	0.8382	0.6267	0.4980	0.7270	16.288	4	2.317	1.943	0.1015

Auxiliary Tests

	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	0.96211	0.749	-0.5551	1.22587
F-Test indicates equal variances ($p = 0.03$)	21.2288	47.4683		
Hypothesis Test (1-tail, 0.05)				
Homoscedastic t Test indicates significant differences				

CERIODAPHNIA TEST INFORMATION SHEET

Test Name: TVA -Sequovah Nuclear Plant

Test Conducted From: 8/28/01 (Day 0) To 9/4/01 (Day 7)

Sites/Concentrations:

1. <u>Control</u>	4. <u>44%</u>
2. <u>10.98%</u>	5. <u>72%</u>
3. <u>22%</u>	6. <u>100%</u>

Stock (if applicable): Intake

Control Water Type (✓):

20% Dilute Mineral Water + Trace Minerals

Other (describe): _____

Dilution Water Type (✓):

20% Dilute Mineral Water + Trace Minerals

Other (describe): _____

Source of Test Organisms: S&ME brood board nos. 158

Age of Test Organisms: $\frac{5.20}{2} < 8$ hrs

Isolated neonates for test on 8/28/01 (date) from 0800 to 1300 (time) Initials gnd

Record of Minor Test Non-Conformity

Date: _____

Description of Non-Conformity: _____

Initials: _____

Date: _____

Description of Non-Conformity: _____

Initials: _____

Test Log sheets QA Reviewed By: Line 11/11/01 (Reviewer Initials) on 9/5/01 (Date)

Ceriodaphnia Daily Test Information Logsheet

Test Name: TVA- Sequoyah

Test Dates: 8/28/01 - 9/4/01

Daily Test information		Temperature Information (cup -25±1°C)		Feeding Information				Test Initiation, Water Change, or Test Termination		Control Water Carboy No. and Additional comments	
Date and Initials	Incubator Temp. (°C)		Therm. No.	Fed 100 uL YCT	YCT Date	Fed 100 uL Selenastrum	Selenastrum Date	Start Time	End Time	Carboy # Date Prep.	
	a.m.	p.m.									
Day 0 B20 8/28/01	25.4	25.4	4	✓	7/19/01	✓	8/10/01	1330	1347	1	8/27/01
Day 1 D55 8/29/01	25.5	25.1	4	✓	7/19/01	✓	8/10/01	1355	1435	1	8/27/01
Day 2 B20 8/30/01	25.2	25.1	4	✓	7/19/01	✓	8/10/01	1255	1315	1	8/27/01
Day 3 B20 8/31/01	25.3	25.2	4	✓	7/19/01	✓	8/10/01	1240	1200	1	8/27/01
Day 4 B20 9/1/01	25.4	25.3	4	✓	7/19/01	✓	8/10/01	1240	1300	1	8/27/01
Day 5 D55 9/2/01	25.1	25.1	4	✓	7/19/01	✓	8/10/01	1320	1350	1	8/27/01
Day 6 D55 9/3/01	25.1	25.2	4	✓	7/19/01	✓	8/10/01	1330	1410	1	8/27/01
Day 7 B20 9/4/01	25.4	25.1	4					1115		—	—

Ceriodaphnia 3-Brood Survival and Reproduction
Raw Data Sheet

Client: Tennessee Valley Authority-Sequoyah

Location: S&ME

Dates Samples Collected: 8/27, 8/29, 8/31/2001

Analysts: DSG, BAD

Test Start-Date/Time: 8/25/01 1330

Test Stop-Date/Time: 9/14/01 1415

Replicate													Number of Young	# of Live Adults	# of Original Adults	Number of Young per Adult
Conc.	Init.	Day	1	2	3	4	5	6	7	8	9	10				
Control DMW 25%			--	--	--	--	--	--	--	--	--	--				
	DSG	1	0										0	10	10	0
	BAD	2	0										0	10	10	0
	BAD	3	0										0	10	10	0
	BAD	4	6	5	5	7	5	6	5	4	5	6	54	10	10	5.4
	DSG	5	8	7	0	9	6	7	8*	8	4	7	65	10	10	6.5
	DSG	6	11	14	7	6	5	9	0	0	3	14	69	10	10	6.9
	BAD	7	18	16	12	14	16	14	13	11	15	17	146	10	10	14.6
Total			43	42	24	36	32	36	27	23	27	44	334	10	10	33.4

* Day 5, rep #7 is a 9/04/01

Aug 5, Sep 11, 13 & 14/64

Conc.	Replicate											Number of Young	# of Live Adults	# of Original Adults	Number of Young per Adult		
	Init.	Day	1	2	3	4	5	6	7	8	9					10	
10.48% 25.0% Outfall	DSG	1	0										→	0	10	10	0
	BAD	2	0										→	0	10	10	0
	BAD	3	0										→	0	10	10	0
	BAD	4	6	6	7	4	6	5	6	5	5	3		53	10	10	5.3
	DSG	5	9	10	4	0	9	8	6	4	3	6		55	10	10	5.5
	DSG	6	11	0	7	6	8	8	9	4	0	14		67	10	10	6.7
	RVI	7	17	14	13	17	16	16	15	12	15	16		151	10	10	15.1
	Total	43	26	31	27	39	37	36	25	23	39		326	10	10	32.6	

Replicate													Number of Young	# of Live Adults	# of Original Adults	Number of Young per Adult
Conc.	Init.	Day	1	2	3	4	5	6	7	8	9	10				
25% 39.2% Outfall	DSG	1	0										0	10	10	0
	BAD	2	0										0	10	10	0
	BAD	3	0										0	10	10	0
	BAD	4	6	6	4	6	4	5	7	8	6	7	59	10	10	5.9
	DSG	5	0	9	5	9	11	9	6	0	7	11	66	10	10	6.6
	DSG	6	11	13	9	7	13	0	9	7	6	5	80	10	10	8.0
	BAD	7	10	16	10	16	12	15	13	18	15	18	143	10	10	14.3
	Total	27	44	28	38	40	28	35	33	34	41	348	10	10	34.8	

Ceriodaphnia 3-Brood Survival and Reproduction
Raw Data Sheet

Client: Tennessee Valley Authority-Sequoyah

Location: S&ME

Analysts: BAD, DSS

Test Start-Date/Time: 8/25/01 1330

Dates Samples Collected: 8/27/01 8/29 8/31/01 Test Stop-Date/Time: 9/14/01 1415

Replicate													Number of Young	# of Live Adults	# of Original Adults	Number of Young per Adult	
Conc.	Init.	Day	1	2	3	4	5	6	7	8	9	10					
44% 49% Outfall	DSS	1	0											0	10	10	0
	BAD	2	0									X ₀	→	0	9	10	0
	BAD	3	0										→	0	9	10	0
	BAD	4	6	5	5	5	6	4	8	4			7	50	9	10	0
	DSS	5	0	0	9	11	7	4	0	9			4	52	9	10	5.0
	DSS	6	0	11	8	9	7	7	5	0			11	58	9	10	5.6
	DSS	7	10	15	14	14	13	12	8	13			12	111	9	10	5.8
																	11.1
	Total	22	31	36	39	33	27	27	26	0	34		275	9	10	27.5	

		Replicate										Number of Young	# of Live Adults	# of Original Adults	Number of Young per Adult			
Conc.		Init.	Day	1	2	3	4	5	6	7	8					9	10	
72% -80% Outfall	D56	1	0											→	0	10	10	0
	BAD	2	0											→	0	10	10	0
	BAD	3	0											→	0	10	10	0
	B50	4	7	5	3	5	6	7	6	6	6	5			56	10	10	0
	D56	5	11	4	6	8	7	2	4	4	7	6			62	10	10	5.6
	D56	6	0	7	4	7	6	10	9	11	10	0			64	10	10	6.2
	R16	7	10	11	14	14	13	11	13	12	10	18			126	10	10	6.4
																		12.6
		Total	27	32	27	34	25	30	37	33	33	29		308	10	10	30.8	

Replicate													Number of Young	# of Live Adults	# of Original Adults	Number of Young per Adult
Conc.			1	2	3	4	5	6	7	8	9	10				
	Init.	Day	—	—	—	—	—	—	—	—	—	—				
100% Outfall	D56	1	0										0	10	10	0
	BAD	2	0										0	10	10	0
	BAD	3	0										0	10	10	0
	BAD	4	3	6	7	6	6	5	7	5	5	6	56	10	10	5.6
	D45	5	9	11	0	0	0	6	4	3	4	11	59	10	10	5.9
	D45	6	8	7	7	11	13	13	6	13	0	11	89	10	10	8.9
	BAD	7	12	10	11	13	12	10	12	11	13	12	116	10	10	11.6
	Total		32	34	25	36	31	34	29	32	27	40	320	10	10	32.0

Ceriodaphnia 3-Brood Survival and Reproduction **Raw Data Sheet**

Client: Tennessee Valley Authority-Sequoyah
 Location: S&ME

Analysts: BAAD, DSG

Dates Samples Collected: 8/27, 9/29, 8/31/01

Test Start-Date/Time: 8/28/01 1330

Test Stop-Date/Time: 9/14/01 1415

Conc.	Init.	Day	Replicate										Number of Young	# of Live Adults	# of Original Adults	Number of Young per Adult
			1	2	3	4	5	6	7	8	9	10				
100% Intake	DSG	1	0										0	10	10	0
	BAAD	2	0										0	10	10	0
	BAAD	3	0										0	10	10	0
	BAAD	4	0	6	7	6	6	5	6	7	6	5	54	10	10	5.4
	DSG	5	7	6	4	5	6	11	9	6	7		61	10	10	6.1
	DSG	6	8	7	11	10	9	7	8	0	0	0	52	10	10	5.2
	BAAD	7	12	16	14	15	17	14	15	11	14	15	143	10	10	14.3
	Total	27	35	36	36	38	26	32	27	26	29		310	10	10	31.0

* Day 6, rep #6 is a zero 9/15/01
 MORA

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date: 8/28/01 13:30	Test ID: TVASeq801c	Sample ID: TN0026450-NPDES Permit #
End Date: 9/4/01 14:15	Lab ID:	Sample Type: EFF3-Power Plant
Sample Date:	Protocol: EPAF 91-EPA Freshwater	Test Species: CD-Ceriodaphnia dubia
Comments:		

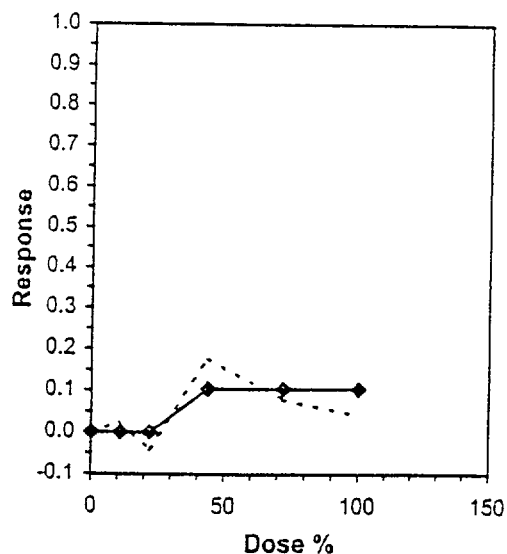
Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	43.000	42.000	24.000	36.000	32.000	36.000	27.000	23.000	27.000	44.000
10.98	43.000	26.000	31.000	27.000	39.000	37.000	36.000	25.000	23.000	39.000
22	27.000	44.000	28.000	38.000	40.000	28.000	35.000	33.000	34.000	41.000
43.9	22.000	31.000	36.000	39.000	33.000	27.000	27.000	26.000	0.000	34.000
72	28.000	32.000	27.000	34.000	25.000	30.000	37.000	33.000	33.000	29.000
100	32.000	34.000	25.000	36.000	31.000	34.000	29.000	32.000	27.000	40.000

Conc-%	Mean	N-Mean	Transform: Untransformed					t-Stat	1-Tailed Critical	MSD	Isotonic	
			Mean	Min	Max	CV%	N				Mean	N-Mean
D-Control	33.400	1.0000	33.400	23.000	44.000	23.877	10				33.600	1.0000
10.98	32.600	0.9760	32.600	23.000	43.000	21.652	10	0.253	2.287	7.242	33.600	1.0000
22	34.800	1.0419	34.800	27.000	44.000	17.070	10	-0.442	2.287	7.242	33.600	1.0000
43.9	27.500	0.8234	27.500	0.000	39.000	39.807	10	1.863	2.287	7.242	30.100	0.8958
72	30.800	0.9222	30.800	25.000	37.000	11.836	10	0.821	2.287	7.242	30.100	0.8958
100	32.000	0.9581	32.000	25.000	40.000	13.661	10	0.442	2.287	7.242	30.100	0.8958

Auxiliary Tests

	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution ($p > 0.01$)	0.61653	1.035	-1.0095	3.12921
Bartlett's Test indicates equal variances ($p = 0.02$)	13.3123	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Dunnett's Test	100	>100		1
	MSDu	MSDp	MSB	MSE
	7.24245	0.21684	63.43	50.1574
			F-Prob	df
			0.29262	5, 54

Linear Interpolation (80 Resamples)				
Point	%	SD	95% CL	Skew
IC05	32.512			
IC10	43.024			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date: 8/28/01 13:30	Test ID: SEQ0801	Sample ID: TN0026450-NPDES Permit #
End Date: 9/4/01 14:15	Lab ID: S&ME	Sample Type: EFF3-Power Plant
Sample Date:	Protocol: EPAF 91-EPA Freshwater	Test Species: CD-Ceriodaphnia dubia
Comments:		

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	43.000	42.000	24.000	36.000	32.000	36.000	27.000	23.000	27.000	44.000
100	27.000	35.000	36.000	36.000	38.000	26.000	32.000	27.000	26.000	29.000

Conc-%	Mean	N-Mean	Transform: Untransformed					t-Stat	1-Tailed	
			Mean	Min	Max	CV%	N		Critical	MSD
D-Control	33.400	1.0000	33.400	23.000	44.000	23.877	10			
100	31.200	0.9341	31.200	26.000	38.000	15.169	10	0.750	1.734	5.085

Auxiliary Tests

	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	0.95511	0.868	0.09344	-1.1423
F-Test indicates equal variances ($p = 0.14$)	2.83929	6.54109		
Hypothesis Test (1-tail, 0.05)				
Homoscedastic t Test indicates no significant differences				

Client: TVA - Sequoyah Nuclear PlantLocation: Soddy Daisy, TNTest Type: Fathead Minnow 7-day ChronicAnalysts: BAO, DSGDates/times: 8/28/01 - 9/4/01 / 1245

Day									
Outfall 101 - 44%	0	1	2	3	4	5	6	7	Remarks
Temperature-Initial	25.6	24.4	24.7	24.8	25.0	26.0	26.0	✓	
Final	✓	25.6	25.7	25.9	25.6	25.3	25.7	25.8	
D.O. Initial	6.9	7.0	6.3	6.8	6.8	7.0	7.2	✓	
Final	✓	6.1	6.2	4.6	5.6	6.1	6.3	5.7	
pH Initial	8.1	8.2	8.1	8.1	8.1	8.2	8.0	✓	
Final	✓	8.0	7.8	7.7	7.9	8.0	8.0	7.8	
Conductivity	290	272	281	276	284	278	275	✓	
Initials	BAO	DSG	BAO	BAO	BAO	DSG	DSG	BAO	
QA Initials	LSD	LSD	LSD	LSD	LSD	LSD	LSD	LSD	
Day									
Outfall 101 - 72%	0	1	2	3	4	5	6	7	Remarks
Temperature-Initial	25.8	25.2	24.5	24.8	24.5	26.0	26.0	✓	LSD 00 - Day 1 temp = 25.2
Final	✓	26.0	26.0	25.4	25.6	25.0	25.0	25.4	
D.O. Initial	7.3	7.1	6.3	6.7	6.9	7.0	7.2	✓	
Final	✓	6.1	6.2	4.8	5.7	6.0	6.3	5.7	
pH Initial	8.0	8.1	8.0	7.9	8.0	8.2	8.2	✓	
Final	✓	8.1	7.6	7.6	7.6	8.0	8.2	7.6	
Conductivity	240	229	228	231	235	239	240	✓	
Initials	BAO	DSG	BAO	BAO	BAO	DSG	DSG	BAO	
QA Initials	LSD	LSD	LSD	LSD	LSD	LSD	LSD	LSD	
Day									
Outfall 101 - 100%	0	1	2	3	4	5	6	7	Remarks
Temperature-Initial	26.0	26.0	24.3	24.5	24.4	26.0	25.0	✓	Temp ~ Day 0 = 26.0
Final	✓	25.6	26.0	25.6	25.8	26.0	26.0	25.4	
D.O. Initial	6.8	7.1	6.7	6.8	6.7	7.0	7.3	✓	
Final	✓	6.1	6.4	4.6	5.4	5.9	6.2	5.9	
pH Initial	8.1	8.1	8.2	7.9	7.8	8.0	8.0	✓	
Final	✓	8.0	7.8	7.6	7.6	7.9	7.9	7.6	
Alkalinity	72	✓	BAO	✓	68	✓	✓	✓	alk day 2 = 76
Hardness	82	✓	BAO	✓	80	✓	✓	✓	hard day 2 = 76
Conductivity	208	217	215	222	245	241	251	✓	alk day 2 = 76 BAO
Chlorine	0.08	✓	0.05	✓	0.08	✓	✓	✓	hard day 2 = 76 BAO
Initials	BAO	DSG	BAO	BAO	BAO	DSG	DSG	BAO	
QA Initials	LSD	LSD	LSD	LSD	LSD	LSD	LSD	LSD	

8/27
Sample8/29
Sample8/31
Sample

Client: TVA - Sequoyah Nuclear Plant
 Location: S&ME
 Test Type: Fathead Minnow 7-day Chronic

Analysts: BAD DSC
 Dates/times: 8/28/01 - 9/4/01 / 1245

Day								
Intake - 100%	0	1	2	3	4	5	6	7
Temperature-Initial	26.0	25.6	24.1	24.1	24.3	26.0	25.0	✓
Final	✓	26.0	25.3	25.3	25.6	25.1	25.0	24.9
D.O. Initial	7.1	7.5	6.9	7.2	6.8	7.0	7.3	✓
Final	✓	6.3	6.5	4.6	5.6	6.1	6.3	5.8
pH Initial	8.2	8.2	8.2	7.9	7.8	7.8	8.0	✓
Final	✓	7.8	7.8	7.7	7.8	7.7	7.8	7.6
Alkalinity	76	✓	66	✓	68	✓	✓	✓
Hardness	80	✓	80	✓	78	✓	✓	✓
Conductivity	230	231	246	251	245	253	253	✓
Chlorine	0.09	✓	0.05	✓	0.12	✓	✓	✓
Initials	BAD DSC	BAD	BAD	BAD	BAD	DSC	DSC	BAD
QA Initials	LSD	LSD	LSD	LSD	LSD	LSD	LSD	LSD

8/27 Sample → 8/29 Sample → 8/31 Sample →

hardness = 80

Location: S&ME

Dates/times: 8/28/01 - 9/4/01 / 1330

Template No

Age of Neonates 28 hrs

Test Type: Ceriodaphnia 7-day Chronic

[illegible]

Location: S&ME

Dates/times: 8/28/01 - 9/4/01 / 1330

Template No.:

Age of Neonates 48 hrs

Test Type: Ceriodaphnia 7-day Chronic

[illegible]

Test Type: Ceriodaphnia 7-day Chronic

Age of Neonates 48 hrs

[illegible]

TOTAL RESIDUAL CHLORINE ADJUSTMENT FOR MANGANESE INTERFERENCE

[illegible]

*Used 30 g/L potassium iodide solution and 5 g/L sodium arsenite solution to adjust for manganese interference in accordance with the HACH Company Pocket Colorimeter procedures manual.

Fish Water Chemistry

SEQ- August 28-September 4, 2001 INITIAL AND FINAL WATER CHEMISTRY (FATHEAD)

Initial Chemistry

Fish - Control	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	25.3	26.0	25.4	25.2	25.5	26.0	26.0	25.2	26.0	25.6
DO	6.7	7.3	6.9	6.7	6.6	6.9	7.0	6.6	7.3	6.9
pH	8.3	8.2	8.3	8.3	8.3	8.3	8.2	8.2	8.3	8.3
Cond	320	290	318	322	323	319	320	290	323	316
Hard	96.0		94.0					94	96	95.0
Alk	70.0		68.0					68	70	69.0

Concentration 10.98%	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	25.4	25.4	24.9	25.3	25.3	26.0	26.0	24.9	26.0	25.5
DO	7.1	7.1	6.7	6.8	6.8	7.0	7.2	6.7	7.2	7.0
pH	8.2	8.2	8.1	8.2	8.2	8.3	8.2	8.1	8.3	8.2
Cond	316	285	311	309	312	309	311	285	316	308

Concentration 22.0%	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	25.5	26.0	25.0	25.0	25.2	26.0	26.0	25.0	26.0	25.5
DO	7.0	7.1	6.3	6.8	6.8	6.9	7.1	6.3	7.1	6.9
pH	8.1	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.2	8.1
Cond	312	281	305	300	302	298	291	281	312	298

Concentration 44.0%	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	25.6	24.4	24.7	24.8	25.0	26.0	26.0	24.4	26.0	25.2
DO	6.9	7.0	6.3	6.8	6.8	7.0	7.2	6.3	7.2	6.9
pH	8.1	8.2	8.1	8.1	8.1	8.2	8.0	8.0	8.2	8.1
Cond	290	272	281	276	284	278	275	272	290	279

Concentration 72.0%	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	25.8	25.2	24.5	24.8	24.5	26.0	26.0	24.5	26.0	25.3
DO	7.3	7.1	6.3	6.7	6.9	7.0	7.2	6.3	7.3	6.9
pH	8.0	8.1	8.0	7.9	8.0	8.2	8.2	7.9	8.2	8.1
Cond	240	229	228	231	235	239	240	228	240	235

Concentration 100%	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	26.0	26.0	24.3	24.5	24.4	26.0	25.0	24.3	26.0	25.2
DO	6.8	7.1	6.7	6.8	6.7	7.0	7.3	6.7	7.3	6.9
pH	8.1	8.1	8.2	7.9	7.8	8.0	8.0	7.8	8.2	8.0
Cond	208	217	215	222	245	241	251	208	251	228
Hard	82.0		76.0		80.0			76	82	79.3
Alk	72.0		76.0		68.0			68	76	72.0
TRC	0.08		0.05		0.08			0.05	0.08	0.07

Fish Water Chemistry

Intake	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	26.0	25.6	24.1	24.1	24.3	26.0	25.0	24.1	26.0	25.0
DO	7.1	7.5	6.9	7.2	6.8	7.0	7.3	6.8	7.5	7.1
pH	8.2	8.2	8.2	7.9	7.8	7.8	8.0	7.8	8.2	8.0
Cond	230	231	246	251	245	253	253	230	253	244
Hard	80.0		80.0		78.0			78	80	79.3
Alk	76.0		66.0		68.0			66	76	70.0
TRC	0.09		0.05		0.12			0.05	0.12	0.09

Final Chemistry

FISH

Fish - Medium	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	25.4	25.0	25.3	25.4	25.4	25.3	24.8	24.8	25.4	25.2
DO	6.0	5.8	4.9	5.8	6.1	6.0	5.5	4.9	6.1	5.7
pH	8.0	7.8	7.6	7.8	7.9	8.1	7.5	7.5	8.1	7.8

Concentration 10.98%	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	26.0	25.1	25.3	25.4	25.4	25.2	25.4	25.1	26.0	25.4
DO	5.9	6.5	5.6	5.8	6.1	6.3	5.7	5.6	6.5	6.0
pH	8.1	7.7	7.7	7.8	7.9	8.0	7.6	7.6	8.1	7.8

Concentration 22.0%	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	25.4	24.9	26.0	25.3	25.1	25.4	25.4	24.9	26.0	25.4
DO	6.0	6.1	5.4	5.8	6.0	6.2	5.9	5.4	6.2	5.9
pH	7.9	7.8	7.7	7.8	8.0	8.0	7.6	7.6	8.0	7.8

Concentration 44.0%	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	25.6	25.7	25.9	25.6	25.3	25.7	25.8	25.3	25.9	25.7
DO	6.1	6.2	4.6	5.6	6.1	6.3	5.7	4.6	6.3	5.8
pH	8.0	7.8	7.7	7.9	8.0	8.0	7.8	7.7	8.0	7.9

Concentration 72.0%	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	26.0	26.0	25.4	25.6	25.0	25.0	25.4	25.0	26.0	25.5
DO	6.1	6.2	4.8	5.7	6.0	6.3	5.7	4.8	6.3	5.8
pH	8.1	7.6	7.6	7.6	8.0	8.2	7.6	7.6	8.2	7.8

Concentration 100%	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	25.6	26.0	25.6	25.8	26.0	26.0	25.4	25.4	26.0	25.8
DO	6.1	6.4	4.6	5.4	5.9	6.2	5.9	4.6	6.4	5.8
pH	8.0	7.8	7.6	7.6	7.9	7.9	7.6	7.6	8.0	7.8

Fish Water Chemistry

Intake	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	26.0	25.3	25.3	25.6	25.1	25.0	24.9	24.9	26.0	25.3
DO	6.3	6.5	4.6	5.6	6.1	6.3	5.8	4.6	6.5	5.9
pH	7.8	7.8	7.7	7.8	7.7	7.8	7.6	7.6	7.8	7.7

Test Temperature Mean 25.5

Minimum 24.8

Maximum 26.0

Word Review by: Cur 10-03-01

Excel Reviewed by: Cur 10-03-01

Cerio Water Chemistry

SQN- August 28 - September 4, 2001 INITIAL AND FINAL WATER CHEMISTRY (CERIO)

Initial Chemistry

CERIO

Control	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	25.6	25.1	25.3	25.4	25.2	26.0	26.0	25.1	26.0	25.5
DO	7.4	7.1	6.3	6.3	6.6	6.8	7	6.3	7.4	6.8
pH	8.3	8.0	8.3	8.2	8.2	8.3	8.3	8.0	8.3	8.2
Cond	192	192	193	195	195	197	198	192	198	195
Hard	90.0							90.0	90.0	90.0
Alk	64.0							64.0	64.0	64.0

Concentration 10.98%	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	25.8	25.3	25.2	25.1	25.1	26.0	25.7	25.1	26.0	25.5
DO	6.7	7.2	6.4	6.7	6.6	6.8	7.0	6.4	7.2	6.8
pH	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
Cond	198	194	196	198	199	197	198	194	199	197

Concentration 22%	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	25.9	26.0	25.1	24.9	25.0	26.0	26.0	24.9	26.0	25.6
DO	6.7	7.1	6.4	6.7	6.5	6.8	7.1	6.4	7.1	6.8
pH	8.2	8.2	8.2	8.2	8.2	8.2	8.3	8.2	8.3	8.2
Cond	200	199	205	206	204	211	214	199	214	206

Concentration 44%	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	26.0	25.5	25.0	24.9	24.8	25.1	26.0	24.8	26.0	25.3
DO	6.6	6.9	6.3	6.6	6.5	6.9	7.3	6.3	7.3	6.7
pH	8.2	8.1	8.2	8.2	8.1	8.1	8.3	8.1	8.3	8.2
Cond	200	207	211	213	216	220	219	200	220	212

Concentration 72%	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	26.0	25.4	24.3	24.5	24.5	26.0	26.0	24.3	26.0	25.2
DO	6.4	7.0	6.3	6.6	6.5	6.8	7.1	6.3	7.1	6.7
pH	8.2	8.1	8.2	8.0	8.0	8.0	8.0	8.0	8.2	8.1
Cond	206	208	213	215	221	231	221	206	231	216

Concentration 100%	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	26.0	26.0	24.3	24.5	24.4	26.0	26.0	24.3	26.0	25.3
DO	6.8	6.9	6.7	6.8	6.7	6.9	7.3	6.7	7.3	6.9
pH	8.1	8.2	8.2	7.9	7.8	8.0	8.0	7.8	8.2	8.0
Cond	208	208	215	222	245	251	243	208	251	227
Hard	82.0		76.0		80.0			76	82	79.3
Alk	72.0		76.0		68.0			68	76	72.0
TRC	0.08		0.05		0.08			0.05	0.08	0.07

Cerio Water Chemistry

Intake	0	1	2	3	4	5	6	MIN	MAX	MEAN
Temp	26.0	25.0	24.1	24.1	24.3	25.1	26.0	24.1	26.0	24.9
DO	7.1	7.2	6.9	7.2	6.8	6.8	6.9	6.8	7.2	7.0
pH	8.2	8.1	8.2	7.9	7.8	7.8	7.8	7.8	8.2	8.0
Cond	230	232	246	251	245	251	250	230	251	244
Hard	80.0		80.0		78.0			78	80	79.3
Alk	76.0		66.0		68.0			66	76	70.0
TRC	0.09		0.05		0.12			0.05	0.12	0.09

Final Chemistry

CERIO

Cerio - Medium	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	26.0	25.8	25.0	26.0	25.7	25.7	25.7	25.0	26.0	25.7
DO	6.9	5.8	5.7	5.9	6.1	6.3	6.2	5.7	6.9	6.1
pH	7.8	8.4	8.3	8.3	8.1	8.0	8.2	7.8	8.4	8.2

Concentration 10.98%	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	25.4	25.7	25.6	26.0	25.1	26.0	25.4	25.1	26.0	25.6
DO	7.9	5.8	5.5	5.8	6.1	6.0	6.3	5.5	7.9	6.2
pH	8.1	8.4	8.3	8.4	8.2	8.2	8.3	8.1	8.4	8.3

Concentration 22%	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	25.7	25.6	25.5	25.8	25.1	26.0	25.7	25.1	26.0	25.6
DO	7.0	5.9	5.6	5.9	6.2	6.1	6.4	5.6	7.0	6.2
pH	8.0	8.4	8.3	8.4	8.1	8.0	8.3	8.0	8.4	8.4

Concentration 44%	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	26.0	25.6	25.4	25.6	25.3	26.0	25.6	25.3	26.0	25.6
DO	6.7	5.7	5.7	5.8	6.2	6.4	6.2	5.7	6.7	6.1
pH	7.9	8.4	8.3	8.4	8.0	8.0	8.3	7.9	8.4	8.2

Concentration 72%	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	26.0	25.5	25.3	25.6	25.3	26.0	25.4	25.3	26.0	25.6
DO	6.8	5.7	5.6	5.5	6.0	6.2	6.1	5.5	6.8	6.0
pH	8.0	8.4	8.3	8.4	7.9	7.9	8.3	7.9	8.4	8.2

Concentration 100%	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	25.1	25.4	25.3	25.7	26.0	26.0	25.1	25.1	26.0	25.5
DO	6.5	5.8	5.5	5.6	6.0	6.1	6.0	5.5	6.5	5.9
pH	8.1	8.4	8.3	8.4	8.0	8.0	8.3	8.0	8.4	8.2

Cerio Water Chemistry

Intake	1	2	3	4	5	6	7	MIN	MAX	MEAN
Temp	26.0	25.3	25.0	25.8	26.0	25.0	24.9	24.9	26.0	25.4
DO	7.1	5.7	5.5	5.8	6.0	6.1	6.0	5.5	7.1	6.0
pH	8.0	8.4	8.3	8.3	7.7	7.8	8.3	7.7	8.4	8.1

Test temperature Mean: 25.6
 Min: 24.9
 Max: 26.0

Word Review by: Cef ^{cu} ~~GP~~ 10-03-01

Excel Reviewed by: Cef 10-03-01

Sequoyah Nuclear Plant Biomonitoring
August 28 - September 4, 2001

Appendix D

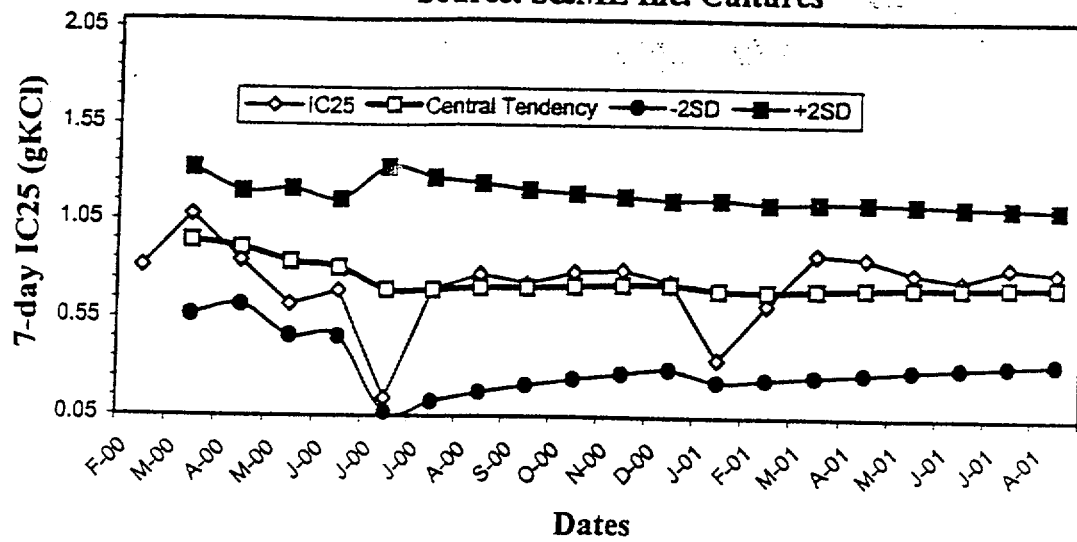
Reference Toxicant Tests and
Control Chart Information

Fathead Minnow Potassium Chloride Chronic Reference Toxicant

CV% = 26.9

Control Chart

Source: S&ME Inc. Cultures



Dates	Values	Mean	-2 SD	+2 SD
2/28/00	0.8125			
3/27/00	1.0800	0.9463	0.5679	1.3246
4/28/00	0.8438	0.9121	0.6196	1.2046
5/15/00	0.6210	0.8393	0.4628	1.2158
6/13/00	0.6935	0.8102	0.4590	1.1613
7/10/00	0.1400	0.6985	0.0675	1.3294
7/26/00	0.7000	0.6987	0.1227	1.2746
8/24/00	0.7760	0.7083	0.1723	1.2444
9/17/00	0.7317	0.7109	0.2093	1.2126
10/17/00	0.7892	0.7188	0.2432	1.1943
11/30/00	-0.7997	0.7261	0.2724	1.1799
12/30/00	0.7418	0.7274	0.2947	1.1602
1/29/01	0.3442	0.6980	0.2323	1.1636
2/19/01	0.6250	0.6927	0.2436	1.1418
3/6/01	0.8859	0.7056	0.2615	1.1497
4/9/01	0.8693	0.7158	0.2791	1.1526
5/10/01	0.7948	0.7205	0.2958	1.1451
6/4/01	0.7580	0.7226	0.3102	1.1349
7/18/01	0.8288	0.7282	0.3245	1.1318
8/20/01	0.8040	0.7320	0.3376	1.1263

FATHEAD MINNOW TEST INFORMATION

Test Name: Chronic Reference Test

Test Conducted From: 8/20/01 (Day 0) To 8/27/01 (Day 7)

Sites/Concentrations: 1. Control 4. 750 µg/L
2. 250 µg/L 5. 1000 µg/L
3. 500 µg/L 6. 1500 µg/L

Stock (if applicable): 10,000 µg/L KCl prepared on 8/20/01

Control Water Type (✓):

Moderately Hard Water + Trace Minerals ☒

Other (describe): ☐

Dilution Water Type (✓):

Moderately Hard Water + Trace Minerals ☒

Other (describe): ☐

Source of Test Larvae (✓):

S&ME 01-124 ☐

Other (describe): ☐

Date Larvae Hatched: 8/19/01 Hatch Time: 1530
8/20/01 Initials: BAD

Record of Minor Test Non-Conformity

Date:

Description of Non-Conformity:

Initials:

Date:

Description of Non-Conformity:

Initials:

Test Log sheets QA Reviewed By: Steve S. Dushoff (Reviewer Initials) on 8/9/01 (Date)

Fathead Minnow Daily Test Information Logsheet

Test Name: Chronic Reference Test

Test Dates: 8/20/01 - 8/27/01

Daily Test information		Temperature Information (25±1°C)		Feeding Information (feeding interval 6± 1h)		Test Initiation, Water Change, or Test Termination		Control Water Carboy No. and Additional comments	
Date and Initials		Incubator Temp. (°C)		Therm. No.	Fed 100 uL Brine Shrimp	Feeding time	Start Time	End Time	
		a.m.	p.m.						
Day 0 8/20/01	DSS	25.1	25.0	4	10:00 ✓	am: 10:00 pm: 1740	13:00	13:45	4 8/13/01
Day 1 8/21/01	VCS	25.5	25.1	3A		am: 0845 pm: 1625	1315	1345	2 8/17/01
Day 2 8/22/01	DSS	25.2	25.1	4		am: 1040 pm: 1700	13:15	13:40	2 8/17/01
Day 3 8/23/01	BAO	26.0	25.9	4		am: 0900 pm: 1600	12:38	13:15	2 8/17/01
Day 4 8/24/01	BAO	25.8	25.5	4		am: 0930 pm: 1600	1250	1310	2 8/21/01
Day 5 8/25/01	BAO	25.3	25.4	4		am: 1000 pm: 1600	1340 1240	1355	4 8/21/01
Day 6 8/26/01	PSS	25.1	25.1	4		am: 10:00 pm: 16:00	12:00	12:31	4 8/21/01
Day 7 8/27/01		25.4	25.2	4			13:00		4 8/21/01

Client: Reference

Location: Knoxville, TN

Analyst: VCS/DSG, BAO

Dates: 8/20/01 - 8/26/01

CUMULATIVE MORTALITY OF P. PROMELAS IN CHRONIC TEST

CONC.	Initials	DAY NO.	REPLICATE			
			A	B	C	D
Control Mod. Hard	VCS	1	0	0	0	0
	DSG	2	0	0	0	0
	DSG	3	0	0	0	0
	DSG	4	0	0	0	0
	BAO	5	1	0	0	0
	DSG	6	1	0	0	0
	DSG	7	1	0	0	0
250	VCS	1	0	0	0	0
	DSG	2	0	0	0	0
	DSG	3	0	0	0	0
	DSG	4	0	0	0	0
	BAO	5	0	0	0	0
	DSG	6	0	0	0	0
	DSG	7	1	0	0	0
500	VCS	1	0	0	0	0
	DSG	2	0	0	0	0
	DSG	3	0	0	0	0
	DSG	4	0	0	0	0
	BAO	5	0	0	0	0
	DSG	6	0	0	0	0
	DSG	7	0	0	0	0
50	VCS	1	0	0	0	0
	DSG	2	0	0	0	0
	DSG	3	0	0	0	0
	DSG	4	2	1	1	0
	BAO	5	2	1	1	0
	DSG	6	2	2	1	0
	DSG	7	0	2	3	0
00	VCS	1	0	0	0	0
	DSG	2	0	0	0	0
	DSG	3	0	0	0	0
	DSG	4	2	2	3	3
	BAO	5	4	3	3	5
	DSG	6	5	7	3	6
	DSG	7	5	7	9	6

CONC.	Initials	DAY NO.	REPLICATE			
			A	B	C	D
1500	VCS	1	7	3	8	3
	DSG	2	7	10	10	8
	DSG	3	8	10	10	9
	DSG	4	9	10	10	10
	BAO	5	10	10	10	10
		6	↓	↓	↓	↓
		7	↓	↓	↓	↓
		1				
		2				
		3				
		4				
		5				
		6				
		7				
		1				
		2				
		3				
		4				
		5				
		6				
		7				
		1				
		2				
		3				
		4				
		5				
		6				
		7				
		1				
		2				
		3				
		4				
		5				
		6				
		7				

FATHEAD MINNOW SEVEN DAY TEST RAW DATA SURVIVAL AND GROWTH

Client: Chronic Reference Test

Test Conducted By: BOB

Date Weighed 8/29/01

Test Dates: 8/20 - 8/27/01

Oven Temp

(°C) 104

Comments:

Drying Time (h) 8/26 - 8/29 1600 - 1000

Exposure & Repl.	Rep.	# Live Fish	# Original Fish	Pan Tare Weight (mg)	Dry Weight Pan + Fish (mg)	Groups Dry Weight (Pan + Fish minus Tare)(mg)	Mean Dry Weight (mg)
Control	A	9	10	1260.66	1266.88	6.22	0.622
(Mod. Hard)	B	10	10	1263.96	1274.30	10.34	1.034
	C	10	10	1266.24	1272.96	6.72	0.672
	D	10	10	1263.23	1271.31	8.08	0.808
250 mg/L	A	9	10	1263.07	1270.63	7.56	0.756
	B	10	10	1274.10	1282.25	8.15	0.815
	C	8	10	1263.90	1269.32	5.42	0.542
	D	10	10	1260.48	1267.45	6.97	0.697
500 mg/L	A	10	10	1243.50	1248.95	5.45	0.545
	B	10	10	1265.84	1274.43	8.59	0.859
	C	10	10	1257.57	1265.42	7.85	0.785
	D	10	10	1269.86	1278.92	9.06	0.906
750 mg/L	A	8	10	1261.18	1269.04	7.86	0.786
	B	8	10	1259.48	1265.73	6.25	0.625
	C	7	10	1260.98	1265.94	4.96	0.496
	D	10	10	1265.63	1273.75	8.12	0.812
1000 mg/L	A	5	10	1268.66	1272.39	3.73	0.373
	B	3	10	1254.08	1257.32	3.24	0.324
	C	1	10	1259.45	1259.82	0.370	0.037
	D	4	10	1251.05	1253.92	2.87	0.287

Larval Fish Growth and Survival Test-7 Day Growth

Start Date: 8/20/01 13:00 Test ID: 0801Reffg Sample ID: REF-Ref Toxicant
 End Date: 8/27/01 13:00 Lab ID: S&ME Sample Type: KCL-Potassium chloride
 Sample Date: Protocol: EPAF 91-EPA Freshwater Test Species: PP-Pimephales promelas
 Comments:

Conc-mg/L	1	2	3	4
S-Control	0.6220	1.0340	0.6720	0.8080
250	0.7560	0.8150	0.5420	0.6970
500	0.5450	0.8590	0.7850	0.9060
750	0.7860	0.6250	0.4960	0.8120
1000	0.3730	0.3240	0.0370	0.2870
1500	0.0000	0.0000	0.0000	0.0000

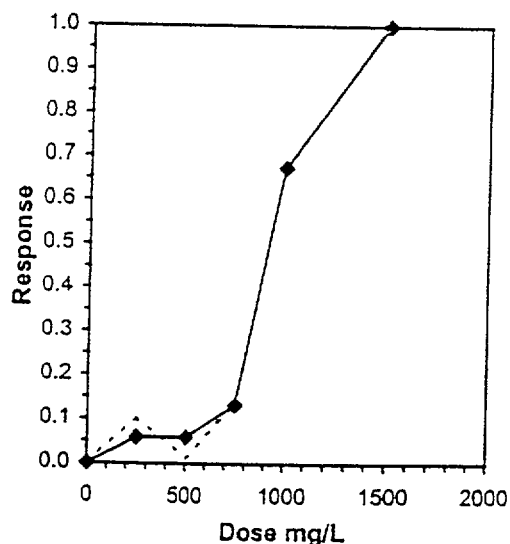
Conc-mg/L	Mean	N-Mean	Transform: Untransformed					t-Stat	1-Tailed Critical	MSD	Isotonic	
			Mean	Min	Max	CV%	N				Mean	N-Mean
S-Control	0.7840	1.0000	0.7840	0.6220	1.0340	23.504	4				0.7840	1.0000
250	0.7025	0.8960	0.7025	0.5420	0.8150	16.704	4	0.751	2.360	0.2561	0.7381	0.9415
500	0.7738	0.9869	0.7738	0.5450	0.9060	20.734	4	0.094	2.360	0.2561	0.7381	0.9415
750	0.6797	0.8670	0.6797	0.4960	0.8120	21.744	4	0.961	2.360	0.2561	0.6797	0.8670
*1000	0.2553	0.3256	0.2553	0.0370	0.3730	58.649	4	4.873	2.360	0.2561	0.2553	0.3256
1500	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	0.0000

Auxiliary Tests

					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)					0.9364	0.868	-0.2971	-0.8736
Bartlett's Test indicates equal variances ($p = 0.97$)					0.54341	13.2767		
Hypothesis Test (1-tail, 0.05)								
Dunnett's Test	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE
	750	1000	866.025		0.25606	0.3266	0.19214	0.02354
								F-Prob
								0.00106
								df
								4, 15

Point	mg/L	SD	Linear Interpolation (80 Resamples)		
			95% CL(Exp)	Skew	
IC05*	213.62	292.09	0.00	1104.05	0.1116
IC10	639.29	268.33	0.00	880.86	-0.5558
IC15	757.86	228.12	0.00	843.63	-1.1718
IC20	780.95	167.17	0.00	869.24	-2.0766
IC25	804.03	93.68	419.34	894.84	-3.1190
IC40	873.29	40.38	726.86	971.65	-0.6717
IC50	919.46	37.68	784.14	1018.50	-0.2641

* indicates IC estimate less than the lowest concentration



Daily Chemistry Data - Fathead Minnow 7-day Chronic

Client: Reference Test

Location: S&ME Inc.

Template No.: 1

Analysts: BAD/NSG

Dates/times: 8/20/01 - 2/26/01

Age of larvae: 15524

[illegible]

Daily Chemistry Data - Fathead Minnow 7-day Chronic

Client: Reference Test

Analysts: BAD/PS

Location: S&ME Inc.

Dates/times: 8/20/01 - 8/24/01

Template No.: _____

Age of larvae: less than 24 hr

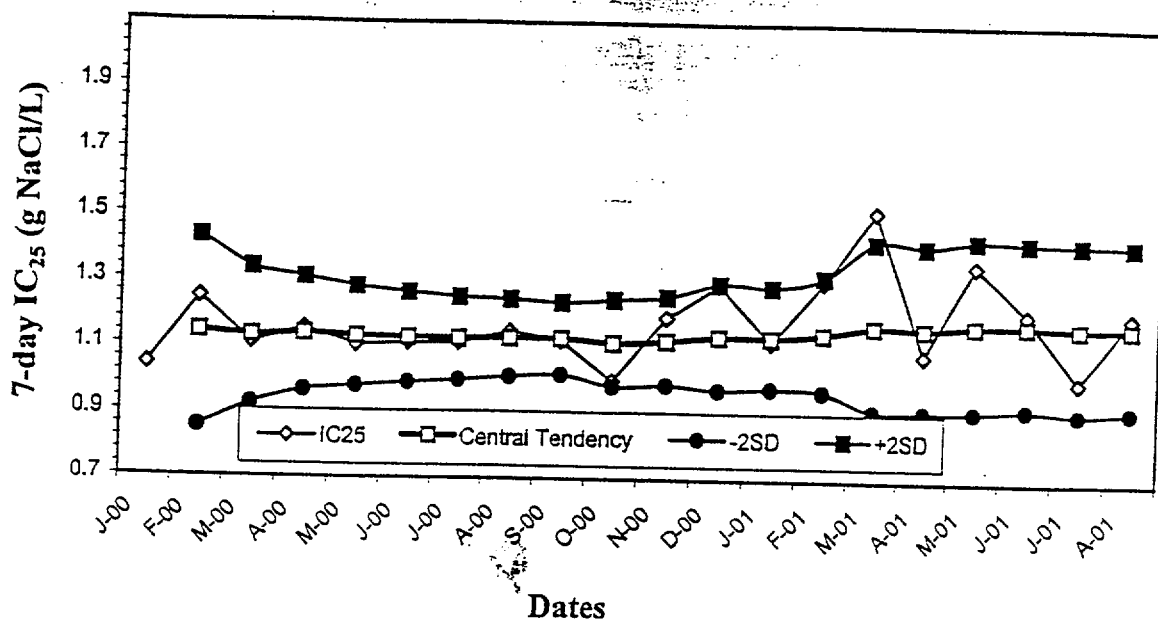
[illegible]

Ceriodaphnia dubia Sodium Chloride Chronic Reference Toxicant

Control Chart

CV% = 10.8

Source: S&ME Inc. Cultures



Dates	Values	Mean	-2 SD	+2 SD
1/10/00	1.0406			
2/18/00	1.2449	1.1427	0.8538	1.4316
3/10/00	1.1098	1.1317	0.9240	1.3395
4/15/00	1.1551	1.1376	0.9663	1.3088
5/19/00	1.1038	1.1308	0.9795	1.2822
6/16/00	1.1100	1.1274	0.9909	1.2638
07/14/00	1.1106	1.1250	0.9998	1.2502
8/11/00	1.1483	1.1279	1.0108	1.2450
09/29/00	1.1180	1.1268	1.0171	1.2365
10/20/00	0.9996	1.1141	0.9830	1.2451
11/27/00	1.1931	1.1212	0.9881	1.2544
12/18/00	1.2921	1.1355	0.9747	1.2963
1/15/01	1.1200	1.1343	0.9801	1.2885
2/23/01	1.3046	1.1465	0.9726	1.3203
3/14/01	1.5233	1.1716	0.9148	1.4284
4/17/01	1.0857	1.1662	0.9144	1.4180
5/20/01	1.3621	1.1777	0.9161	1.4394
6/15/01	1.2154	1.1798	0.9254	1.4343
7/17/01	1.0089	1.1708	0.9114	1.4302
8/14/01	1.2067	1.1726	0.9196	1.4256

Ceriodaphnia Daily Test Information Logsheet

Test Name: Reference Test

Test Dates: 8/14/01 - 8/21/01

Daily Test information		Temperature Information (cup -25±1°C)		Feeding Information				Test Initiation, Water Change, or Test Termination		Control Water Carboy No. and Additional comments	
Date and Initials	Incubator Temp. (°C)		Therm. No.	Fed 100 uL YCT	YCT Date	Fed 100 uL Selenastrum	Selenastrum Date	Start Time	End Time	Carboy # Date Prep.	
	a.m.	p.m.									
Day 0 8/14/01 8/14/01	25.1	25.1	4	✓	7/17/01	✓	8/10/01	13:35	14:12	1	8/10/01
Day 1 8/15/01 8/15/01	25.2	25.1	4	✓	7/17/01	✓	8/10/01	12:50	13:15	1	8/10/01
Day 2 8/16/01 8/16/01	25.4	25.2	4	✓	7/17/01	✓	8/10/01	13:15	13:35	1	8/14/01
Day 3 8/17/01 8/17/01	25.2	25.1	4	✓	7/17/01	✓	8/10/01	12:40	12:55	1	8/14/01
Day 4 8/18/01 8/18/01	25.0	25.0	4	✓	7/17/01	✓	8/10/01	12:50	13:05	1	8/14/01
Day 5 8/19/01 8/19/01	25.1	25.0	4	✓	7/17/01	✓	8/10/01	12:38	12:54	1	8/14/01
Day 6 8/20/01 8/20/01	25.1	25.0	4	✓	7/17/01	✓	8/10/01	12:40	13:05	1	8/14/01
Day 7 8/21/01 8/21/01	25.5	25.0	4					13:30		1	8/14/01

Ceriodaphnia 3-Brood Survival and Reproduction **Raw Data Sheet**

Client: Reference Test

Location: S&ME Inc.

Analysts: DSG, BAD

Conc.	Init.	Day	Replicate										No. of Young	No. of live Adults	No. of Original Adults	Young Per Adult
			1	2	3	4	5	6	7	8	9	10				
Control	DSG	1	0										0	10	10	0
	BAD	2	0										0	10	10	0
	BAD	3	0										0	10	10	0
	BAD	4	5	4	4	5	6	5	5	5	6	5	50	10	10	5.0
	DSG	5	8	4	5	4	6	4	9	9	7	8	60	9	10	6.0
	DSG	6	0		7	5	8	14	11	0	0	10	51	9	10	5.155 LSD
	DSG	7	11		11	10	10	5	0	12	15	6	80	9	10	8.0
	Total		24	0	27	24	30	28	25	26	28	29	245	9	10	24.1 24.5 LSD

Conc.	Init.	Day	Replicate										No. of Young	No. of live Adults	No. of Original Adults	Young Per Adult
			1	2	3	4	5	6	7	8	9	10				
500	DSG	1	0										0	10	10	0
	BAD	2	0										0	10	10	0
	BAD	3	0										0	10	10	0
	BAD	4	5	4	5	3	6	4	6	7	3	5	48	10	10	4.8
	DSG	5	7	2	9	6	8	3	9	4	1	3	52	11	10	5.2 LSD
	DSG	6	0	6	7	9	12	10	14	10	7	12	87	10	10	8.7
	DSG	7	10	10	10	10	7	9	6	4	15	9	90	10	10	9.0
	Total		22	22	31	28	33	26	35	25	26	29	277	10	10	27.7

Conc.	Init.	Day	Replicate										No. of Young	No. of live Adults	No. of Original Adults	Young Per Adult
			1	2	3	4	5	6	7	8	9	10				
750	DSG	1	0										0	10	10	0
	BAD	2	0										0	10	10	0
	BAD	3	0										0	10	10	0
	BAD	4	5	6	5	4	6	2	4	5	4	6	47	10	10	4.7
	DSG	5	11	9	6	9	7	10	4	3	8	7	74	10	10	7.4
	DSG	6	14	7	9	0	4	8	6	0	6	0	54	10	10	5.4
	DSG	7	0	4	10	10	12	6	15	14	11	9	91	10	10	9.1
	Total		30	26	30	23	29	26	29	22	29	22	266	10	10	26.6

Raw Data Sheet

Client: Reference Test

Location: S&ME Inc.

Analysts: DSG, BAD

Replicate												No. of Young	No. of live Adults	No. of Original Adults	Young Per Adult	
		1	2	3	4	5	6	7	8	9	10					
1000	Init.	Day	--	--	--	--	--	--	--	--	--	---	---	---	---	
	DS6	1	0									→ 0	10	10	0	
	RAD	2	0									→ 0	10	10	0	
	RAD	3	0									→ 0	10	10	0	
	RAD	4	1	4	4	3	4	5	3	2	5	4	35 ⁴⁰ 31	9	9	3.5 3.44
	DS6	5	4		5	9	8	6	7	1	2	0	42	9	9	4.2 4.67
	DS6	6	9		11	6	6	7	9	13	0	7	62	9	9	6.2 6.89
	DS6	7	0		2	10	9	10	12	9	16	13	81	9	9	8.1 9.0
				↓									216 ¹⁰⁰			
		Total	14	4	22	22	27	28	31	25	23	24	220	9	9	22.0 24.0 ¹⁰⁰

dropped cup rep# 2 day 4 (bto)

Replicate												No. of Young	No. of live Adults	No. of Original Adults	Young Per Adult
Init.	Day	1	2	3	4	5	6	7	8	9	10				
1500	1	0	—	—	—	—	—	—	—	—	—	0	10	10	0
	2	0	—	—	—	—	—	—	X ₀	—	—	0	9	10	0
	3	0	—	—	—	—	—	—	1	—	—	0	9	10	0
	4	1	3	2	2	3	4	1	1	3	4	23	9	10	2.3
	5	1	0	3	X	2	5	3	1	6	9	23	8	10	2.9
	6	0	7	13	1	0	7	12	1	11	6	56	8	10	5.6
	7	5	6	6	1	0	6	5	1	3	9	28	8	10	2.8
	Total	7	10	18	2	5	22	21	0	23	28	136	8	10	13.6

[illegible]

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date: 8/14/01 13:35 Test ID: Ref801cr Sample ID: REF-Ref Toxicant
 End Date: 8/21/01 13:30 Lab ID: SME INC. Sample Type: NACL-Sodium chloride
 Sample Date: Protocol: EPAF 91-EPA Freshwater Test Species: CD-Ceriodaphnia dubia
 Comments:

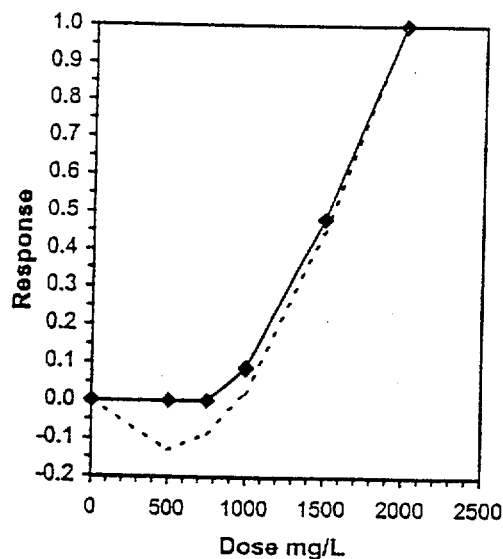
Conc-mg/L	1	2	3	4	5	6	7	8	9	10
D-Control	24.000	4.000	27.000	24.000	30.000	28.000	25.000	26.000	28.000	29.000
500	22.000	22.000	31.000	28.000	33.000	26.000	35.000	25.000	26.000	29.000
750	30.000	26.000	30.000	23.000	29.000	26.000	29.000	22.000	29.000	22.000
1000	14.000	22.000	22.000	27.000	28.000	31.000	25.000	23.000	24.000	
1500	7.000	10.000	18.000	2.000	5.000	22.000	21.000	0.000	23.000	28.000
2000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Conc-mg/L	Mean	N-Mean	Transform: Untransformed					t-Stat	1-Tailed Critical	MSD	Isotonic	
			Mean	Min	Max	CV%	N				Mean	N-Mean
D-Control	24.500	1.0000	24.500	4.000	30.000	30.559	10				26.267	1.0000
500	27.700	1.1306	27.700	22.000	35.000	15.787	10	-1.104	2.321	6.725	26.267	1.0000
750	26.600	1.0857	26.600	22.000	30.000	12.304	10	-0.725	2.321	6.725	26.267	1.0000
1000	24.000	0.9796	24.000	14.000	31.000	19.983	9	0.168	2.321	6.909	24.000	0.9137
*1500	13.600	0.5551	13.600	0.000	28.000	73.136	10	3.761	2.321	6.725	13.600	0.5178
2000	0.000	0.0000	0.000	0.000	0.000	0.000	10				0.000	0.0000

Auxiliary Tests

	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	0.9635	0.929	-0.8121	1.86201
Bartlett's Test indicates equal variances ($p = 0.01$)	13.2684	13.2767		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Bonferroni t Test	1000	1500	1224.74	
	MSDu	MSDp	MSB	MSE
	6.72497	0.27449	315.538	41.9864
			F-Prob	df
			1.1E-04	4, 44

Point	mg/L	SD	Linear Interpolation (80 Resamples)			
			95% CL	Skew		
IC05	894.853	132.657	602.459	1054.11	-0.5788	
IC10	1017.31	98.223	746.969	1119.15	-0.8361	
IC15	1080.45	75.2336	927.319	1205.17	0.0752	
IC20	1143.59	76.1308	1003.06	1290.05	0.9604	
IC25	1206.73	80.5527	1088.63	1374.93	1.1681	
IC40	1396.15	92.7163	1262.41	1580.03	0.3861	
IC50	1517.16	84.3279	1351.79	1650.02	-0.1020	



Daily Chemistry Data - Ceriodaphnia 7-day Chronic

Client: Reference Test

Location: S&ME Inc.

Template No.: 1

Analysts: DSG, BAD

Dates/times: 8/14/01 - 8/21/01 1335

Age of Neonates: <8hrs.

Day									
Control: (20% DMW)	0	1	2	3	4	5	6	7	Remarks
Temperature-Initial	25.7	25.8	24.9	25.7	25.8	26.0	25.9		
Final		26.0	25.6	25.5	24.9	25.7	26.0	25.7	DSG
D.O. Initial	6.2	6.5	6.3	6.2	6.2	6.3	6.1		D.O. = 7.1
Final		6.2	5.9	6.3	6.1	6.1	6.0	6.1	D.O. = 6.4
pH Initial	8.5	7.9	8.2	8.1	8.6	8.4	8.2		
Final		8.3	8.5	8.3	8.6	8.2	8.1	8.3	final pH day 4 = 8.4
Alkalinity	124	120	108			106	102		alk day 0 = 105
Hardness	124		90			93	91		hard. day 0 = 91
Conductivity	192	190	193	191	185	183	187		cond. day 7 = 192
Analyst Initials	DSG	DSG	BAD	DSG	BAD	DSG	DSG	DSG	
QA Review Initials	LSD	LSD	LSD	LSD	LSD	LSD	LSD	LSD	
Day									
500 mg/L	0	1	2	3	4	5	6	7	Remarks
Temperature-Initial	26.0	26.0	25.2	26.0	25.8	25.7	26.0		
Final		25.7	26.0	25.0	24.9	26.0	25.7	26.0	
D.O. Initial	6.5	6.4	6.3	6.2	6.2	6.3	6.2		
Final		6.1	5.9	6.4	6.1	6.0	6.1	6.2	
pH Initial	8.5	8.5	8.3	8.1	8.5	8.3	8.2		
Final		8.3	8.5	8.3	8.5	8.1	8.1	8.1	
Conductivity	1027	1157	1120	1132	1019	1032	1029		
Analyst Initials	DSG	DSG	BAD	DSG	BAD	DSG	DSG	DSG	
QA Review Initials	LSD	LSD	LSD	LSD	LSD	LSD	LSD	LSD	
Day									
750 mg/L	0	1	2	3	4	5	6	7	Remarks
Temperature-Initial	25.7	26.0	25.3	25.7	25.9	25.4	26.0		
Final		25.7	26.0	25.2	25.0	25.6	25.9	26.0	
D.O. Initial	6.5	6.4	6.1	6.2	6.2	6.3	6.3		
Final		6.1	5.8	6.3	6.1	6.2	6.1	6.3	
pH Initial	8.5	8.5	8.3	8.1	8.6	8.5	8.4		
Final		8.4	8.5	8.3	8.3	8.4	8.4	8.2	
Conductivity	1601	1608	1605	1619	1586	1623	1619		
Analyst Initials	DSG	DSG	BAD	DSG	BAD	DSG	DSG	DSG	
QA Review Initials	LSD	LSD	LSD	LSD	LSD	LSD	LSD	LSD	

used alk +
hard. for
hard H+2
results.

Daily Chemistry Data - Ceriodaphnia 7-day Chronic

Client: Reference Test

Analysts:

Location: S&ME Inc.

Dates/times: 8/14/01 - 8/21/01

Template No.: D56, BAD

Age of Neonates: less 8 hr

Day									
1000 mg/L	0	1	2	3	4	5	6	7	Remarks
Temperature-Initial	25.9	25.8	25.3	25.9	25.9	25.8	26.0		
Final		25.9	25.8	26.0	24.9	26.0	25.9	26.0	
D.O. Initial	6.5	6.4	6.1	6.2	6.2	6.3	6.4		
Final		6.1	5.8	6.1	6.1	6.0	6.1	6.2	
pH Initial	8.5	8.6	8.3	8.1	8.6	8.5	8.4		
Final		8.4	8.5	8.2	8.2	8.3	8.3	8.2	
Conductivity	1997	2100	2040	2040	2080	2071	2019		
Analyst Initials	D56	D56	BAD	D56	BAD	D56	D56	D56	
QA Review Initials	LSD	LSD	LSD	LSD	LSD	LSD	LSD	LSD	
Day									
1500 mg/L	0	1	2	3	4	5	6	7	Remarks
Temperature-Initial	25.7	26.0	25.3	26.0	25.9	26.0	25.9		
Final		25.9	25.2	25.4	24.9	24.7	26.0	25.7	
D.O. Initial	6.5	6.5	6.0	6.2	6.2	6.3	6.4		
Final		6.1	6.0	6.3	6.0	6.1	6.2	6.3	u.1 = D. dinit Day 2
pH Initial	8.5	8.5	8.3	8.2	8.6	8.5	9.3		
Final		8.4	8.4	8.3	8.4	8.4	8.1	8.2	
Conductivity	2931	3001	2860	2941	2890	2917	3011		
Analyst Initials	D56	D56	BAD	D56	BAD	D56	D56	D56	
QA Review Initials	LSD	LSD	LSD	LSD	LSD	LSD	LSD	LSD	
Day									
2000 mg/L	0	1	2	3	4	5	6	7	Remarks
Temperature-Initial	26.0	26.0	25.3	26.0					
Final		25.9	25.8	26.0					
D.O. Initial	6.5	6.5	6.1	6.2					
Final		6.1	6.0	6.0					
pH Initial	8.5	8.5	8.3	8.1					
Final		8.4	8.3	8.2					
Conductivity	3812	4000	3770	3912					
Analyst Initials	D56	D56	BAD	D56	BAD	D56			
QA Review Initials	LSD	LSD	LSD	LSD					
Stock Solution Date	8/14/01								