Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

April 26, 1996

Tennessee Department of Environment & Conservation
Division of Water Pollution Control
Compliance Review Section
Sixth Floor, L & C Annex
401 Church Street
Nashville, Tennessee 37243-1534

Dear Sir:

WATTS BAR NUCLEAR PLANT (WBN) - NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT NUMBER TN0020168 - DISCHARGE MONITORING REPORT FOR MARCH 1996

Enclosed is the Discharge Monitoring Report for the month of March 1996, including the groundwater monitoring results and the toxicity test results. We have also included a 3-1/2 inch computer diskette with text files for January, February, and March DMRs. Please notify me of any formatting changes you might require. If you should have any questions or need additional information, please contact me at (423) 365-8116 at Watts Bar.

I certify under penalty of law that this document and all attachments were prepared under the 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,

V. J. Shanks
Radwaste/Environmental Superintendent

020195

Enclosures
cc (Enclosure): (paper copies only)
Mr. Philip L. Stewart, Manager
Division of Water Pollution Control
Chattanooga Field Office
Suite 550
540 McCallie Avenue
Chattanooga, Tennessee 37402

Mr. P. S. Tam, Senior Project Manager
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852

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

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50-390 TVA WATTS BAR 1

NPDES PERMIT NUMBER TN0020168 -
DISCHARGE MONITORING REPORT
FOR MARCH 1996.

REC'D W/LTR DTD 04/26/96....9605020302

- NOTICE -

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- NOTICE -

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

Name TVA-WATTS BAR NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE MOB 2U)
SPRING CITY, TN 37381
Facility TVA-WATTS BAR NUCLEAR PLANT
Location RHEA COUNTY

ATTN: VERNON J. SHANKS, ENV. MGR.

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

TN0020168	101 G	*Diffuser Discharge*
PERMIT NUMBER	DISCHARGE NO.	

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From:	96	03	01	To:	96	03	31

Form Approved.
OMB No. 2030-0004
Approval Expires 10-31-94
(WBN-TVA MS Access Electronic version)

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	********	********	**	********	********	14	04	0	31 / 31	RCORDR
00010 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	35 DAILY MX	DEG. C		CONTINUOUS	RCORDR
PH	SAMPLE MEASUREMENT	********	********	**	7.8	********	8.5	12	0	5 / 31	GRAB
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	6.0 DAILY MN	********	9.0 DAILY MX	SU		1/7	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	********	********	**	********	8	13	19	0	4 / 31	GRAB
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	30 MO AVG	100 DAILY MX	MG/L		1/7	GRAB
OIL & GREASE FREON EXTR-GRAV METH	SAMPLE MEASUREMENT	********	********	**	********	<5	<5	19	0	4 / 31	GRAB
00556 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	15 MO AVG	20 DAILY MX	MG/L		1/7	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	37.283	46.909	03	********	********	********	**	0	31 / 31	RCORDR
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	********	********	********	******		CONTINUOUS	RCORDR
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	********	********	**	********	********	0.04	19	0	36 / 31	M-GRAB
50060 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	0.10 DAILY MX	MG/L		5/7	M-GRAB
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
JOHN A. SCALICE SITE VICE PRESIDENT	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 FINES 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.)	V. J. Shanks SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	365-8116	96	04	26
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

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

Name: TVA-WATTS BAR NUCLEAR PLANT
Address: P.O. BOX 2000
(INTEROFFICE MOB 2U)
SPRING CITY, TN 37381
Facility: TVA-WATTS BAR NUCLEAR PLANT
Location: RHEA COUNTY

ATTN: VERNON J. SHANKS, ENV. MGR.

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

TN0020168	101 T	*Diffuser Discharge*
PERMIT NUMBER	DISCHARGE NO.	

Form Approved.
OMB No. 2030-0004
Approval Expires 10-31-94
(WBN-TVA MS Access Electronic version)

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From:	95	10	01	To:	96	03	31

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
LC50 STATRE 96HR ACU CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	>100.0	********	********	23	0	1 / 180	GRAB
TAN3B 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	9.78 MINIMUM	********	********	PERCENT		1/180	GRAB
LC50 STATRE 96HR ACU PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	>100.0	********	********	23	0	1 / 180	GRAB
TAN6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	9.78 MINIMUM	********	********	PERCENT		1/180	GRAB
NOEL STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	9.8	********	********	23	0	1 / 180	GRAB
TBP3B 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	2.93 MINIMUM	********	********	PERCENT		1/180	GRAB
NOEL STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	>100.0	********	********	23	0	1 / 180	GRAB
TBP6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	2.93 MINIMUM	********	********	PERCENT		1/180	GRAB
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
JOHN A. SCALICE SITE VICE PRESIDENT	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 FINES 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.)	V. J. Shanks SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	365-8116	96	04	26
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

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

Name TVA-WATTS BAR NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE MOB 2U)
SPRING CITY, TN 37381
Facility TVA-WATTS BAR NUCLEAR PLANT
Location RHEA COUNTY

ATTN: VERNON J. SHANKS, ENV. MGR.

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

TN0020168	102 G	*Yard Holding Pond Emergency Overflow Weir*
PERMIT NUMBER	DISCHARGE NO.	

Form Approved.
OMB No. 2030-0004
Approval Expires 10-31-94
(WBN-TVA MS Access Electronic version)

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From:	96	03	01	To:	96	03	31

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	********	********	**	********	********	No Discharge	04	0	0 / 31	INSTAN
00010 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	40 DAILY MX	DEG. C		1/1	INSTAN
PH	SAMPLE MEASUREMENT	********	********	**	No Discharge	********	No Discharge	12	0	0 / 31	GRAB
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	6.0 MINIMUM	********	9.0 MAXIMUM	SU		1/7	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	********	********	**	********	No Discharge	No Discharge	19	0	0 / 31	GRAB
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	30 MO AVG	100 DAILY MX	MG/L		1/7	GRAB
OIL & GREASE FREON EXTR-GRAV METH	SAMPLE MEASUREMENT	********	********	**	********	No Discharge	No Discharge	19	0	0 / 31	GRAB
00556 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	15 MO AVG	20 DAILY MX	MG/L		1/7	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	No Discharge	No Discharge	03	********	********	********	**	0	0 / 31	GRAB
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	********	********	********	******		1/1	GRAB
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	********	********	**	********	********	No Discharge	19	0	0 / 31	M-GRAB
50060 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	0.10 DAILY MX	MG/L		5/7	M-GRAB
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
JOHN A. SCALICE SITE VICE PRESIDENT	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 FINES 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.)	V. J. Shanks SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	365-8116	96	04	26
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

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

Name TVA-WATTS BAR NUCLEAR PLANT
Address P.O. BOX 2000
(INTEROFFICE MOB 2U)
SPRING CITY, TN 37381
Facility TVA-WATTS BAR NUCLEAR PLANT
Location RHEA COUNTY

ATTN: VERNON J. SHANKS, ENV. MGR.

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

TN0020168	102 T	*Yard Holding Pond Emergency Overflow Weir*
PERMIT NUMBER	DISCHARGE NO.	

Form Approved.
OMB No. 2030-0004
Approval Expires 10-31-94
(WBN-TVA MS Access Electronic version)

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From:	95	10	01	To:	96	03	31

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
LC50 STATRE 96HR ACU CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	No Discharge	********	********	23	0	0 / 180	GRAB
TAN3B 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	10.74 MINIMUM	********	********	PERCENT		1/180	GRAB
LC50 STATRE 96HR ACU PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	No Discharge	********	********	23	0	0 / 180	GRAB
TAN6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	10.74 MINIMUM	********	********	PERCENT		1/180	GRAB
NOEL STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	No Discharge	********	********	23	0	0 / 180	GRAB
TBP3B 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	3.22 MINIMUM	********	********	PERCENT		1/180	GRAB
NOEL STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	No Discharge	********	********	23	0	0 / 180	GRAB
TBP6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	3.22 MINIMUM	********	********	PERCENT		1/180	GRAB
	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 FINES 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		
JOHN A. SCALICE SITE VICE PRESIDENT		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	365-8116	96	04	26
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

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

Name: TVA-WATTS BAR NUCLEAR PLANT
Address: P.O. BOX 2000
(INTEROFFICE MOB 2U)
SPRING CITY, TN 37381
Facility: TVA-WATTS BAR NUCLEAR PLANT
Location: RHEA COUNTY

ATTN: VERNON J. SHANKS, ENV. MGR.

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

TN0020168	103 G	*Low Vol. Waste Treatment Pond*
PERMIT NUMBER	DISCHARGE NO.	

Form Approved.
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(WBN-TVA MS Access Electronic version)

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From:	96	03	01	To:	96	03	31

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
PH	SAMPLE MEASUREMENT	********	********	**	7.0	********	9.0	12	0	5 / 31	GRAB
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	6.0 DAILY MN	********	9.0 DAILY MX	SU		3/7	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	29	29	26	********	5	5	19	0	1 / 31	GRAB
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	250 MO AVG	834 DAILY MAX	LBS/DAY	********	30 MO AVG	100 DAILY MX	MG/L		1/7	GRAB
OIL & GREASE FREON EXTR-GRAV METH	SAMPLE MEASUREMENT	<32	<32	26	********	<5	<5	19	0	1 / 31	GRAB
00556 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	125 MO AVG	167 DAILY MAX	LBS/DAY	********	15 MO AVG	20 DAILY MX	MG/L		1/7	GRAB
ALUMINUM	SAMPLE MEASUREMENT	********	********	**	********	********	Conditional / NR this MP	19	0	0 / 31	GRAB
01105 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	10 DAILY MX	MG/L		5/7	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	0.771	0.771	03	********	********	********	**	0	7 / 31	PMPLOG
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	********	********	********	******		1/1	PMPLOG
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
JOHN A. SCALICE SITE VICE PRESIDENT	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 FINES 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.)	V. J. Shanks SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	365-8116	96	04	26
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

If the TBSS is discharged directly to the yard holding pond, the sump effluent shall be subject to the limitations for pH, TSS, and O&G and monitored 5/week under DSN 103. Aluminum analyses are only applicable when effluent from the alum sludge ponds is discharged to points other than the low volume waste treatment pond. Discharged LVWTP 7 days in March.

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

Name: TVA-WATTS BAR NUCLEAR PLANT
Address: P.O. BOX 2000
(INTEROFFICE MOB 2U)
SPRING CITY, TN 37381
Facility: TVA-WATTS BAR NUCLEAR PLANT
Location: RHEA COUNTY

ATTN: VERNON J. SHANKS, ENV. MGR.

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

TN0020168	107 G	*Metal Cleaning Waste Pond*
PERMIT NUMBER	DISCHARGE NO.	

Form Approved.
OMB No. 2030-0004
Approval Expires 10-31-94
(WBN-TVA MS Access Electronic version)

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From:	96	03	01	To:	96	03	31

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	********	7.9	12	0	2 / 31	GRAB
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	6.0 DAILY MN	********	9.0 DAILY MX	SU		1/1	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	********	********	**	********	********	4	19	0	1 / 31	COMPOS
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	30 DAILY MX	MG/L		1/1	COMPOS
OIL & GREASE FREON EXTR-GRAV METH	SAMPLE MEASUREMENT	********	********	**	********	********	<5	19	0	1 / 31	GRAB
00556 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	15 DAILY MX	MG/L		1/1	GRAB
PHOSPHORUS, TOTAL (AS P)	SAMPLE MEASUREMENT	********	********	**	********	********	Conditional / NR this MP	19	0	0 / 31	COMPOS
00665 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	1.0 DAILY MX	MG/L		1/1	COMPOS
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT	********	********	**	********	********	<0.01	19	0	2 / 31	COMPOS
01042 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	1.0 DAILY MX	MG/L		1/1	COMPOS
IRON, TOTAL (AS FE)	SAMPLE MEASUREMENT	********	********	**	********	********	0.51	19	0	2 / 31	COMPOS
01045 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	1.0 DAILY MX	MG/L		1/1	COMPOS
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	2.750	2.750	03	********	********	********	**	0	1 / 31	CALCTD
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	********	********	********	******		1/1	CALCTD

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
JOHN A. SCALICE SITE VICE PRESIDENT	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 FINES 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.)	V. J. Shanks SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	365-8116	96	04	26
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
No phosphorous containing cleaning solutions have been used since the last release of this pond.

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

Name: TVA-WATTS BAR NUCLEAR PLANT
Address: P.O. BOX 2000
(INTEROFFICE MOB 2U)
SPRING CITY, TN 37381
Facility: TVA-WATTS BAR NUCLEAR PLANT
Location: RHEA COUNTY

ATTN: VERNON J. SHANKS, ENV. MGR.

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

TN0020168	111 G
PERMIT NUMBER	DISCHARGE NO.

Combined Sewage Treatment Plants

Form Approved.
OMB No. 2030-0004
Approval Expires 10-31-94
(WBN-TVA MS Access Electronic version)

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From:	96	03	01	To:	96	03	31

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
BOD, 5-DAY (20 DEG. C)	SAMPLE MEASUREMENT	********	********	**	********	<3	4	19	0	4 / 31	GRAB
00310 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	30 MO AVG	45 DAILY MX	MG/L		1/7	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	********	********	**	********	4	5	19	0	4 / 31	GRAB
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	30 MO AVG	45 DAILY MX	MG/L		1/7	GRAB
SOLIDS, SETTLEABLE	SAMPLE MEASUREMENT	********	********	**	********	********	<0.1	25	0	21 / 31	GRAB
00545 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	1.0 DAILY MX	ML/L		2/7	GRAB
COLIFORM, FECAL	SAMPLE MEASUREMENT	********	********	**	********	<132	270	13	0	4 / 31	GRAB
31616 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	200 MO AVG	1000 DAILY MX	N/100ML		1/7	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	0.046	0.087	03	********	********	********	**	0	31 / 31	RCORDR
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	********	********	********	******		CONTINUOUS	RCORDR
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	********	********	**	********	********	0.4	19	0	21 / 31	GRAB
50060 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	********	2.0 DAILY MX	MG/L		5/7	GRAB
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

JOHN A. SCALICE
SITE VICE PRESIDENT

TYPED OR PRINTED

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 FINES 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.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
423	365-8116	96	04	26
AREA CODE	NUMBER	YEAR	MO	DAY

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

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

Name: TVA-WATTS BAR NUCLEAR PLANT
Address: P.O. BOX 2000
(INTEROFFICE MOB 2U)
SPRING CITY, TN 37381
Facility: TVA-WATTS BAR NUCLEAR PLANT
Location: RHEA COUNTY

ATTN: VERNON J. SHANKS, ENV. MGR.

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

TN0020168	112 G	*Runoff Holding Pond*
PERMIT NUMBER	DISCHARGE NO.	

Form Approved.
OMB No. 2030-0004
Approval Expires 10-31-94
(WBN-TVA MS Access Electronic version)

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From:	96	03	01	To:	96	03	31

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	********	********	**	12.2	********	********	19	0	4 / 31	GRAB
00300 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	5.0 DAILY MN	********	********	MG/L		1/7	GRAB
PH	SAMPLE MEASUREMENT	********	********	**	7.8	********	9.1	12	0	4 / 31	GRAB
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	6.0 DAILY MN	********	9.5 DAILY MX	SU		1/7	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	********	********	**	********	10	11	19	0	4 / 31	GRAB
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	30 MO AVG	100 DAILY MX	MG/L		1/7	GRAB
NITROGEN, AMMONIA TOTAL (AS N)	SAMPLE MEASUREMENT	********	********	**	********	0.1	0.2	19	0	4 / 31	GRAB
00610 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	5.0 MO AVG	12 INST MAX	MG/L		1/7	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	0.530	0.653	03	********	********	********	**	0	4 / 31	INSTAN
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	********	********	********	******		1/7	INSTAN
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	********	********	**	********	<0.1	<0.1	19	0	4 / 31	GRAB
50060 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	********	.011 WEEKLY AVG	.019 INST MAX	MG/L		1/7	GRAB
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
JOHN A. SCALICE SITE VICE PRESIDENT	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 FINES 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.)	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	365-8116	96	04	26
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

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

Name: TVA-WATTS BAR NUCLEAR PLANT
Address: P.O. BOX 2000
(INTEROFFICE MOB 2U)
SPRING CITY, TN 37381
Facility: TVA-WATTS BAR NUCLEAR PLANT
Location: RHEA COUNTY

ATTN: VERNON J. SHANKS, ENV. MGR.

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

TN0020168	112 T	*Runoff Holding Pond*
PERMIT NUMBER	DISCHARGE NO.	

Form Approved.
OMB No. 2030-0004
Approval Expires 10-31-94
(WBN-TVA MS Access Electronic version)

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
From:	95	10	01	To:	96	03	31

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
LC50 STATRE 96HR ACU CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	>100	********	********	23	0	1 / 180	GRAB
TAN3B 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	100 MINIMUM	********	********	PERCENT		1/180	GRAB
LC50 STATRE 96HR ACU PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	>100	********	********	23	0	1 / 180	GRAB
TAN6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	100 MINIMUM	********	********	PERCENT		1/180	GRAB
NOEL STATRE 7DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	********	********	**	>100	********	********	23	0	1 / 180	GRAB
TBP3B 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	100 MINIMUM	********	********	PERCENT		1/180	GRAB
NOEL STATRE 7DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	********	********	**	>100	********	********	23	0	1 / 180	GRAB
TBP6C 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	********	********	******	100 MINIMUM	********	********	PERCENT		1/180	GRAB
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
JOHN A. SCALICE SITE VICE PRESIDENT	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 FINES 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.)	V. J. Shanks SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	423	365-8116	96	04	26
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO	DAY

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

WATTS BAR NUCLEAR PLANT

WELL NO. 1 GROUNDWATER MONITORING

FY 1996

05-Apr-96

DATCOL	BORON (ug/l)	SODIUM (mg/l)	AMMONIA (mg/l)	PH (S. U.)	TOTAL PHOSPORUS (mg/l)
10/3/95	<200.	1800.	0.42	7.2	0.01
10/11/95	230.	2200.	0.46	7.2	0.04
10/17/95	<200.	2200.	0.48	7.4	0.04
10/25/95	<200.	2000.	0.48	7.6	0.01
11/1/95	<200.	2100.	0.5	7.3	0.02
11/8/95	<200.	1800.	0.3	7.3	<0.01
11/15/95	220.	1900.	0.44	7.5	0.02
11/21/95	210.	1900.	0.49	7.6	0.02
11/28/95	<200.	2000.	0.41	7.3	<0.01
12/6/95	<200.	2100.	0.45	7.3	0.01
12/13/95	200.	1900.	0.35	7.4	0.01
12/20/95	260.	2200.	0.49	7.7	0.01
12/26/95	240.	2100.	0.48	7.5	<0.01
1/2/96	260.	2100.	0.48	7.2	<0.01
1/10/96	290.	2100.	0.44	7.6	0.01
1/18/96	300.	350.	0.08	7.5	0.06
1/23/96	265.	2000.	0.57	7.5	<0.01
1/31/96	290.	2500.	0.53	7.7	0.02
2/14/96	<200.	2500.	0.55	7.5	0.02
2/21/96	260.	2500.	0.57	7.7	0.02
2/27/96	290.	2400.	0.53	9.1*	0.06
3/5/96	290.	2500.	0.52	7.9	0.04
3/12/96	220.	1300.	0.29	7.4	0.02
3/20/96	250.	1900.	0.4	7.6	0.02
3/27/96	<500.	2000.	0.49	7.4	0.07
MAX.	**300.**	**350.**	**0.57**	**9.1**	**0.07**
MIN.	**<200.**	**1300.**	**0.08**	**7.2**	**<0.01**

*pH Analytical Results For 2/27/96 Are Questionable

TENNESSEE VALLEY AUTHORITY
TOXICITY TESTING LABORATORY
TOXICITY TEST REPORT

INTRODUCTION/EXECUTIVE SUMMARY

1) Facility/Discharger: Watts Bar Nuclear Plant/TVA Report Date: 03/26/96

2) County/State: Rhea/Tennessee 3) NPDES Permit #: TN0020168

4) Type of Facility: Nuclear-fueled electric generating plant

5) Design Flow: Outfall 101: 66.4 MGD Outfall 112: 1.3 MGD

6) Receiving Stream: Outfall 101: TRM 527.9

Outfall 112: Unnamed tributary to Yellow Creek

7) 1Q20: Outfall 101: 22.63 MGD Outfall 112: 0.0 MGD

8) Outfall(s) Tested: 101 112 9) Dates Sampled: 02/22-28/ 1996

10) Flow on day(s) sampled (MGD): Outfall 101: 26.4 28.2 23.4 17.7 18.0 20.4 35.2

Outfall 112: 0.28 0.24 0.21 0.20 0.18 0.06 0.35

11) Pertinent site conditions:

1. Watts Bar Hydro and WBN DSN101 dilution factors ranged from 698 to 1440. River flow past WBN during the sample period was continuous.

2. The daily periodic bromine/chlorine treatment of WBN cooling water was not in service during the toxicity test. The injection of antifouling, metal corrosion inhibitors was operational during this toxicity test.

12) Test Dates: 02/23-03/01/96 13) Test Type: Short-term chronic-Definitive

14) Test Species: #1 Fathead Minnows (*Pimephales promelas*)

#2 Daphnids (*Ceriodaphnia dubia*)

15) Concentrations Tested (%):

Outfall 101	2.3	2.9	7.8	9.8	100
Outfall 112	12.5	25	50	80	100
Raw Water Intake	100				

16) Permit Limit Endpoint (%): Outfall 101 LC_{50} = 9.78 NOEC = 2.93

Outfall 112 LC_{50} = 100 NOEC = 100

17) Test Results (%): Outfall 101 Fathead Minnows - LC_{50} > 100 NOEC > 100

Ceriodaphnia dubia - LC_{50} > 100 NOEC = 9.8

Outfall 112 Fathead Minnows - LC_{50} > 100 NOEC > 100

Ceriodaphnia dubia - LC_{50} > 100 NOEC > 100

18) Facility Contact: Ann McGregor 19) Phone #: (423)365-8011

20) Consultant/Testing Lab Name: Commonwealth Technology, Inc. (CTI)

21) Lab Contact: CTI - Paul Patterson 22) Phone #: (606) 276-3506

TVA - Jennifer Moses Phone #: (205) 729-3340

23) Notes: Samples from Outfalls 101 and 112 exhibited no toxicity to either species based on the applicable permit limits. Toxicity to *Ceriodaphnia dubia*, however, was indicated in the intake water and Outfall 101 when tested at 100%.

METHODS SUMMARY

Samples

1) Sampling Point: Outfall 101 - Diffuser Discharge

Outfall 112 - Holding Pond

2) Sample Type: Grab

METHODS SUMMARY CONTINUED:

Samples

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 (MM-DD/Time)
101	02-22/0910 EST	02-23/1400 EST	3.0	< 0.02	02-23/1500 EST
112	02-22/1000 EST	02-23/1400 EST	3.1	< 0.02	02-23/1530 EST
Intake	02-22/0930 EST	02-23/1400 EST	3.1	< 0.02	02-23/1530 EST
101	02-23/0915 EST	02-24/1120 EST	0.8	< 0.02	02-24/1300-EST
112	02-23/0930 EST	02-24/1120 EST	0.8	< 0.02	02-24/1500-EST
Intake	02-23/0905 EST	02-24/1120 EST	0.5	< 0.02	02-24/1500-EST
101	02-24/0900 EST	02-24/1315 EST	0.7	< 0.02	02-25/1000-EST
112	02-24/0920 EST	02-24/1315 EST	0.6	< 0.02	02-25/1430-EST
Intake	02-24/0850 EST	02-24/1315 EST	0.1	< 0.02	02-25/1430-EST
101	02-25/0825 EST	02-25/1215 EST	1.1	< 0.02	02-26/1300-EST
112	02-25/0845 EST	02-25/1215 EST	1.2	< 0.02	02-26/1500-EST
Intake	02-25/0815 EST	02-25/1215 EST	0.6	< 0.02	02-26/1500-EST
101	02-26/0900 EST	02-27/0930 EST	2.0	< 0.02	02-27/1130-EST
112	02-26/0910 EST	02-27/0930 EST	2.5	< 0.02	02-27/1500-EST
Intake	02-26/0845 EST	02-27/0930 EST	2.0	< 0.02	02-27/1500-EST
101	02-27/0905 EST	02-28/1000 EST	1.0	< 0.02	02-28/1400-EST
112	02-27/0915 EST	02-28/1000 EST	1.6	< 0.02	02-28/1505-EST
Intake	02-27/0855 EST	02-28/1000 EST	1.6	< 0.02	02-28/1505-EST
101	02-28/0910 EST	02-29/0930 EST	0.7	< 0.02	02-29/1400-EST
112	02-28/0920 EST	02-29/0930 EST	1.2	< 0.02	02-29/1500-EST
Intake	02-28/0855 EST	02-29/0930 EST	1.1	< 0.02	02-29/1500-EST

*Total residual chlorine.

4) Sample manipulation: Samples were warmed to test temperature (25°C) in a warm water bath.

Test Organisms

	Fathead Minnow	*Ceriodaphnia dubia*
1) Source:	In-house Culture	In-house Culture
2) Age:	< 24 hours	< 24 hours, within 8-hour window

Test Method Summary (See Appendix A for additional information)

		Fathead Minnow	*Ceriodaphnia dubia*
1) Test Conditions		Static, renewal	Static, renewal
2) Test Duration		7-days	6-7 days (3 brood)
3) Dilution/Control Water		"9:1" Moderately Hard Reconstituted Water	"9:1" Moderately Hard Reconstituted Water
4) Number Replicates		4	10
5) Animals per Replicate		10	1
6) Test Initiation (Date/Time)	(101)	02-23-96/1500 EST	02-23-96/1500 EST
	(112)	02-23-96/1530 EST	02-23-96/1515 EST
7) Test Termination (Date/Time)	(101)	03-01-96/1400 EST	02-29-96/1400 EST
	(112)	03-01-96/1030 EST	02-29-96/1420 EST
8) Test Temperature	(101)	Mean = 24.6°C (24.0°C-25.5°C)	Mean = 24.4°C (24.0°C-25.5°C)
	(112)	Mean = 24.5°C (24.0°C-26.0°C)	Mean = 24.7°C (24.0°C-26.0°C)

9) Physical/Chemical Measurements: Parameters measured daily in 100 percent samples in the laboratory at the time of test initiation were temperature, DO, pH, conductivity, alkalinity, hardness and total residual chlorine. Final measurements of temperature, DO and pH were taken daily. (See Appendix A for additional information and Appendix B for data summary.)

TOXICITY TEST RESULTS (See Appendix C for Bench Sheets)

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

Conducted 02/23/96 (mm/dd/yy) - 03/01/96 (mm/dd/yy) Using Effluent From Outfall 101 (number).

Test Solution	Percent Surviving (time intervals used - days)							# of Young		Dry Weight (mg)	
	1	2	3	4	5	6	7	Total	Mean	Total	Mean
Control	100	95	95	95	95	95	95	___	___	24.87	0.622
2.3% Effluent	100	98	98	98	98	98	98	___	___	26.14	0.654
2.9% Effluent	100	98	98	98	98	98	98	___	___	26.39	0.660
7.8% Effluent	100	100	100	100	98	98	98	___	___	27.30	0.683
9.8% Effluent	100	90	90	90	90	90	90	___	___	27.07	0.677
100% Effluent	100	100	98	98	98	98	98	___	___	28.38	0.710

96-Hour LC_{50} Value > 100% NOEC Value >100%	Calculated TU Estimates* < 1.0 TUa (indicate acute/chronic) <1.0 TUc
UL N/A LL N/A	Permit Limit 10.2 TUa, 34.1 TUc (indicate TUa/TUc)
UL = Upper Limit LL = Lower Limit	If acute test, method used to determine LC_{50} and Confidence Limit values: Inspection based on the LC_{50} definition.

*NOTE: TUa = $100/LC_{50}$; TUc = 100/NOEC

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

Conducted 02/23/96 (mm/dd/yy) - 02/29/96 (mm/dd/yy) Using Effluent From Outfall 101 (number).

Test Solution	Percent Surviving (time intervals used - days)							# of Young		Dry Weight (mg)	
	1	2	3	4	5	6	7	Total	Mean	Total	Mean
Control	100	100	100	100	100	100	_	283	28	___	___
2.3% Effluent	100	100	100	100	100	100	_	279	28	___	___
2.9% Effluent	100	100	100	100	100	100	_	260	26	___	___
7.8% Effluent	100	100	100	100	100	100	_	271	27	___	___
9.8% Effluent	100	100	100	100	100	100	_	251	25	___	___
100% Effluent	100	100	100	100	100	100	_	209	21	___	___

96-Hour LC_{50} Value > 100% NOEC Value 9.8% 95% Confidence Limits UL N/A LL N/A UL = Upper Limit LL = Lower Limit	Calculated TU Estimate* < 1.0 TUa (indicate acute/chronic) 10.2 TUc Permit Limit 10.2 TUa, 34.1 TUc (indicate TUa/TUc) If acute test, method used to determine LC_{50} and Confidence Limit values: Inspection based on the LC_{50} definition.

*NOTE: TUa = $100/LC_{50}$; TUc = 100/NOEC

TOXICITY TEST RESULTS (See Appendix C for Bench Sheets)

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

Conducted 02/23/96 (mm/dd/yy) - 03/01/96 (mm/dd/yy) Using Effluent From Outfall 112 (number).

Test Solution	Percent Surviving (time intervals used - days)							# of Young		Dry Weight (mg)	
	1	2	3	4	5	6	7	Total	Mean	Total	Mean
Control*	95	91	91	91	91	91	91	___	___	20.82	0.521
12.5% Effluent	100	100	100	100	100	100	100	___	___	23.75	0.594
25% Effluent	100	100	100	100	98	98	95	___	___	25.45	0.636
50% Effluent	100	100	100	100	100	100	100	___	___	27.76	0.694
80% Effluent	98	98	98	93	93	88	88	___	___	24.52	0.613
100% Effluent	100	100	98	88	85	83	80	___	___	25.80	0.645
Intake	100	100	98	98	98	98	98	___	___	26.04	0.651

96-Hour LC_{50} Value > 100% NOEC Value > 100%	Calculated TU Estimate† < 1.0 TUa (indicate acute/chronic) < 1.0 TUc
95% Confidence Limits UL N/A LL N/A	Permit Limits 1.0 TUa, 1.0 TUc (indicate TUa/TUc)
UL = Upper Limit LL = Lower Limit	If acute test, method used to determine LC_{50} and Confidence Limit values: Inspection based on the LC_{50} definition.

*Control survival at 96-hours was 88 percent which did not meet the minimum of 90 percent specified in the permit. Mr. Robert Howard of the Tennessee Department of Environment and Conservation was informed of the situation. He said that the minimum acceptability requirement and survival NOEC could be evaluated based on pooled control data from this test and the Outfall 101 test, because both tests used the same batch of organisms and were initiated about the same time. The pooled mean survival equals 91.3 percent at 96-hours, which meets the minimum survival requirement.

†NOTE: TUa = $100/LC_{50}$; TUc = 100/NOEC

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

Conducted 02/23/96 (mm/dd/yy) - 02/29/96 (mm/dd/yy) Using Effluent From Outfall 112 (number).

Test Solution	Percent Surviving (time intervals used - days)							# of Young		Dry Weight (mg)	
	1	2	3	4	5	6	7	Total	Mean	Total	Mean
Control	100	100	100	100	100	100	_	258	26	___	___
12.5% Effluent	100	100	100	100	100	100	_	250	25	___	___
25% Effluent	100	100	100	100	100	100	_	260	26	___	___
50% Effluent	100	100	100	100	100	100	_	241	24	___	___
80% Effluent	100	100	100	100	100	100	_	255	26	___	___
100% Effluent	100	100	100	100	100	100	_	263	26	___	___
Intake	100	100	100	100	100	100	_	230	23	___	___

96-Hour LC_{50} Value > 100% NOEC Value > 100% 95% Confidence Limits UL N/A LL N/A UL = Upper Limit LL = Lower Limit	Calculated TU Estimate* < 1.0 TUa (indicate acute/chronic) < 1.0 TUc Permit Limits 1.0 TUa, 1.0 TUc (indicate TUa/TUc) If acute test, method used to determine LC_{50} and Confidence Limit values: Inspection based on the LC_{50} definition.

*NOTE: TUa = $100/LC_{50}$; TUc = 100/NOEC

REFERENCE TOXICANT TEST RESULTS (See Appendixes A and D)

Species	Date	Time	Duration	Toxicant	Results (LC_{50}/IC_{25})
1) P. *Promelas*	02-09-96	1400	7-days	NaCl	2583 mg/L (IC_{25})
2) C. *dubia*	02-06-96	1300	3-brood	NaCl	1515 mg/L (IC_{25})

PHYSICAL/CHEMICAL SUMMARY

1) Initial and Final Chemistry for Fathead Minnow 7-day and Daphnid 3-brood Chronic Tests

See Appendix B

SUMMARY/CONCLUSIONS

Samples from Outfalls 101 and 112 exhibited no toxicity to either species based on the applicable permit limits. Toxicity to *Ceriodaphnia dubia*, however, was indicated in the intake water and Outfall 101 when tested at 100%.

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 cups, each containing 250 mL of test solution.

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 vesselsconsisted of 30-mL plastic cups, each containing 15 mL of test solution.

DEVIATIONS/MODIFICATIONS TO TEST PROTOCOL

1) *Pimephales promelas*

Laboratory culture medium ("9:1" moderately hard reconstituted water) prepared according to CTI SOP 3040 was used for dilution water and control. The water consists of 9 parts moderately hard reconstituted water and 1 part mineral water. [3]

2) *Ceriodaphnia dubia*

Laboratory culture medium ("9:1" moderately hard reconstituted water) prepared according to CTI SOP 3040 was used for dilution water and control. The water consists of 9 parts moderately hard reconstituted water and 1 part mineral water. Experience has shown that the daphnids cultured in water without the mineral water addition are stressed. This stress is eliminated through the use of mineral water. [3]

Ceriodaphnia dubia cultures are fed daily 300 mL of a suspension containing a cereal leaf extract and the green alga *Selenastrum minutum*. The algal cell density of the suspension is 4×10^7 cells per mL. The food is prepared according to CTI SOP 3100. [3]

DEVIATIONS/MODIFICATIONS TO PRETEST CULTURE OR HOLDING OF TEST ORGANISMS

1) *Pimephales promelas*

During the pretest acclimation period fish were not held in a flow-through or recirculating system. However, approximately 75 percent of holding tank water was removed and replaced weekly with fresh culture water. Also, uneaten food and fecal matter were removed daily.

2) *Ceriodaphnia dubia*

Laboratory culture medium ("9:1" moderately hard reconstituted water) prepared according to CTI SOP 3040 was used for dilution water and control. The water consists of 9 parts moderately hard reconstituted water and 1 part mineral water. Experience has shown that the daphnids cultured in water without the mineral water addition are stressed. This stress is eliminated through the use of mineral water. [3]

Ceriodaphnia dubia cultures are fed daily 300 mL of a suspension containing a cereal leaf extract and the green alga *Selenastrum minutum*. The algal cell density of the suspension is 4×10^7 cells per mL. The food is prepared according to CTI SOP 3100. [3]

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 CTI laboratory instruments is recorded in calibration and maintenance log books.

3) Temperature was measured using a Labcraft digital NIST-traceable thermometer according to CTI SOP 3203. [3]

4) Dissolved oxygen was measured using a Jenway 3410 Electrochemistry Analyzer. The instrument was calibrated and readings were made according to CTI SOP 3187. [3]

5) The pH was measured using a Jenway 3410 Electrochemistry Analyzer equipped with a Markson combination electrode. The instrument was calibrated and readings were made according to CTI SOP 3195. [3]

6) Conductance was measured using a Jenway 3410 Electrochemistry Analyzer. The instrument was calibrated and readings were taken according to CTI SOP 3183. [3]

7) Alkalinity was measured using Standard Methods Titration Method 2320 B on a Lachat Colorimetric Autoanalyzer equipped with Quickchem AE Software.

8) Hardness was measured using Standard Methods EDTA Titrimetric Method 2440 C on a Lachat Colorimetric Autoanalyzer equipped with Quickchem AE Software.

9) Total residual chlorine was determined using the DPD Ferrous Titrimetric Method according to CTI SOP 3210. [3]

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 mg NaCl/L.

2) Standard Toxicant: Sodium Chloride (NaCl crystalline)

3) Dilution Water Used: "9:1" moderately hard reconstituted water. [3]

4) Statistics: Dunnett's Multiple Comparison Test, Steel's Many One Rank Test, Wilcoxon Rank Sum Test, and t-Test. [2]

REFERENCES

1) NPDES Permit No. TN0020168.

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) Standard Operating Procedures, Laboratory Division, Biomonitoring Section, Commonwealth Technology, Incorporated.

Watts Bar Nuclear Plant Biomonitoring
February 23-March 1, 1996

Appendix B

Initial and Final Chemistry for Fathead Minnow 7-day and
Daphnid 3-brood Chronic Tests

Table B-1. Water Chemistry Mean Values and Ranges () for Fathead Minnow and Daphnid Tests, DSN 101, Watts Bar Nuclear Plant, February 23-March 1, 1996.

Test/ Sample ID	Temp. (°C)	Dissolved Oxygen Initial (mg/L)	Dissolved Oxygen Final (mg/L)	pH Initial S.U.	pH Final S.U.	Cond. (µmhos)	Alk. *	Hardness *	TRC †
Fathead/ Control	24.6 (24.1-25.3)	7.8 (7.7-8.1)	5.2 (4.5-6.3)	7.9 (7.7-8.0)	7.3 (7.2-7.4)	354 (349-361)	82 (78-84)	123 (111-133)	
Fathead/ 101-2.3%	24.6 (24.1-25.3)	7.8 (7.5-8.2)	5.1 (4.4-5.9)	7.9 (7.8-8.1)	7.2 (7.2-7.3)	350 (339-359)			
Fathead/ 101-2.9%	24.5 (24.0-25.4)	7.9 (7.6-8.2)	5.1 (4.5-5.9)	7.9 (7.8-8.1)	7.2 (7.2-7.3)	350 (344-356)			
Fathead/ 101-7.8%	24.5 (24.1-24.8)	8.0 (7.8-8.3)	5.0 (4.4-5.8)	7.9 (7.7-8.1)	7.2 (7.1-7.3)	341 (336-347)			
Fathead/ 101-9.8%	24.6 (24.1-25.5)	8.1 (7.9-8.3)	5.0 (4.4-5.7)	7.9 (7.7-8.1)	7.2 (7.1-7.3)	337 (334-342)			
Fathead/ 101-100%	24.6 (24.0-25.5)	8.9 (7.9-9.5)	5.2 (4.4-6.0)	7.1 (6.9-7.3)	7.0 (6.9-7.1)	161 (151-174)	52 (43-86)	71 (63-80)	<0.02 (<0.02-<0.02)
Daphnid/ Control	24.4 (24.0-25.3)	7.9 (7.7-8.1)	7.8 (7.4-8.0)	7.9 (7.7-8.0)	7.9 (7.7-8.0)	353 (349-357)	81 (78-85)	123 (111-133)	
Daphnid/ 101-2.3%	24.4 (24.0-25.3)	7.8 (7.5-8.2)	7.9 (7.4-8.1)	7.9 (7.8-8.1)	7.9 (7.7-8.0)	349 (339-356)			
Daphnid/ 101-2.9%	24.4 (24.1-25.4)	7.9 (7.6-8.2)	7.8 (7.4-8.1)	7.9 (7.8-8.1)	7.9 (7.7-8.0)	349 (344-351)			
Daphnid/ 101-7.8%	24.3 (24.1-24.7)	8.0 (7.8-8.3)	7.9 (7.4-8.1)	7.9 (7.7-8.1)	7.9 (7.7-8.0)	341 (336-346)			
Daphnid/ 101-9.8%	24.5 (24.1-25.5)	8.0 (7.9-8.3)	7.9 (7.4-8.1)	7.9 (7.7-8.1)	7.9 (7.7-8.0)	336 (334-339)			
Daphnid/ 101-100%	24.5 (24.1-25.3)	9.0 (7.9-9.5)	7.9 (7.4-8.1)	7.1 (6.9-7.3)	7.6 (7.4-7.7)	160 (151-1 74)	52 (43-86)	73 (67-80)	<0.02 (<0.02-<0.02)

* mg/L $CaCO_3$

† Total Residual Chlorine

Table B-2. Water Chemistry Mean Values and Ranges () for Fathead Minnow and Daphnid Tests, DSN 112, Watts Bar Nuclear Plant, February 23-March 1, 1996.

Test/ Sample ID	Temp. (°C)	Dissolved Oxygen Initial (mg/L)	Dissolved Oxygen Final (mg/L)	pH Initial S.U.	pH Final S.U.	Cond. (µmhos)	Alk. *	Hardness *	TRC †
Fathead/ Control	24.4 (24.1-25.3)	7.9 (7.7-8.1)	5.2 (4.4-5.7)	7.8 (7.6-8.0)	7.3 (7.2-7.4)	354 (349-357)	82 (78-88)	123 (111-133)	
Fathead/ 112-12.5%	24.6 (24.1-25.7)	8.0 (7.8-8.3)	5.0 (4.6-5.4)	7.9 (7.6-8.2)	7.3 (7.2-7.3)	343 (340-350)			
Fathead/ 112-25%	24.5 (24.0-25.7)	8.3 (8.1-8.4)	5.0 (4.5-5.3)	7.9 (7.6-8.2)	7.2 (7.1-7.3)	330 (325-338)			
Fathead/ 112-50%	24.5 (24.0-25.4)	8.7 (8.4-9.2)	5.1 (4.5-5.9)	7.8 (7.5-8.1)	7.2 (7.1-7.3)	304 (297-313)			
Fathead/ 112-80%	24.5 (24.1-25.4)	8.8 (8.6-9.1)	5.1 (4.6-5.6)	7.7 (7.3-8.2)	7.2 (7.1-7.4)	273 (265-283)			
Fathead/ 112-100%	24.6 (24.2-26.0)	9.4 (9.1-9.6)	5.2 (4.9-5.5)	7.6 (7.2-8.2)	7.2 (7.1-7.4)	252 (244-262)	72 (46-91)	111 (67-126)	<0.02 (<0.02-<0.02)
Fathead/ Intake	24.7 (24.1-25.7)	9.4 (8.8-9.7)	5.2 (4.5-6.3)	7.1 (7.0-7.2)	7.0 (7.0-7.1)	161 (152-166)	60 (49-84)	71 (55-119)	<0.02 (<0.02-<0.02)
Daphnid/ Control	24.6 (24.0-25.3)	7.9 (7.7-8.1)	7.9 (7.7-8.1)	7.9 (7.7-8.0)	7.9 (7.8-7.9)	354 (349-357)	81 (78-85)	123 (111-133)	
Daphnid/ 112-12.5%	24.7 (24.0-25.7)	8.1 (7.7-8.3)	8.0 (7.8-8.1)	7.9 (7.6-8.2)	7.9 (7.7-7.9)	343 (340-350)			
Daphnid/ 112-25%	24.7 (24.0-25.7)	8.3 (8.1-8.4)	8.0 (7.9-8.2)	7.8 (7.6-8.2)	7.8 (7.7-7.9)	330 (325-338)			
Daphnid/ 112-50%	24.7 (24.1-25.4)	8.7 (8.4-9.2)	8.0 (7.9-8.2)	7.7 (7.5-8.1)	7.8 (7.7-7.9)	304 (297-313)			
Daphnid/ 112-80%	24.6 (24.1-25.4)	8.8 (8.6-9.1)	8.1 (7.9-8.2)	7.6 (7.3-8.1)	7.8 (7.7-7.9)	273 (265-283)			
Daphnid/ 112-100%	24.7 (24.1-26.0)	9.4 (9.1-9.6)	8.1 (7.9-8.2)	7.5 (7.2-8.1)	7.8 (7.7-7.9)	252 (244-262)	69 (46-85)	110 (67-126)	<0.02 (<0.02-<0.02)
Daphnid/ Intake	24.6 (24.0-25.7)	9.4 (8.8-9.7)	8.1 (7.9-8.2)	7.1 (7.0-7.2)	7.6 (7.4-7.7)	162 (152-166)	61 (49-84)	72 (55-119)	<0.02 (<0.02-<0.02)

Watts Bar Nuclear Plant Biomonitoring
February 23-March 1, 1996

Appendix C

Chain of Custody Record and
Toxicity Test Bench Sheets

TVA 11064 (WR-1-80)

SAMPLE CUSTODY RECORD

ACCT. # _____

SURVEY Watts Bar N.P. Biotoxicity

DATE 02/22/96

SHIPPED FROM Watts Bar N.P. Site

VIA Fed EX

SHIPPED BY Delmas E. Clark

AT 11:20 E (TIME)

RECEIVED BY _____ AT _____ (TIME) ON _____ (DATE)

CHECK AS INDICATED:

SHIPPING ☐

RECEIVING ☒

BOTTLE REQUIREMENT*

TAG NO.	BOD	COD	FERROUS	METALS	DISS. METALS	SPEC. METALS	MINERAL	DISS. MINERAL	NUTRIENT	OIL & GREASE	PHENOLS	1 gallon cubitainer	2 1/2 gallon cubitainer	CHLOROPHYLLS	SEDIMENT	pH	temp.	flow		
WBNT-I- 1	on: 02-22-96 at: 09:30 E											X								
	by: D.E. Clark														X		X		X	
															X		X		X	
WBNT-DD- 1	on: 02-22-96 at: 09:10 E												X		X		X		X	
	by: D.E. Clark														X		X		X	
WBNT-RHP- 1	on: 02-22-96 at: 10:00 E												X		8.1		10.6		195.6	GPM
	by: D.E. Clark																			

NO. OF ICE CHESTS SHIPPED 2 RECEIVED _____

NO. OF SHIPPING CHESTS SHIPPED — RECEIVED _____

NO. OF RACKS SHIPPED — RECEIVED _____

NO. OF FIELD SHEETS SHIPPED 1 RECEIVED _____

SIGNATURE OF SHIPPER Delmas E. Clark DATE _____

*IF THE NUMBER OF SAMPLES OF EACH TYPE RECEIVED IS DIFFERENT FROM THE NUMBER SHIPPED, NOTIFY THE WATER SAMPLING GROUP AS RECEIVED IS DIFFERENT FROM THE NUMBER SHIPPED.

BIOMONITORING
CHAIN OF CUSTODY RECORD

Bio Log No.: 3173, 3174, 3175, 3176 Collected by: _____

Client: TVA WATTS BAR NUCLEAR Facility Sampled: _____

Outfall/Station: _____ NPDES Permit #: _____

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

SAMPLE TYPE:

CTI use only: Bio. Notification Time: _____ By: _____

Grab	Collection		Temp (°C) upon Pick up / shipping Date:				Temp (°C) upon receipt at CTI Date:			Volume Collected	Visual Description
	Date	Time	On site	Rec. by	Client Init.	Time	Laboratory	Rec. by	Time		
1											
2											
3											
4											

Composite	From		To		Temp (°C) upon Pick up / shipping Date:				Temp (°C) upon receipt at CTI Date: 2-23-96			Volume Collected	Visual Description
	Date	Time	Date	Time	On site	Rec. by	Client Init.	Time	Laboratory	Rec. by	Time		
HOLDING POND	2-22	10:00							3.1	SMH	200PM	2G	CLEAR
DIFFUSER	2-22	9:10							3.0	SMH	200PM	2G	CLEAR
INTAKE	2-22	9:30							3.1	SMH	200PM	1G	CLEAR

Comments:

First Day Rain Event: Yes Amount (In.)_____ No Trace Daily Flow (MGD)_____

Second Day Rain Event: Yes Amount (In.)_____ No Trace Daily Flow (MGD)_____

TEST PARAMETERS:

Test Type:

( ) Acute Screening ( ) Acute Definitive ( ) Chronic Screening (✓) Chronic Definitive

Test Species:

(✓) C. dubia ( ) D. pulex (✓) P. promelas ( ) Other_____

SAMPLE DELIVERY: UPS ( ) Airborne Express ( ) Fed Ex ( ) Bus ( ) Client ( ) CTI / Charge ( ) $_____

SAMPLE RECEIVING:

Relinquished by: Fed Ex 4/23/96 2:00 — Signature / Date/Time

Received by: [signature] 2/23/96 [illegible] — Signature / Date/Time

[signature] 2/23/96 2:00 — Signature / Date/Time

L. Hamilton 2-23-96 200PM — Signature / Date/Time

Signature / Date/Time

Signature / Date/Time

Virginia Clients - please complete reverse side

TVA 11064 (WR-1-80)

SAMPLE CUSTODY RECORD

ACCT. # _____

SURVEY Watts Bar N.P. Biotoxicity

DATE 2-23-96

SHIPPED FROM Watts Bar N.P. Site

VIA Fedex

SHIPPED BY Delmas E. Clark

AT 10:30 (TIME)

RECEIVED BY Lisa Leyton AT 11:20 AM (TIME) ON 2-24-96 (DATE)

CHECK AS INDICATED:

SHIPPING ☐

RECEIVING ☒

BOTTLE REQUIREMENT*

TAG NO.	BOD	COD	FERROUS	METALS	DISS. METALS	SPEC. METALS	MINERAL	DISS. MINERAL	NUTRIENT	OIL & GREASE	PHENOLS	1 gallon cubitainer	2½ gallon cubitainer	CHLOROPHYLLS	SEDIMENT	pH	temp. °C	flow
WBNT-I- 2	on: 02-23-96 at: 09:05											X				X	X	X
	by: D.E. Clark															X	X	X
WBNT-DD- 2	on: 02-23-96 at: 09:15												X			X	X	X
	by: D.E. Clark															X	X	X
WBNT-RHP- 2	on: 02-23-96 at: 09:30												X			8.0	12.1	1650 gpm
	by: D.E. Clark																	

NO. OF ICE CHESTS SHIPPED 2 RECEIVED 2

NO. OF SHIPPING CHESTS SHIPPED — RECEIVED —

NO. OF RACKS SHIPPED — RECEIVED

NO. OF FIELD SHEETS SHIPPED 1 RECEIVED 1

SIGNATURE OF SHIPPER Delmas E. Clark DATE 2-23-96

*IF THE NUMBER OF CONTAINERS OF EACH TYPE RECEIVED DIFFERS FROM THE NUMBER SHIPPED, NOTIFY THE WATER QUALITY AND ECOLOGY PROGRAM IMMEDIATELY.

BIOMONITORING
CHAIN OF CUSTODY RECORD

Bio Log No.: 3173-6-2

Client: TVA Watts Bar Nuclear

Outfall/Station:

Collected by:

Facility Sampled:

NPDES Permit #:

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

SAMPLE TYPE:

CTI use only: Bio. Notification Time: By:

Grab	Collection		Temp (°C) upon Pick up / shipping Date:				Temp (°C) upon receipt at CTI Date: 2-24-96			Volume Collected	Visual Description
	Date	Time	On site	Rec. by	Client Init.	Time	Laboratory	Rec. by	Time		
NT-I-21	2-23-96	9:05Am					0.5	LS	11:30Am	1G	clear
T-DD-22 101	2-23-96	9:15Am					0.8	LS	↓	2G	clear
T-RHP-23 2	2-23-96	9:30Am					0.8	LS	↓	2G	clear
4											

Composite	From		To		Temp (°C) upon Pick up / shipping Date:				Temp (°C) upon receipt at CTI Date:			Volume Collected	Visual Description
	Date	Time	Date	Time	On site	Rec. by	Client Init.	Time	Laboratory	Rec. by	Time		
1													
2													

Comments:

First Day Rain Event: Yes Amount (in.)____ No Trace Daily Flow (MGD)____

Second Day Rain Event: Yes Amount (in.)____ No Trace Daily Flow (MGD)____

TEST PARAMETERS:

Test Type:

( ) Acute Screening ( ) Acute Definitive ( ) Chronic Screening (✓) Chronic Definitive

Test Species:

(✓) *C. dubia* ( ) *D. pulex* (✓) *P. promelas* ( ) Other____

SAMPLE DELIVERY: UPS ( ) Airborne Express ( ) Fed Ex ( ) Bus ( ) Client ( ) CTI / Charge ( ) $____

SAMPLE RECEIVING:

Relinquished by: Fed X

Signature Date/Time

Signature Date/Time

Signature Date/Time

Received by: Lisa Sexton 2-24-96 11:20Am

Signature Date/Time

Signature Date/Time

Signature Date/Time

Virginia Clients - please complete reverse side

TVA 11064 (WR-1-80)

SAMPLE CUSTODY RECORD

ACCT. # _____

SURVEY Watts Bar N.P. Biotoxicity DATE 2-24-96

SHIPPED FROM Watts Bar N.P. Site VIA Max Coulter

SHIPPED BY Delmas E. Clark AT 11:00 E (TIME)

RECEIVED BY [signature] AT 1:35 Pm (TIME) ON 2/24/96 (DATE)

CHECK AS INDICATED:

SHIPPING ☐

RECEIVING ☒

BOTTLE REQUIREMENT*

TAG NO.	BOD	COD	FERROUS	METALS	DISS. METALS	SPEC. METALS	MINERAL	DISS. MINERAL	NUTRIENT	OIL & GREASE	PHENOLS	1 gallon cubitainer	2½ gallon cubitainer	CHLOROPHYLLS	SEDIMENT	pH	temp. °C	flow
WBNT-I-	on: 2-24-96 at: 08:50											X				X	X	X
	by: DE. Clark														X	X	X	X
WBNT-DD-	on: 2-24-96 at: 09:00											X			X	X	X	X
	by: DE. Clark														X	X	X	X
WBNT-RHP-	on: 2-24-96 at: 09:20											X			8.1	11.3	145.6	
	by: DE. Clark																	

NO. OF ICE CHESTS SHIPPED 2 RECEIVED 2

NO. OF SHIPPING CHESTS SHIPPED — RECEIVED —

NO. OF RACKS SHIPPED — RECEIVED —

NO. OF FIELD SHEETS SHIPPED 1 RECEIVED 1

SIGNATURE OF SHIPPER Delmas E. Clark DATE 2/24/96

*IF THE NUMBER OF CONTAINERS OF EACH TYPE RECEIVED IS DIFFERENT FROM THE NUMBER SHIPPED, NOTIFY THE WATER QUALITY AND ECOLOGY PROGRAM IMMEDIATELY.

BIOMONITORING
CHAIN OF CUSTODY RECORD
Bio Log No.: 3173-6-3

Client: TVA WATTS BAR Nuclear

Outfall/Station:

Collected by:

Facility Sampled:

NPDES Permit #:

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

SAMPLE TYPE:

CTI use only: Bio. Notification Time: By:

Grab	Collection		Temp (°C) upon Pick up / shipping Date:				Temp (°C) upon receipt at CTI Date: 2/24/96			Volume Collected	Visual Description
	Date	Time	On site	Rec. by	Client Init.	Time	Laboratory	Rec. by	Time		
WBNT-7-3 1	2/24/96	8:50AM					0.1	JS	1:40 pm	1 GAL	Clear ok
WBNT-DD-3 2	2/24/96	9:00AM					0.7	JS	1:42 pm	2 GAL	Clear ok
WBNT-RMP-3 3	2/24/96	9:20AM					0.6	JS	1:45 pm	2 GAL	Clear ok
4											

Composite	From		To		Temp (°C) upon Pick up / shipping Date:				Temp (°C) upon receipt at CTI Date:			Volume Collected	Visual Description
	Date	Time	Date	Time	On site	Rec. by	Client Init.	Time	Laboratory	Rec. by	Time		
1													
2													

Comments:

First Day Rain Event: Yes Amount (in.)____ No Trace Daily Flow (MGD)____
Second Day Rain Event: Yes Amount (in.)____ No Trace Daily Flow (MGD)____

TEST PARAMETERS:

Test Type:
( ) Acute Screening ( ) Acute Definitive ( ) Chronic Screening ( ) Chronic Definitive

Test Species:
( ) *C. dubia* ( ) *D. pulex* ( ) *P. promelas* ( ) Other____

SAMPLE DELIVERY: UPS ( ) Airborne Express ( ) Fed Ex ( ) Bus ( ) Client ( ) CTI / Charge ( ) $____

SAMPLE RECEIVING:

Relinquished by: 2/24/96 1:25pm
Signature Date/Time

2/24/96 1:35pm
Signature Date/Time

Signature Date/Time

Received by: 2/24/96 1:15pm
Signature Date/Time

2/24/96 1:35p.
Signature Date/Time

Signature Date/Time

Virginia Clients - please complete reverse side

TVA 11064 (WR-1-80)

SAMPLE CUSTODY RECORD

ACCT. # _____

SURVEY Watts Bar N.P. Biotoxicity

DATE 2/25/96

SHIPPED FROM Watts Bar N.P. Site

VIA Max Coulter

SHIPPED BY Delmas E. Clark

AT 10:30 E (TIME)

RECEIVED BY Lisa Denton AT 12:45PM (TIME) ON 2-25-96 (DATE)

BOTTLE REQUIREMENT*

CHECK AS INDICATED:

SHIPPING ☐

RECEIVING ☒

TAG NO.	BOD	COD	FERROUS	METALS	DISS. METALS	SPEC. METALS	MINERAL	DISS. MINERAL	NUTRIENT	OIL & GREASE	PHENOLS	1 gallon cubitainer	2½ gallon cubitainer	CHLOROPHYLLS		SEDIMENT		pH		temp. °C		flow			
WBNT-I-	on: 02-25-96 at: 0875 E											X						X		X		X			
	by: D.E. Clark																	X		X		X			
WBNT-DD-	on: 02-25-96 at: 08:25 E												X					X		X		X			
	by: D.E. Clark																	X		X		X			
WBNT-RHP-	on: 02-25-96 at: 08:45 E												X					8.41		11.6		1360 gpm			
	by: DE. Clark																								

NO. OF ICE CHESTS SHIPPED 2 RECEIVED 2

NO. OF SHIPPING CHESTS SHIPPED — RECEIVED _____

NO. OF RACKS SHIPPED — RECEIVED _____

NO. OF FIELD SHEETS SHIPPED 1 RECEIVED _____

SIGNATURE OF SHIPPER Delmas E. Clark DATE 2/25/96

*IF THE NUMBER OF SAMPLES OF EACH TYPE RECEIVED DIFFERS FROM THE NUMBER SHIPPED, NOTIFY THE WATER QUALITY AND ECOLOGY PROGRAM IMMEDIATELY.

BIOMONITORING
CHAIN OF CUSTODY RECORD
Bio Log No.: 3143-96-4

Client: TVA Watts Bar Nuclear Plant

Outfall/Station:

Collected by:

Facility Sampled:

NPDES Permit #:

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

SAMPLE TYPE:

CTI use only: Bio. Notification Time: By:

Grab	Collection		Temp (°C) upon Pick up / shipping Date:				Temp (°C) upon receipt at CTI Date: 2-25-96			Volume Collected	Visual Description
	Date	Time	On site	Rec. by	Client Init.	Time	Laboratory	Rec. by	Time		
T- RHP-4 1 112	2-25-96	8:45 Am					1.2	LS	12:50 Pm	2G	clear
T- J-4 2	2-25-96	8:15 Am					0.6	LS	12:50 Pm	1G	clear
T- DD-4 3 101	2-25-96	8:25 Am					1.1	LS	12:50 Pm	2G	clear
4											

Composite	From		To		Temp (°C) upon Pick up / shipping Date:				Temp (°C) upon receipt at CTI Date:			Volume Collected	Visual Description
	Date	Time	Date	Time	On site	Rec. by	Client Init.	Time	Laboratory	Rec. by	Time		
1													
2													

Comments:

First Day Rain Event: Yes Amount (in.)____ No Trace Daily Flow (MGD)____
Second Day Rain Event: Yes Amount (in.)____ No Trace Daily Flow (MGD)____

TEST PARAMETERS:

Test Type:
( ) Acute Screening ( ) Acute Definitive ( ) Chronic Screening (✓) Chronic Definitive

Test Species:
(✓) C. dubia ( ) D. pulex (✓) P. promelas ( ) Other____

SAMPLE DELIVERY: UPS ( ) Airborne Express ( ) Fed Ex ( ) Bus ( ) Client ( ) CTI / Charge ( ) $____

SAMPLE RECEIVING:

Relinquished by: [signature] 2/25/96 12:15
Signature Date/Time

Received by: Daniel Baldwin 2/25/96 12:15
Signature Date/Time

[signature] 2/25/96 12:40
Signature Date/Time

Rita Sutton 2-25-96 12:45
Signature Date/Time

Signature Date/Time

Signature Date/Time

Virginia Clients - please complete reverse side

TVA 11064 (WR-1-80)

SAMPLE CUSTODY RECORD

ACCT. # _____

SURVEY Watts Bar N.P. Biotoxicity

DATE 2-26-96

SHIPPED FROM Watts Bar N.P. Site

VIA Fed ex

SHIPPED BY Delmas E. Clark

AT 10:00 E (TIME)

RECEIVED BY _____ AT _____ (TIME) ON _____ (DATE)

BOTTLE REQUIREMENT*

CHECK AS INDICATED:

SHIPPING ☐

RECEIVING ☒

TAG NO.	BOD	COD	FERROUS	METALS	DISS. METALS	SPEC. METALS	MINERAL	DISS. MINERAL	NUTRIENT	OIL & GREASE	PHENOLS	1 gallon cubitainer	2 1/2 gallon cubitainer	CHLOROPHYLLS	SEDIMENT	pH	temp. °C	flow
WBNT-I- 5	on: 2-26-96 at: 08:45											X				X	X	X
	by: D.E. Clark															X	X	X
WBNT-DD- 5	on: 2-26-96 at: 09:00												X			X	X	X
	by: D.E. Clark															X	X	X
WBNT-RHP- 5	on: 2-26-96 at: 09:10												X			8.71	13.0	127.9 gpm
2.5°C	by: D.E. Clark																	

NO. OF ICE CHESTS SHIPPED 2 — RECEIVED [signature] 2/27/96

NO. OF SHIPPING CHESTS SHIPPED — — RECEIVED ~~S. Hyatt TOU 2/27/96~~ 935

NO. OF RACKS SHIPPED — — RECEIVED _____

NO. OF FIELD SHEETS SHIPPED 1 — RECEIVED _____

SIGNATURE OF SHIPPER Delmas E. Clark — DATE 2/26/96

*IF THE NUMBER OF CONTAINERS OF EACH TYPE RECEIVED DIFFERS FROM THE NUMBER SHIPPED, NOTIFY THE WATER QUALITY AND ECOLOGY PROGRAM IMMEDIATELY FROM THE NUMBER SHIPPED.

BIOMONITORING
CHAIN OF CUSTODY RECORD

Bio Log No.: 3173-3176 -5

Client: TVA

Outfall/Station: 101, 112, INTAKE

Collected by:

Facility Sampled:

NPDES Permit #:

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

SAMPLE TYPE:

CTI use only: Bio. Notification Time: By:

Grab	Collection		Temp (°C) upon Pick up / shipping Date:				Temp (°C) upon receipt at CTI Date:			Volume Collected	Visual Description
	Date	Time	On site	Rec. by	Client Init.	Time	Laboratory	Rec. by	Time		
INTAKE	2-26-96	845AM					2.0	JMH	935 A	1G	
101 DISCHARGE	2-26-96	900AM					2.0	JMH	935 A	2.5G	
112 POND RUNOFF	2-26-96	910AM					2.5	JMH	935A	2.5G	
4											

Composite	From		To		Temp (°C) upon Pick up / shipping Date:				Temp (°C) upon receipt at CTI Date:			Volume Collected	Visual Description
	Date	Time	Date	Time	On site	Rec. by	Client Init.	Time	Laboratory	Rec. by	Time		
1													
2													

Comments:

First Day Rain Event: Yes Amount (in.)_____ No Trace Daily Flow (MGD)_____
Second Day Rain Event: Yes Amount (in.)_____ No Trace Daily Flow (MGD)_____

TEST PARAMETERS:

Test Type:

( ) Acute Screening ( ) Acute Definitive ( ) Chronic Screening (✓) Chronic Definitive

Test Species:

(✓) *C. dubia* ( ) *D. pulex* (✓) *P. promelas* ( ) Other_____

SAMPLE DELIVERY: UPS ( ) Airborne Express ( ) Fed Ex ( ) Bus ( ) Client ( ) CTI / Charge ( ) $_____

SAMPLE RECEIVING:

Relinquished by:

Signature Fed X Date/Time

Signature 2/27/96 9:35A Date/Time

Signature Date/Time

Received by:

Signature 2-27/96 9:30A Date/Time

Signature J. HAMILTON 2-27-96 935AM Date/Time

Signature Date/Time

Virginia Clients - please complete reverse side

TVA 11064 (WR-1-80)

SAMPLE CUSTODY RECORD

#3173-6-6

ACCT. # _____

SURVEY Watts Bar N.P. Biotoxicity

DATE 2-27-96

SHIPPED FROM Watts Bar N.P. Site

VIA Fed ex

SHIPPED BY Delmas E. Clark

AT 10:00 E

RECEIVED BY Jeff Stiles AT 10:00am (TIME) ON 2/28/96 (DATE)

BOTTLE REQUIREMENT*

CHECK AS INDICATED:

SHIPPING ☐

RECEIVING ☒

	TAG NO.	BOD	COD	FERROUS	METALS	DISS. METALS	SPEC. METALS	MINERAL	DISS. MINERAL	NUTRIENT	OIL & GREASE	PHENOLS	1 gallon cubitainer	2½ gallon cubitainer	CHLOROPHYLLS	SEDIMENT	pH	temp. °C	flow			
	WBNT-I-6	on: 2-27-96 at: 08:55 E											X				X		X		X			1.
		by: D.E. Clark															X		X		X			
101	WBNT-DD-6	on: 2-27-96 at: 09:05 E												X			X		X		X			1.
		by: D.E. Clark															X		X		X			
112	WBNT-RHP-6	on: 2-27-96 at: 09:15 E												X			7.82		14.2		43.5 gpm			1.
		by: D.E. Clark																						

NO. OF ICE CHESTS SHIPPED 2 RECEIVED _____

NO. OF SHIPPING CHESTS SHIPPED — RECEIVED _____

NO. OF RACKS SHIPPED — RECEIVED _____

NO. OF FIELD SHEETS SHIPPED 1 RECEIVED _____

SIGNATURE OF SHIPPER Delmas E. Clark DATE 2/27/96

*IF THE NUMBER OF SAMPLES OF EACH TYPE RECEIVED IS DIFFERENT FROM THE NUMBER SHIPPED, NOTIFY THE WATER QUALITY AND ECOLOGY PROGRAM IMMEDIATELY.

TVA 11064 (WR-1-80)

SAMPLE CUSTODY RECORD

ACCT. # _____

Bio # 3173-6-7

SURVEY Watts Bar N.P. Biotoxicity — DATE 2/28/96

SHIPPED FROM Watts Bar N.P. Site — VIA Fed EX

SHIPPED BY Delmas E. Clark — AT 10:00 E (TIME)

RECEIVED BY [signature] — AT 9:30 E (TIME) ON 2/29/96 (DATE)

BOTTLE REQUIREMENT*

CHECK AS INDICATED:

SHIPPING ☐

RECEIVING ☒

	TAG NO.		BOD	COD	FERROUS	METALS	DISS. METALS	SPEC. METALS	MINERAL	DISS. MINERAL	NUTRIENT	OIL & GREASE	PHENOLS	1 gallon cubitainer	2½ gallon cubitainer	CHLOROPHYLLS	SEDIMENT	pH	temp. °C	flow				
1G	WBNT-I-7	on:	2/28/96			at: 08:55 E								X				X		X		X		
		by:	DE. Clark															X		X		X		
½G	WBNT-DD-101-7	on:	2/28/96			at: 09:10 E									X			X		X		X		
		by:	DE. Clark															X		X		X		
2½G	WBNT-RHP-112-7	on:	2/28/96			at: 09:20 E									X			9.0		14.6		240.8 gpm		
		by:	DE. Clark																					

NO. OF ICE CHESTS SHIPPED _____ RECEIVED _____

NO. OF SHIPPING CHESTS SHIPPED _____ RECEIVED _____

NO. OF RACKS SHIPPED _____ RECEIVED _____

NO. OF FIELD SHEETS SHIPPED _____ RECEIVED _____

SIGNATURE OF SHIPPER Delmas E Clark DATE 2/28/96

*IF THE NUMBER OF BOTTLES OF EACH TYPE RECEIVED IS DIFFERENT FROM THE NUMBER SHIPPED, NOTIFY THE WATER QUALITY AND ECOLOGY BRANCH IMMEDIATELY.

SURVIVAL AND GROWTH DEFINITIVE TEST

Start Date:	23 Feb-96 15:00	Protocol ID:	EPA/600/4-89/001	Sample ID:	3174
End Date:	01 Mar-96 14:00	Analyst Name:	Yarnell	Permit ID:	N/A
Sample Date:		Response:	Survival	Test Species:	Pimephales promelas
Comments:	TVA - Watts Bar Outfall 101				

Conc-%	1	2	3	4
Control	0.8	1	1	1
2.3	1	1	0.9	1
2.9	0.9	1	1	1
7.8	0.9	1	1	1
9.8	1	0.9	1	0.7
100	1	1	0.9	1

			Transformed (Angular) Data					T	Rank		Probit Data	
Conc-%	Mean	N-Mean	Mean	Min	Max	Var	SD	Statistic	Sum	Critical	NRESP	NDOSE
Control	0.95	1.000	1.4174	1.107149	1.5208	0.04277	0.2068					
2.3	0.975	1.026	1.4528	1.249046	1.5208	0.01846	0.1359	-0.289	18.50	10		
2.9	0.975	1.026	1.4528	1.249046	1.5208	0.01846	0.1359	-0.289	18.50	10		
7.8	0.975	1.026	1.4528	1.249046	1.5208	0.01846	0.1359	-0.289	18.50	10		
9.8	0.9	0.947	1.3204	0.991157	1.5208	0.0646	0.2542	0.789	16.00	10		
100	0.975	1.026	1.4528	1.249046	1.5208	0.01846	0.1359	-0.289	18.50	10		

ANOVA Assumptions	Calculated Statistic	Critical Statistic
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.010)	0.788	0.884
Bartlett's Test indicates equality of variance (p = 0.8083)	2.286	15.086

Hypothesis Tests (alpha = 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSB	MSE	Critical	df
Dunnett's Multiple Comparison Test	>100	>100		<1	0.1655	0.0113	0.0302	2.410	5, 18
→ Steel's Many One Rank Test	>100	>100		<1					

Reviewed by: [illegible]

FATHEAD MINNOW
LARVAL SURVIVAL AND GROWTH TEST
EPA 600/4-89/001, METHOD 1000.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharger/Location: TVA / WATTS BAR NUCLEAR PLANT - OUTFALL 101

Date/Time Test Terminated: 3/1/96 [illegible]

Bio. Log No: 3174

Organism Batch Number: 0222

Date/Time Test Initiated: 2-23-96 3 PM

Initial Organism Age: <24hrs

Dilution Water Used: 9:1 RW

Dilution Water Batch Number on Day: 1: 023B 2: 024G 3: 024G 4: 025J 5: 027H 6: 028O 7: 031m

Time of Day Renewed on Day: 1: 3PM 2: 1PM 3: 10AM 4: 1PM 5: 11:30 6: 2PM 7: 2PM.

Sample ID	Test Cont. No.	No. of Live Larvae (Days) Sample Dates 2/23 (1)	2/23 (2)	2/24 (3)	2/25 (4)	2/26 (5)	2/27 (6)	2/28 (7)	Tin No.	Wt. of Tin & Larvae (mg)	Wt. of Tin (mg)	Total Wt. of Larvae (mg)	Average Wt. of Larvae (mg)	Average Wt. for Treatment (mg)
Control	1	10	8	8	8	8	8	8	1	1004.11	999.43	4.68	0.585	
	2	10	10	10	10	10	10	10	2	1004.12	997.39	6.73	0.673	
	3	10	10	10	10	10	10	10	3	1002.02	995.52	6.50	0.650	
	4	10	10	10	10	10	10	10	4	1003.61	996.65	6.96	0.696	0.651
2.3%	5	10	10	10	10	10	10	10	5	1017.17	1010.16	7.01	0.701	
	6	10	10	10	10	10	10	10	6	1004.86	998.10	6.76	0.676	
	7	10	9	9	9	9	9	9	7	981.76	975.85	5.91	0.657	
	8	10	10	10	10	10	10	10	8	983.01	976.55	6.46	0.646	0.670
2.9%	9	10	9	9	9	9	9	9	9	979.88	973.08	6.80	0.756	
	10	10	10	10	10	10	10	10	10	989.66	982.66	7.00	0.700	
	11	10	10	10	10	10	10	10	11	975.14	969.24	5.90	0.590	
	12	10	10	10	10	10	10	10	12	980.48	973.79	6.69	0.669	0.679
7.8%	13	10	10	10	10	9	9	9	13	991.43	984.93	6.50	0.722	
	14	10	10	10	10	10	10	10	14	993.30	986.04	7.26	0.726	
	15	10	10	10	10	10	10	10	15	989.36	982.30	7.06	0.706	
	16	10	10	10	10	10	10	10	16	979.37	972.89	6.48	0.648	0.700
9.8%	17	10	10	10	10	10	10	10	17	1007.74	1001.02	6.72	0.672	
	18	10	9	9	9	9	9	9	18	1001.41	994.56	6.85	0.761	
	19	10	10	10	10	10	10	10	19	986.11	978.19	7.92	0.792	
	20	10	7	7	7	7	7	7	20	1006.37	1000.79	5.58	0.797	0.756
Analyst		LS	LS	LS	RN	TE	SY	JS		RN	JS	LS	LS	LS

Notes: Weights shown on this page were obtained by ~~dividing~~ dividing the total weight for a replicate by the number of survivors. However, weights used in the statistical analyses are based on the original number of test organisms. -RP

Approved By RP

FATHEAD MINNOW
LARVAL SURVIVAL AND GROWTH TEST
EPA 600/4-89/001, METHOD 1000.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharger/Location: TVA / WATTS BAR NUCLEAR PLANT - OUTFALL 101

Date/Time Test Terminated: 3/1/96 2:00 PM

Organism Batch Number: 0222

Bio. Log No: 3174

Initial Organism Age: < 24hrs

Date/Time Test Initiated: 2-23-96 3PM

Dilution Water Used: 9:1 RW

Dilution Water Batch Number on Day: 1: 023B 2: 024G 3: 024G 4: 025J 5: 027H 6: 028O 7: 03im

Time of Day Renewed on Day: 1: 3PM 2: 1PM 3: 10AM 4: 1PM 5: 11:30 6: 2PM 7: 2PM

Sample ID	Test Cont. No.	No. of Live Larvae (Days) Sample Dates 2/23	2/23	2/24	2/25	2/26	2/27	2/28	Tin No.	Wt. of Tin & Larvae (mg)	Wt. of Tin (mg)	Total Wt. of Larvae (mg)	Average Wt. of Larvae (mg)	Average Wt. for Treatment (mg)
		1	2	3	4	5	6	7						
100%	21	10	10	10	10	10	10	10	21	993.23	985.74	7.49	0.749	
	22	10	10	10	10	10	10	10	22	1000.75	992.48	8.27	0.827	
	23	10	10	9	9	9	9	9	23	1006.41	999.13	7.28	0.809	
	24	10	10	10	10	10	10	10	24	999.02	993.68	5.34	0.534	0.730
Analyst		LS	LS	LS	RN	TF	SY	JS		RN	JS	LS	LS	LS

Notes: See page 1 note

Approved By RP

dybVanns:93 059

CHEMICAL AND PHYSICAL ANALYSIS DATA SHEET / FRESH WATER

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

DISCHARGER/LOCATION: TVA / WATTS BAR NUCLEAR PLANT - Outfall 101
BIOLOGY LOG NUMBER: 3174
TEST INITIATION DATE/TIME: 2-23-96 3pm
TEST ORGANISM (Check one): ____ *Ceriodaphnia dubia* (Method 1002.0)[1] ✓ *Pimephales promelas* (Method 1000.0)[1]
SAMPLE DATE: Day 1 ~~2-22~~ 2-22 i.e. BO 3-22-96 Day 2 2-23 Day 3 2/24 Day 4 2/25 Day 5 2/26 Day 6 2/27 Day 7 2/28

EFFLUENT CONC. (%)	pH (Standard Units) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.9	7.2	7.9	7.2	7.7	7.4	7.9	7.3	7.9	7.4	8.0	8.0	8.0	7.3
2.3	8.0	7.2	7.9	7.2	8.0	7.3	7.8	7.2	7.8	7.3	8.1	8.1	8.0	7.3
2.9	8.0	7.2	7.9	7.2	8.0	7.3	7.8	7.2	7.8	7.3	8.1	8.1	8.0	7.3
7.8	8.0	7.1	7.8	7.1	7.9	7.3	7.7	7.2	7.7	7.2	8.1	7.2	7.9	7.3
9.8	8.0	7.1	7.8	7.1	7.9	7.3	7.7	7.2	7.7	7.2	8.1	7.1	7.9	7.2
100	7.1	6.9	7.0	6.9	7.1	7.1	7.1	7.0	6.9	7.1	7.3	6.9	7.2	6.9
Control												7.3		
2.3												7.2		
2.9												7.2		
Analyst	SF	LS	LS	LS	LS	LS	LS	RN	LS	TF	SY	SY	SY	SS

EFFLUENT CONC. (%)	DISSOLVED OXYGEN (mg/L) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.8	5.2	7.8	4.5	8.0	5.1	7.7	6.3	7.8	4.9	8.1	5.2	7.7	[illegible]
2.3	7.5	5.1	7.9	4.4	7.6	5.0	7.6	5.9	7.9	4.8	8.2	5.0	8.0	[illegible]
2.9	7.8	5.0	7.8	4.5	7.8	4.7	7.6	5.9	8.1	4.8	8.2	4.9	8.0	[illegible]
7.8	8.1	4.8	7.9	4.4	7.8	4.9	7.8	5.8	8.2	4.8	8.3	4.6	8.0	[illegible]
9.8	8.2	4.9	7.9	4.4	7.9	5.0	7.9	5.7	8.2	5.0	8.3	4.6	8.0	[illegible]
100	8.8	5.3	7.9	5.0	9.4	5.1	9.4	6.0	9.5	5.6	8.8	4.4	8.8	[illegible]
Control														
2.3														
2.9														
Analyst	SF	LS	LS	LS	LS	LS	LS	RN	LS	TF	SY	SY	SY	[illegible]

EFFLUENT CONC. (%)	SPECIFIC CONDUCTANCE (micromhos/cm) TEST DAY 1	2	3	4	5	6	7	TOTAL ALKALINITY (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7
Control	354	349	356	357	350	353	361	84	81	81	85	78	79	84
2.3	339	356	346	352	349	350	359							
2.9	344	350	347	351	349	350	356							
7.8	336	340	338	342	341	346	347							
9.8	334	335	334	339	337	338	342							
100	160	151	154	162	160	174	165	45	44	43	44	86	52	48
Analyst	SF	LS	LS	LS	LS	SY	SY	SH	SH	SH	SH	SH	SH	SH

EFFLUENT CONC. (%)	TOTAL HARDNESS (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7	TOTAL RESIDUAL CHLORINE (mg/L) TEST DAY 1	2	3	4	5	6	7
Control	111	133	133	122	125	114	123							
2.3														
2.9														
7.8														
9.8														
100	78	73	80	67	69	68	63	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	[illegible]
Analyst	SH	SH	SH	SH	SH	SH	SH	SF	LS	LS	LS	LS	SY	[illegible]

Sample Treatment With Sodium Thiosulfate? ____ Yes ✓ No

[1] Toxicity Test Method Manual: EPA 600/4-89/001; Method numbers for chemical parameters are listed on appropriate chemical bench sheets.

Approved by: BO

dbm\dataproc\bmms-55 010

SHORT-TERM CHRONIC TOXICITY TEST TEMPERATURE RECORD

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharge: TVA-Outfall 101
Location: Watts Bar Nuclear Plant
Bio Log No.: 3174

Test Initiation Date / Time: 2-23-96 3PM
Test Protocol Temperature: 25 ± 1°C
Test Organism: (circle one) *C. dubia*, *P. prometas*, *M. beryllina*, *M. bahia*
Other:

Sample Identification	Temperature (°C)								
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Control	25.3	24.2	24.1	24.6	24.9	24.1	25.0	24.8	
2.3%	25.3	24.2	24.1	24.7	24.9	24.1	24.9	24.8	
2.9%	25.4	24.0	24.1	24.6	24.7	24.1	24.7	24.6	
7.8%	24.7	24.3	24.1	24.6	24.8	24.1	24.8	24.7	
9.8%	25.5	24.2	24.2	24.6	24.6	24.1	24.9	24.7	
100%	25.5	24.0	24.1	24.6	24.5	24.1	24.9	24.8	
Analyst	SH	LS	LS	LS	ZN	TF	SY	JB	

Comments: mean (range) = 24.6 (24.0 - 25.5)

SURVIVAL AND REPRODUCTION DEFINITIVE TEST

Start Date:	23 Feb-96 15:00	Protocol ID:	EPA/600/4-89/001	Sample ID:	3173
End Date:	01 Mar-96 14:00	Analyst Name:	Yarnell	Permit ID:	N/A
Sample Date:		Response:	Reproduction	Test Species:	Ceriodaphnia dubia
Comments:	TVA - Watts Bar Outfall 101				

Conc-%	1	2	3	4	5	6	7	8	9	10
Control	26	25	27	29	29	29	31	30	30	27
2.3	31	26	24	32	29	26	30	30	26	25
2.9	28	20	27	30	25	30	25	23	28	24
7.8	27	24	27	31	28	26	27	28	25	28
9.8	26	6	27	29	30	28	28	26	26	25
100	22	20	21	23	24	20	22	17	17	23

			Transformed (None) Data					T	Rank		Probit Data	
Conc-%	Mean	N-Mean	Mean	Min	Max	Var	SD	Statistic	Sum	Critical	NRESP	NDOSE
Control	28.3	1.000	28.3	25	31	3.78889	1.9465					
2.3	27.9	0.986	27.9	24	32	7.87778	2.8067	0.247	101.00	75		
2.9	26	0.919	26	20	30	10.2222	3.1972	1.419	83.00	75		
7.8	27.1	0.958	27.1	24	31	3.65556	1.912	0.740	87.50	75		
9.8	25.1	0.887	25.1	6	30	47.4333	6.8872	1.974	84.50	75		
100	20.9	0.739	20.9	17	24	5.87778	2.4244	*4.564	*55.00	75		

ANOVA Assumptions	Calculated Statistic	Critical Statistic
D'Agostino's D Test indicates non-normal distribution (p <= 0.010)	0.237	0.2673, 0.2873
Bartlett's test indicates unequal variances (p = 0.0002)	24.223	15.086

Hypothesis Tests (alpha = 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSB	MSE	Critical	df
Dunnett's Multiple Comparison Test	9.8	100	31.305	10.204	3.7073	73.697	13.143	2.287	5, 54
Steel's Many One Rank Test	9.8	100	31.305	10.204					

Reviewed by: PW

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST DATA SHEET

EPA 600/4-89/001, Method 1002.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharger: TVA - OUTFALL 101
Location: WATTS BAR NUCLEAR PLANT
Bio No.: 3173
Date/Time Initial Sample Collected: 2-22-96 9:10A

Date/Time Test Initiated: 2-23-96 3pm
Date/Time Test Terminated: 2-29-96 2PM
Dilution Water Used: 9:1 RW
Source Culture Date: 0209

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult) — Sample Date or Dilution Water Batch Number								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		2-22	2/23	2/24	2/25	2/26	2/27				
		1	2	3	4	5	6	7	8		
2.9	21	0	0	4	10	0	14			28	
	22	0	0	4	0	9	7			20	
	23	0	0	4	0	9	14			27	
	24	0	0	5	0	10	15			30	
	25	0	0	4	0	9	12			25	
	26	0	0	5	0	10	15			30	
	27	0	0	3	0	9	13			25	
	28	0	0	0	3	8	12			23	
	29	0	0	4	0	10	14			28	
	30	0	0	4	0	7	13			24	260
No. of Live Adults		10	10	10	10	10	10				

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult) — Sample Date or Dilution Water Batch Number								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		2-22	2/23	2/24	2/25	2/26	2/27				
		1	2	3	4	5	6	7	8		
7.8	31	0	0	5	0	9	13			27	
	32	0	0	4	0	7	13			24	
	33	0	0	4	0	10	13			27	
	34	0	0	5	0	11	15			31	
	35	0	0	5	0	8	15			28	
	36	0	0	4	0	9	13			26	
	37	0	0	5	0	9	13			27	
	38	0	0	5	0	9	14			28	
	39	0	0	5	0	9	11			25	
	40	0	0	6	0	8	14			28	271
No. of Live Adults		10	10	10	10	10	10				
Analyst		LS	LS	LS	RN	SG	LS			LS	LS

Comments:

Approved By: [illegible]

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST DATA SHEET

EPA 600/4-89/001, Method 1002.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharger: TVA - OUTFALL 101
Location: WATTS BAR
Bio No.: ~~39~~ 3173
Date/Time Initial Sample Collected: 2-22-96 9:10 A

Date/Time Test Initiated: 2-23-96 3pm
Date/Time Test Terminated: 2-29-96 3pm
Dilution Water Used: 9:1 RW
Source Culture Date: 0209

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult)								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		Sample Date or Dilution Water Batch Number									
		023B	024G	024G	025J	027H	028O				
		1	2	3	4	5	6	7*	8*		
Control	1	0	0	4	0	9	13			26	
	2	0	0	4	0	8	13			25	
	3	0	0	5	0	9	13			27	
	4	0	0	5	0	9	15			29	
	5	0	0	4	0	9	16			29	
	6	0	0	6	0	10	13			29	
	7	0	0	5	0	10	16			31	
	8	0	0	4	0	10	16			30	
	9	0	0	5	0	10	15			30	
	10	0	0	5	0	9	13			27	283
No. of Live Adults		10	10	10	10	10	10				

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult)								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		Sample Date or Dilution Water Batch Number									
		2-22	2/23	2/24	2/25	2/26	2/27				
		1	2	3	4	5	6	7	8		
2.3	11	0	0	4	11	0	16			31	
	12	0	0	3	0	9	14			26	
	13	0	0	4	0	8	12			24	
	14	0	0	5	0	11	16			32	
	15	0	0	4	0	10	15			29	
	16	0	0	5	0	8	13			26	
	17	0	0	5	0	10	15			30	
	18	0	0	5	0	10	15			30	
	19	0	0	4	0	9	13			26	
	20	0	0	5	0	9	11			25	279
No. of Live Adults		10	10	10	10	10	10				
Analyst		LS	LS	LS	RW	SY	LS			LS	LS

Comments:
* If necessary

Approved By: RP

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST DATA SHEET

EPA 600/4-89/001, Method 1002.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharger: TVA - OUTFALL 101
Location: WATTS BAR NUCLEAR PLANT
Bio No.: 3173
Date/Time Initial Sample Collected: 2-22-96 9:10A

Date/Time Test Initiated: 2-23-96 3pm
Date/Time Test Terminated: 2-29-96 2pm
Dilution Water Used: 9:1RW
Source Culture Date: 0209

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult) — Sample Date or Dilution Water Batch Number								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		2-22	2/23	2/24	2/25	2/26	2/27				
		1	2	3	4	5	6	7	8		
9.8	41	0	0	3	0	9	14			26	
	42	0	0	0	0	4	2			6	
	43	0	0	5	0	9	13			27	
	44	0	0	5	0	10	14			29	
	45	0	0	6	0	10	14			30	
	46	0	0	5	0	9	14			28	
	47	0	0	6	0	9	13			28	
	48	0	0	0	5	8	13			26	
	49	0	0	5	0	9	12			26	
	50	0	0	4	0	8	13			25	251
No. of Live Adults		10	10	10	10	10	10				

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult) — Sample Date or Dilution Water Batch Number								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		2-22	2/23	2/24	2/25	2/26	2/27				
		1	2	3	4	5	6	7	8		
100	51	0	0	4	0	8	10			22	
	52	0	0	3	0	6	11			20	
	53	0	0	0	5	6	10			21	
	54	0	0	5	0	7	11			23	
	55	0	0	0	4	8	12			24	
	56	0	0	4	0	7	9			20	
	57	0	0	0	3	7	12			22	
	58	0	0	0	2	6	9			17	
	59	0	0	0	3	5	9			17	
	60	0	0	5	0	7	11			23	209
No. of Live Adults		10	10	10	10	10	10				
Analyst		LS	LS	LS	RN	SY	LS			LS	LS

Comments:

Approved By: RF

wp:forms\93-036

CHEMICAL AND PHYSICAL ANALYSIS DATA SHEET / FRESH WATER

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

DISCHARGER/LOCATION: TVA / WATTS BAR NUCLEAR PLANT - OUTFALL 101
BIOLOGY LOG NUMBER: 3173
TEST INITIATION DATE/TIME: 2-23-96 3PM
TEST ORGANISM (Check one): ✓ *Ceriodaphnia dubia* (Method 1002.0)[1] ____ *Pimephales promelas* (Method 1000.0)[1]
SAMPLE DATE: Day 1 2-22 Day 2 2-23 Day 3 2/24 Day 4 2/25 Day 5 2/26 Day 6 2/27 Day 7 ____

EFFLUENT CONC. (%)	pH (Standard Units) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.9	8.0	7.9	8.0	7.7	7.9	7.9	7.7	7.9	7.9	8.0	7.8		
2.3	8.0	8.0	7.9	8.0	8.0	7.9	7.8	7.7	7.8	7.9	8.1	7.8		
2.4	8.0	8.0	7.9	8.0	8.0	7.9	7.8	7.7	7.8	7.9	8.1	7.8		
7.8	8.0	8.0	7.8	8.0	7.9	7.9	7.7	7.7	7.7	7.9	8.1	7.8		
9.8	8.0	7.9	7.8	8.0	7.9	7.9	7.7	7.7	7.7	7.9	8.1	7.8		
100	7.1	7.7	7.0	7.7	7.1	7.7	7.1	7.4	6.9	7.6	7.3	7.6		
Analyst	SF	LS	LS	LS	LS	LS	LS	RN	LS	SH	SH	LS		

EFFLUENT CONC. (%)	DISSOLVED OXYGEN (mg/L) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.8	7.8	7.8	7.9	8.0	7.4	7.7	7.8	7.8	8.0	8.1	7.6		
2.3	7.5	7.9	7.9	7.9	7.6	7.4	7.6	7.9	7.9	8.1	8.2	7.9		
2.4	7.8	7.9	7.8	7.9	7.8	7.4	7.6	7.9	8.1	8.1	8.2	7.9		
7.8	8.1	7.9	7.9	7.9	7.8	7.4	7.8	7.9	8.2	8.1	8.3	7.9		
9.8	8.2	7.9	7.9	7.9	7.9	7.4	7.9	7.9	8.2	8.1	8.3	7.9		
100	8.8	7.9	7.9	8.0	9.4	7.4	9.4	7.9	9.5	8.1	8.8	7.9		
Analyst	SF	LS	LS	LS	LS	LS	LS	RN	LS	SH	SH	LS		

EFFLUENT CONC. (%)	SPECIFIC CONDUCTANCE (micromhos/cm) TEST DAY 1	2	3	4	5	6	7
Control	354	349	356	357	350	353	
2.3	339	356	346	352	349	350	
2.4	344	350	347	351	349	350	
7.8	336	340	338	342	341	346	
9.8	334	335	334	339	337	338	
100	160	151	154	162	160	174	
Analyst	SF	LS	LS	LS	LS	SH	

EFFLUENT CONC. (%)	TOTAL ALKALINITY (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7
Control	84	81	81	85	78	79	
2.3							
2.4							
7.8							
9.8							
100	45	44	43	44	86	52	
Analyst	SH	SH	SH	SH	SH	SH	

EFFLUENT CONC. (%)	TOTAL HARDNESS (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7
Control	111	133	133	122	125	114	
2.3							
2.4							
7.8							
9.8							
100	78	73	80	67	69	68	
Analyst	SH	SH	SH	SH	SH	SH	

EFFLUENT CONC. (%)	TOTAL RESIDUAL CHLORINE (mg/L) TEST DAY 1	2	3	4	5	6
Control						
2.3						
2.4						
7.8						
9.8						
100	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Analyst	SF	LS	LS	LS	LS	SH

Sample Treatment With Sodium Thiosulfate? ____ Yes ✓ No

[1] Toxicity Test Method Manual: EPA 600/4-89/001; Method numbers for chemical parameters are listed on appropriate chemical bench sheets.

Approved by: RP

SHORT-TERM CHRONIC TOXICITY TEST TEMPERATURE RECORD

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharge: TVA - Outfall 101
Location: Watts Bar Nuclear Plant
Bio Log No.: 3173

Test Initiation Date / Time: 2-23-96 3PM
Test Protocol Temperature: 25 ± 1°C
Test Organism: (circle one) C. dubia, P. promelas, M. beryllina, M. bahia
Other: _____

Sample Identification	Temperature (°C)								
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Control	25.3	24.6	24.0	24.1	24.6	24.2	24.0		
2.3	25.3	24.6	24.0	24.2	24.5	24.2	24.0		
2.9	25.4	24.6	24.1	24.2	24.5	24.1	24.1		
7.8	24.7	24.6	24.1	24.1	24.5	24.1	24.2		
9.8	25.5	24.6	24.1	24.3	24.5	24.1	24.1		
100	25.5	24.6	24.2	24.3	24.6	24.2	24.1		
Analyst	SH	LS	LS	LS	RN	SY	LS		

Comments: Mean (range) = 24.4 (24.0 - 25.5)

SURVIVAL AND GROWTH DEFINITIVE TEST

Start Date:	23 Feb-96 15:30	Protocol ID:	EPA/600/4-89/001	Sample ID:	3176
End Date:	01 Mar-96 10:30	Analyst Name:	Yarnell	Permit ID:	N/A
Sample Date:		Response:	Survival	Test Species:	Pimephales promelas
Comments:	TVA - Watts Bar Outfall 112				

Conc-%	1	2	3	4	5	6	7	8
Control	0.8	1	1	1	0.9	0.9	0.9	0.8
12.5	1	1	1	1				
25	1	0.9	1	0.9				
50	1	1	1	1				
80	0.9	0.6	1	1				
100	0.6	0.8	0.8	1				

Conc-%	Mean	N-Mean	Transformed (Angular) Data Mean	Min	Max	Var	SD	T Statistic	Rank Sum	Critical	Probit Data NRESP	NDOSE
Control	0.9125	1.000	1.3155	1.107149	1.5208	0.03236	0.1799					
12.5	1	1.096	1.5208	1.520779	1.5208	0	0	-1.778	36.00	12		
25	0.95	1.041	1.3849	1.249046	1.5208	0.02461	0.1569	-0.601	30.00	12		
50	1	1.096	1.5208	1.520779	1.5208	0	0	-1.778	36.00	12		
80	0.875	0.959	1.2942	0.886077	1.5208	0.09043	0.3007	0.184	26.50	12		
100	0.8	0.877	1.1553	0.886077	1.5208	0.07023	0.265	1.387	18.50	12		

ANOVA Assumptions	Calculated Statistic	Critical Statistic
Shapiro-Wilk's Test indicates normal distribution (p > 0.010)	0.958	0.896
Equality of variances cannnot be confirmed	#N/A	15.086

Hypothesis Tests (alpha = 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSB	MSE	Critical	df
Bonferroni Adjusted t Test	> 100	>100		< 1	0.1925	0.082	0.0356	2.508	5, 22
→ Wilcoxon Rank Sum Test	>100	>100		<1					

Reviewed by: PW

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

EPA 600/4-89/001, METHOD 1000.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharger/Location: TVA / WATTS BAR NUCLEAR PLANT - OUTFALL 112

Bio. Log No: 3176

Date/Time Test Initiated: 2-23-96 3:30PM

Dilution Water Batch Number on Day: 1: 023B 2: 024G 3: 024G 4: 025J 5: 027A 6: 028O 7: 032F

Time of Day Renewed on Day: 1: 3:30P 2: 3:00pm 3: 2:30pm 4: 3:00pm 5: 3:00pm 6: 3:05pm 7: 3:00pm

Date/Time Test Terminated: 3-1-96 10:30Am

Organism Batch Number: 0222

Initial Organism Age: < 24 hrs

Dilution Water Used: 9:1 RW

Sample ID	Test Cont. No.	No. of Live Larvae (Days) Sample Dates 2/22 (1)	2/23 (2)	2/24 (3)	2/25 (4)	2/26 (5)	2/27 (6)	2/28 (7)	Tin No.	Wt. of Tin & Larvae (mg)	Wt. of Tin (mg)	Total Wt. of Larvae (mg)	Average Wt. of Larvae (mg)	Average Wt. for Treatment (mg)
Control	1	9	9	9	9	9	9	9	1	974.26	970.00	4.26	0.473	
	2	9	9	9	9	9	9	9	2	979.64	973.49	6.15	0.683	
	3	9	9	9	9	9	9	9	3	984.93	979.26	5.67	0.630	
	4	9	8	8	8	8	8	8	4	987.06	982.32	4.74	0.592	0.594
12.5	5	10	10	10	10	10	10	10	5	985.43	979.28	6.15	0.615	
	6	10	10	10	10	10	10	10	6	983.17	976.79	6.38	0.638	
	7	10	10	10	10	10	10	10	7	979.41	973.23	6.18	0.618	
	8	10	10	10	10	10	10	10	8	978.94	973.90	5.04	0.504	0.594
25	9	10	10	10	10	10	10	10	9	1003.53	996.78	6.75	0.675	
	10	10	10	10	10	9	9	9	10	1004.18	998.76	5.42	0.602	
	11	10	10	10	10	10	10	10	11	1007.17	1000.14	7.03	0.703	
	12	10	10	10	10	10	10	9	12	990.53	984.28	6.25	0.694	0.668
50	13	10	10	10	10	10	10	10	13	979.48	973.04	6.44	0.644	
	14	10	10	10	10	10	10	10	14	982.53	975.88	6.65	0.665	
	15	10	10	10	10	10	10	10	15	981.90	974.84	7.06	0.706	
	16	10	10	10	10	10	10	10	16	986.52	978.91	7.61	0.761	0.694
80	17	10	10	10	9	9	9	9	17	981.67	975.83	5.84	0.649	
	18	9	9	9	8	7	6	6	18	981.31	976.28	5.03	0.838	
	19	10	10	10	10	10	10	10	19	979.51	972.79	6.72	0.672	
	20	10	10	10	10	10	10	10	20	974.93	968.00	6.93	0.693	0.713
Analyst		LS	LS	LS	LS	LS	LS	SG		RN	SG	LS	LS	LS

Notes: Weights shown on this page were obtained by dividing total weight for a replicate by the number of survivors. However, weights used for statistical analyses are based on the number of original test organisms.

Approved By PP

dgb/forms\93-059

FATHEAD MINNOW
LARVAL SURVIVAL AND GROWTH TEST
EPA 600/4-89/001, METHOD 1000.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharger/Location: TVA / WATTS BAR NUCLEAR PLANT - OUTFALL 112

Bio. Log No: 3176

Date/Time Test Initiated: 2-23-96 3:30PM

Dilution Water Batch Number on Day: 1: 023B 2: 024G 3: 024G 4: 025J 5: 027H 6: 028U 7: 032F

Time of Day Renewed on Day: 1: 3:30P 2: 3:00Pm 3: 2:30Pm 4: 3:00Pm 5: 3:00Pm 6: 3:05Pm 7: 3:00Pm

Date/Time Test Terminated: 3-1-96 10:30Am

Organism Batch Number: 0222

Initial Organism Age: ~~6.222~~ <24 hrs

Dilution Water Used: 9:1 RW

Sample ID	Test Cont. No.	No. of Live Larvae (Days) Sample Dates 2/22 (1)	2/23 (2)	2/24 (3)	2/25 (4)	2/26 (5)	2/27 (6)	2/28 (7)	Tin No.	Wt. of Tin & Larvae (mg)	Wt. of Tin (mg)	Total Wt. of Larvae (mg)	Average Wt. of Larvae (mg)	Average Wt. for Treatment (mg)
100	21	10	10	9	7	6	6	6	21	987.95	982.88	5.07	0.845	
	22	10	10	10	9	9	9	8	22	979.64	973.37	6.27	0.784	
	23	10	10	10	9	9	8	8	23	987.16	980.69	6.47	0.809	
	24	10	10	10	10	10	10	10	24	988.02	980.03	7.99	0.799	0.809
Intake 100	25	10	10	10	10	10	10	10	25	1000.15	993.74	6.41	0.641	
	26	10	10	9	9	9	9	9	26	1007.53	1001.41	6.12	0.680	
	27	10	10	10	10	10	10	10	27	1002.61	996.00	6.61	0.661	
	28	10	10	10	10	10	10	10	28	1003.79	996.89	6.90	0.690	0.668
Analyst		LS	LS	LS	LS	LS	LS	LS		RN	SM	LS	LS	LS

Notes:

Approved By RP

dpbforms:93 059

CHEMICAL AND PHYSICAL ANALYSIS DATA SHEET / FRESH WATER

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

DISCHARGER/LOCATION: TVA / WATTS BAR NUCLEAR PLANT - OUTFALL 112
BIOLOGY LOG NUMBER: 3176
TEST INITIATION DATE/TIME: 2-23-96 3:30PM
TEST ORGANISM (Check one): ____ *Ceriodaphnia dubia* (Method 1002.0)[1] ✓ *Pimephales promelas* (Method 1000.0)[1]
SAMPLE DATE: Day 1 2-22 Day 2 2/23 Day 3 2/24 Day 4 2/25 Day 5 2/26 Day 6 2/27 Day 7 2/28

EFFLUENT CONC. (%)	pH (Standard Units) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.9	7.2	7.9	7.3	7.7	7.4	7.9	7.3	7.9	7.3	8.0	7.3	7.6	7.3
12.5	8.0	7.2	7.2	7.2	7.8	7.3	7.6	7.3	7.8	7.3	8.2	7.2	8.0	7.3
25	7.9	7.2	7.7	7.1	7.8	7.3	7.6	7.2	7.8	7.3	8.2	7.2	8.0	7.2
50	7.6	7.2	7.5	7.1	7.7	7.3	7.5	7.2	7.8	7.3	8.1	7.2	8.1	7.3
80	7.5	7.2	7.3	7.1	7.6	7.3	7.4	7.2	7.7	7.3	8.1	7.1	8.2	7.4
100	7.3	7.2	7.2	7.1	7.5	7.3	7.4	7.2	7.7	7.3	8.1	7.2	8.2	7.4
Intake-100	7.1	7.0	7.0	7.1	7.0	7.0	7.0	7.0	7.1	7.0	7.2	7.0	7.2	7.1
Analyst	SF	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS	SH

EFFLUENT CONC. (%)	DISSOLVED OXYGEN (mg/L) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.8	4.4	7.8	5.3	8.0	5.5	7.7	5.3	7.8	4.8	8.1	5.7	8.0	[illegible]
12.5	8.1	4.6	8.2	4.7	8.0	5.3	7.8	5.1	7.9	5.0	8.3	5.4	8.6	[illegible]
25	8.4	4.9	8.3	4.5	8.2	5.2	7.1	5.0	8.2	5.1	8.4	5.3	8.2	[illegible]
50	7.2	5.3	8.7	4.5	7.5	5.2	7.5	4.8	8.4	4.9	8.7	5.2	8.6	[illegible]
80	8.7	5.4	9.1	4.6	8.8	5.1	8.8	4.8	8.6	5.2	8.9	4.9	9.0	[illegible]
100	7.3	5.3	9.6	4.9	9.5	5.2	9.5	5.1	9.1	5.5	9.3	5.3	9.2	[illegible]
Intake-100	9.4	5.3	9.6	4.5	8.8	5.0	9.1	4.6	9.5	5.5	9.7	5.0	9.6	[illegible]
Analyst	SF	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS

EFFLUENT CONC. (%)	SPECIFIC CONDUCTANCE (micromhos/cm) TEST DAY 1	2	3	4	5	6	7
Control	359	349	356	357	350	356	357
12.5	346	341	340	344	350	342	345
25	328	326	325	333	338	328	331
50	303	298	297	310	313	300	304
80	272	265	266	281	283	269	273
100	248	244	246	261	262	248	252
Intake-100	161	152	166	162	144	164	161
Analyst	SF	JS	JS	JS	JS	JS	JS

EFFLUENT CONC. (%)	TOTAL ALKALINITY (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7
Control	84	81	81	85	78	79	88
12.5							
25							
50							
80							
100							
Intake-100	77	73	46	80	54	85	91
	49	81	50	50	84	53	53
Analyst	SH	SH	SH	SH	SH	SH	SH

EFFLUENT CONC. (%)	TOTAL HARDNESS (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7
Control	111	133	133	122	125	114	127
12.5							
25							
50							
80							
100							
Intake-100	106	124	67	114	126	120	120
	56	117	79	55	59	62	64
Analyst	SH	SH	SH	SH	SH	SH	SH

EFFLUENT CONC. (%)	TOTAL RESIDUAL CHLORINE (mg/L) TEST DAY 1	2	3	4	5	6	7
Control	~~<0.02~~						
12.5							
25							
50							
80							
100							
Intake-100	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	[illegible]
	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	[illegible]
Analyst	SF	JS	JS	JS	JS	JS	[illegible]

Sample Treatment With Sodium Thiosulfate? ____ Yes ✓ No

[1] Toxicity Test Method Manual: EPA 600/4-89/001; Method numbers for chemical parameters are listed on appropriate chemical bench sheets.

Approved by: [illegible]

SHORT-TERM CHRONIC TOXICITY TEST TEMPERATURE RECORD

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharge: TVA-OUTFALL 112
Location: WATTS BAR NUCLEAR PLANT
Bio Log No.: 3176

Test Initiation Date / Time: 2-23-96 3:30pm
Test Protocol Temperature: 25 ± 1°C
Test Organism: (circle one) C. dubia, (P. promelas), M. beryllina, M. bahia
Other:

Sample Identification	Temperature (°C)								
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Control	25.3	24.3	24.1	24.3	24.8	24.1	24.2	24.2	
12.5	25.1	24.3	24.2	24.5	24.9	24.1	24.6	24.2	
25	25.1	24.1	24.2	24.3	24.9	24.0	24.7	24.4	
50	25.4	24.3	24.0	24.6	25.1	24.0	24.6	24.3	
80	25.4	24.3	24.1	24.5	25.0	24.1	24.5	24.3	
100	26.0	24.2	24.2	24.2	25.0	24.2	24.4	24.2	
Intake-100	25.1	24.6	24.3	24.8	25.1	24.1	24.5	24.4	
Analyst	SF	JS	JS	JS	JS	TF	JS	SY	

Comments: Mean (range) = 24.5 (24.0 - 26.0)

SURVIVAL AND REPRODUCTION DEFINITIVE TEST

Start Date:	23 Feb-96 15:15	Protocol ID:	EPA/600/4-89/001	Sample ID:	3175
End Date:	29 Feb-96 14:20	Analyst Name:	Yarnell	Permit ID:	N/A
Sample Date:		Response:	Reproduction	Test Species:	Ceriodaphnia dubia
Comments:	TVA - Watts Bar Outfall 112				

Conc-%	1	2	3	4	5	6	7	8	9	10
Control	28	27	24	26	25	24	21	27	29	27
12.5	23	22	22	27	22	26	25	28	25	30
25	24	22	27	27	28	27	25	28	26	26
50	26	23	26	24	25	24	29	23	21	20
80	27	24	28	22	24	29	26	25	27	23
100	26	21	29	24	26	27	27	25	24	34

			Transformed (None) Data					T	Rank		Probit Data	
Conc-%	Mean	N-Mean	Mean	Min	Max	Var	SD	Statistic	Sum	Critical	NRESP	NDOSE
Control	25.8	1.000	25.8	21	29	5.51111	2.3476					
12.5	25	0.969	25	22	30	7.77778	2.7889	0.686	95.50	75		
25	26	1.008	26	22	28	3.55556	1.8856	-0.172	107.00	75		
50	24.1	0.934	24.1	20	29	6.76667	2.6013	1.458	83.50	75		
80	25.5	0.988	25.5	22	29	5.16667	2.273	0.257	100.00	75		
100	26.3	1.019	26.3	21	34	12.0111	3.4657	-0.429	104.50	75		

ANOVA Assumptions	Calculated Statistic	Critical Statistic
D'Agostino's D Test indicates normal distribution (p > 0.010)	0.278	0.2673, 0.2873
Bartlett's Test indicates equality of variance (p = 0.5877)	3.738	15.086

Hypothesis Tests (alpha = 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSB	MSE	Critical	df
→ Dunnett's Multiple Comparison Test	>100	>100		< 1	2.6663	6.35	6.7981	2.287	5, 54
Steel's Many One Rank Test	> 100	>100		< 1					

Reviewed by: PP

SURVIVAL AND REPRODUCTION SCREENING TEST

Start Date:	23 Feb-96 15:15	Protocol ID:	EPA/600/4-89/001	Sample ID:	3175
End Date:	29 Feb-96 14:20	Analyst Name:	Yarnell	Permit ID:	N/A
Sample Date:		Response:	Reproduction	Test Species:	Ceriodaphnia dubia
Comments:	TVA - Watts Bar Outfall 112 - Intake				

Conc-%	1	2	3	4	5	6	7	8	9	10
Control	28	27	24	26	25	24	21	27	29	27
100	22	21	25	22	23	21	25	22	24	25

Conc-%	Mean	N-Mean	Transformed (None) Data Mean	Min	Max	Var	SD	T Statistic	Rank Sum	Critical	Probit Data NRESP	NDOSE
Control	25.8	1.000	25.8	21	29	5.51111	2.3476					
100	23	0.891	23	21	25	2.66667	1.633	*3.096	*72.50	82		

ANOVA Assumptions	Calculated Statistic	Critical Statistic
Shapiro-Wilk's Test indicates normal distribution (p > 0.010)	0.946	0.868
The F Test indicates equality of variance (p = 0.1473)	2.067	6.5411

Hypothesis Tests (alpha = 0.05)	Sp	Critical	df
→ The t-Test indicates significant difference (p = 0.0031)	2.0221	1.734	18
Wilcoxon Rank Sum Test indicates significant difference (p <= 0.050)			

Reviewed by: PV

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST DATA SHEET

EPA 600/4-89/001, Method 1002.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharger: TVA - OUTFALL 112
Location: WATTS BAR NUCLEAR PLANT
Bio No.: 3175
Date/Time Initial Sample Collected: 2-22-96 10AM

Date/Time Test Initiated: 2-23-96 3:15 PM
Date/Time Test Terminated: 2/29/96 2:20 PM
Dilution Water Used: 9:1 RW
Source Culture Date: 0209

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult)								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		Sample Date or Dilution Water Batch Number									
		023B	024G	024G	0255	027H	0280				
		1	2	3	4	5	6	7*	8*		
Control	1	0	0	4	0	10	14			28	
	2	0	0	5	0	9	13			27	
	3	0	0	4	0	8	12			24	
	4	0	0	5	0	8	13			26	
	5	0	0	4	0	8	13			25	
	6	0	0	4	JE 0	8	12			24	
	7	0	0	4	JE 6	0	11			21	
	8	0	0	4	0	9	14			27	
	9	0	0	5	0	10	14			29	
	10	0	0	4	0	9	14			27	258
No. of Live Adults		10	10	10	10	10	10				

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult)								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		Sample Date or Dilution Water Batch Number									
		2-22	2-23	2-24	2-25	2/24	2/27				
		1	2	3	4	5	6	7	8		
12.5	11	0	0	3	0	7	13			23	
	12	0	0	3	0	7	12			22	
	13	0	0	4	0	6	12			22	
	14	0	0	5	0	8	14			27	
	15	0	0	4	0	7	11			22	
	16	0	0	4	0	8	14			26	
	17	0	0	4	8	0	13			25	
	18	0	0	5	0	9	14			28	
	19	0	0	4	0	8	13			25	
	20	0	0	0	5	10	15			30	250
No. of Live Adults		10	10	10	10	10	10				
Analyst		JS	JS	JS	JS	JS	JS			JS	JS

Comments:
* If necessary

Approved By: PP

mhtforms\93-036

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST DATA SHEET

EPA 600/4-89/001, Method 1002.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharger: TVA - OUTFALL 112
Location: WATTS BAR NUCLEAR PLANT
Bio No.: 3175
Date/Time Initial Sample Collected: 2-22-96 10AM

Date/Time Test Initiated: 2-23-96 3:15PM
Date/Time Test Terminated: 2/29/96 2:20PM
Dilution Water Used: 9:1 RW
Source Culture Date: 0209

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult) — Sample Date or Dilution Water Batch Number								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		2-22	2-23	2-24	2-25	2/26	2/27				
		1	2	3	4	5	6	7	8		
25	21	0	0	4	0	7	13			24	
	22	0	0	0	6	7	9			22	
	23	0	0	5	0	8	14			27	
	24	0	0	5	0	8	14			27	
	25	0	0	4	0	10	14			28	
	26	0	0	3	0	8	16			27	
	27	0	0	4	7	0	14			25	
	28	0	0	5	0	7	16			28	
	29	0	0	3	0	9	14			26	
	30	0	0	0	4	8	14			26	260
No. of Live Adults		10	10	10	10	10	10				

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult) — Sample Date or Dilution Water Batch Number								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		2-22	2-23	2-24	2-25	2/26	2/27				
		1	2	3	4	5	6	7	8		
50	31	0	0	3	0	10	13			26	
	32	0	0	4	0	8	11			23	
	33	0	0	4	0	8	14			26	
	34	0	0	4	0	7	13			24	
	35	0	0	4	0	9	12			25	
	36	0	0	4	0	8	12			24	
	37	0	0	5	0	9	15			29	
	38	0	0	3	0	7	13			23	
	39	0	0	4	0	7	10			21	
	40	0	0	3	0	6	11			20	241
No. of Live Adults		10	10	10	10	10	10				
Analyst		JS	JS	JS	JS	JS	JS			JS	JS

Comments:

Approved By: RP

wh\forms\93 036

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST DATA SHEET

EPA 600/4-89/001, Method 1002.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharger: TVA - OUTFALL 112
Location: WATTS BAR NUCLEAR PLANT
Bio No.: 3175
Date/Time Initial Sample Collected: 2-22-96 10AM

Date/Time Test Initiated: 2-23-96 3:15 PM
Date/Time Test Terminated: ~~2/26/96~~ 2/29/96 3:20 PM
Dilution Water Used: 9:1 RW
Source Culture Date: 0209

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult)								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		Sample Date or Dilution Water Batch Number									
		2-22	2-23	2-24	2-25	2/26	2/27				
		1	2	3	4	5	6	7	8		
80	41	0	0	4	0	9	14			27	
	42	0	0	3	0	7	14			24	
	43	0	0	4	0	9	15			28	
	44	0	0	4	0	7	11			22	
	45	0	0	4	0	6	14			24	
	46	0	0	4	0	9	16			29	
	47	0	0	0	3	8	15			26	
	48	0	0	4	0	8	13			25	
	49	0	0	5	0	8	14			27	
	50	0	0	0	3	8	12			23	255
No. of Live Adults		10	10	10	10	10	10				

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult)								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		Sample Date or Dilution Water Batch Number									
		2-22	2-23	2-24	2-25	2/26	2/27				
		1	2	3	4	5	6	7	8		
100	51	0	0	3	0	8	15			26	
	52	0	0	3	0	7	11			21	
	53	0	0	4	0	9	16			29	
	54	0	0	4	0	6	14			24	
	55	0	0	4	0	8	14			26	
	56	0	0	3	0	9	15			27	
	57	0	0	3	0	9	15			27	
	58	0	0	5	0	8	12			25	
	59	0	0	0	4	5	15			24	
	60	0	0	3	5	10	16			34	263
No. of Live Adults		10	10	10	10	10	10				
Analyst		JS	JS	JS	JS	JS	JS			JS	KS

Comments:

Approved By: RP

CHEMICAL AND PHYSICAL ANALYSIS DATA SHEET / FRESH WATER

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

DISCHARGER/LOCATION: TVA / WATTS BAR NUCLEAR PLANT - OUTFALL 112
BIOLOGY LOG NUMBER: 3175
TEST INITIATION DATE/TIME: 2-23-96 3:15PM
TEST ORGANISM (Check one): ✓ *Ceriodaphnia dubia* (Method 1002.0)[1] ____ *Pimephales promelas* (Method 1000.0)[1]
SAMPLE DATE: Day 1 2-22 Day 2 2/23 Day 3 2/24 Day 4 2/25 Day 5 2/26 Day 6 2/27 Day 7 ____

EFFLUENT CONC. (%)	pH (Standard Units) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.9	7.9	7.9	7.9	7.7	7.9	7.9	7.7	7.9	7.9	8.0	7.8		
12.5	8.6	7.9	7.8	7.9	7.8	7.9	7.6	7.7	7.8	7.9	8.2	7.8		
25	7.9	7.9	7.7	7.9	7.6	7.8	7.6	7.7	7.8	7.9	8.2	7.8		
50	7.6	7.9	7.5	7.9	7.7	7.8	7.5	7.7	7.8	7.9	8.1	7.8		
80	7.5	7.9	7.3	7.9	7.6	7.8	7.4	7.7	7.8	7.9	8.1	7.8		
100	7.3	7.9	7.2	7.9	7.5	7.8	7.4	7.7	7.8	7.9	8.1	7.8		
Intake-100	7.1	7.7	7.0	7.7	7.0	7.6	7.0	7.4	7.1	7.6	7.2	7.6		
Analyst	SF	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS		

EFFLUENT CONC. (%)	DISSOLVED OXYGEN (mg/L) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.8	8.1	7.8	8.0	8.0	7.9	7.7	7.9	7.8	8.0	8.1	7.7		
12.5	8.1	8.1	8.2	8.0	8.0	8.0	7.8	7.9	7.9	8.1	8.3	7.7		
25	8.4	8.1	8.3	8.1	8.2	7.9	8.1	7.9	8.2	8.2	8.4	7.9		
50	9.2	8.2	8.7	8.0	8.5	7.9	8.5	7.9	8.4	8.2	8.7	7.9		
80	8.7	8.2	9.1	8.2	8.8	7.9	8.8	7.9	8.6	8.1	8.4	8.0		
100	7.3	8.2	9.6	8.2	9.5	7.9	9.5	7.9	9.1	8.2	9.3	8.0		
Intake-100	9.4	8.2	9.6	8.2	8.8	7.9	9.1	7.9	9.5	8.2	9.7	8.0		
Analyst	SF	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS		

EFFLUENT CONC. (%)	SPECIFIC CONDUCTANCE (micromhos/cm) TEST DAY 1	2	3	4	5	6	7
Control	354	349	356	357	350	356	
12.5	340	341	340	344	350	342	
25	328	326	325	333	332	326	
50	303	298	297	310	313	300	
80	273	265	266	281	283	269	
100	248	244	246	261	262	248	
Intake-100	161	152	166	162	164	164	
100							
Intake-100							
Analyst	SF	JS	JS	JS	JS	JS	

EFFLUENT CONC. (%)	TOTAL ALKALINITY (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7
Control	84	81	81	85	78	79	
12.5							
25							
50							
80							
100							
Intake-100	97	73	46	80	54	85	
100	53	81	50	50	84	53	
Intake-100	77						
	49						
Analyst	SH	SH	SH	SH	SH	SH	

EFFLUENT CONC. (%)	TOTAL HARDNESS (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7
Control	111	133	133	122	125	114	
12.5							
25							
50							
80							
100							
Intake-100	120	124	67	114	126	120	
100	64	119	79	55	59	62	
Intake-100	106						
	56						
Analyst	SH	SH	SH	SH	SH	SH	

EFFLUENT CONC. (%)	TOTAL RESIDUAL CHLORINE (mg/L) TEST DAY 1	2	3	4	5	6
Control						
12.5						
25						
50						
80						
100						
Intake-100	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
100	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Intake-100						
Analyst	SF	JS	JS	JS	JS	JS

Sample Treatment With Sodium Thiosulfate? ____ Yes ✓ No

[1] Toxicity Test Method Manual: EPA 600/4-89/001; Method numbers for chemical parameters are listed on appropriate chemical bench sheets.

Approved by: PP

dbm\data\proc\bmsi\ss

SHORT-TERM CHRONIC TOXICITY TEST TEMPERATURE RECORD

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharge: TVA - OUTFALL 112
Location: WATTS BAR NUCLEAR PLANT
Bio Log No.: 3175

Test Initiation Date / Time: 2-23-96 3:15PM
Test Protocol Temperature: 25 ± 1°C
Test Organism: (circle one) C. dubia, P. promelas, M. beryllina, M. bahia
Other:

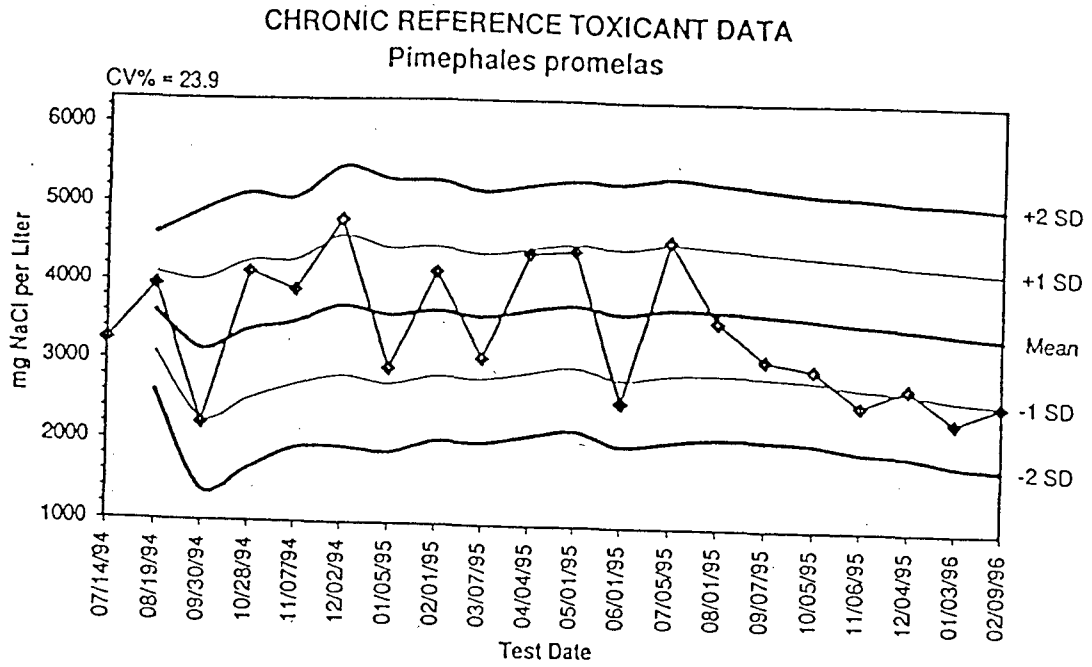
Sample Identification	Temperature (°C)								
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Control	25.3	24.7	24.2	24.8	25.1	24.4	24.0		
12.5%	25.7	24.7	24.2	24.8	25.1	24.6	24.0		
25%	25.7	24.7	24.2	24.7	25.1	24.7	24.0		
50%	25.4	24.7	24.2	24.6	25.0	24.8	24.1		
80%	25.4	24.6	24.1	24.5	25.0	24.7	24.1		
100%	26.0	24.6	24.1	24.5	24.7	24.6	24.1		
Intake-100%	25.7	24.7	24.0	24.6	24.7	24.5	24.1		
Analyst	SF	JS	JS	JS	JS	JS	JS		

Comments: Mean (range) = 24.7 (24.0 - 26.0)

Watts Bar Nuclear Plant Biomonitoring
February 23-March 1, 1996

Appendix D

Reference Toxicant Tests and
Control Chart Information



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
07/14/94	3242.0000					
08/19/94	3952.0000	3597.0000	3094.9542	2592.9084	4099.0458	4601.0916
09/30/94	2213.0000	3135.6667	2261.3039	1386.9410	4010.0295	4884.3923
10/28/94	4120.0000	3381.7500	2514.6274	1647.5048	4248.8726	5115.9952
11/07/94	3889.0000	3483.2000	2698.7341	1914.2683	4267.6659	5052.1317
12/02/94	4790.0000	3701.0000	2819.5634	1938.1269	4582.4366	5463.8731
01/05/95	2926.0000	3590.2857	2733.9881	1877.6905	4446.5833	5302.8809
02/01/95	4152.0000	3660.5000	2843.2261	2025.9523	4477.7739	5295.0477
03/07/95	3063.0000	3594.1111	2804.1036	2014.0961	4384.1186	5174.1261
04/04/95	4392.0000	3673.9000	2887.4976	2101.0952	4460.3024	5246.7048
05/01/95	4427.0000	3742.3636	2962.5266	2182.6895	4522.2007	5302.0378
06/01/95	2540.0000	3642.1667	2821.5979	2001.0292	4462.7354	5283.3042
07/05/95	4570.0000	3713.5385	2886.8323	2060.1261	4540.2446	5366.9508
08/01/95	3567.0000	3703.0714	2907.8329	2112.5943	4498.3100	5293.5486
09/07/95	3097.0000	3662.6667	2880.5408	2098.4150	4444.7925	5226.9183
10/05/95	2987.0000	3620.4375	2846.1816	2071.9256	4394.6934	5168.9494
11/06/95	2558.0000	3557.9412	2765.2220	1972.5028	4350.6603	5143.3795
12/04/95	2779.0000	3514.6667	2724.0042	1933.3418	4305.3291	5095.9915
01/03/96	2366.0000	3454.2105	2641.8925	1829.5744	4266.5286	5078.8466
02/09/96	2583.0000	3410.6500	2596.3518	1782.0537	4224.9482	5039.2463

COMMONWEALTH TECHNOLOGY, INC.
Laboratory Division

SURVIVAL AND GROWTH DEFINITIVE TEST

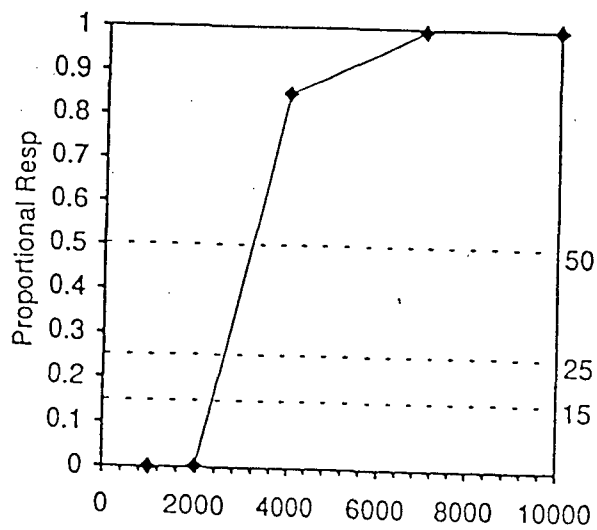
Start Date:	09 Feb-96 14:00	Protocol ID:	EPA/600/4-89/001	Sample ID:	3094
End Date:	16 Feb-96 14:00	Analyst Name:	Yarnell	Permit ID:	N/A
Sample Date:		Response:	Growth	Test Species:	Pimephales promelas
Comments:	Reference Toxicant NaCl				

Conc-mg/L	1	2	3	4
Control	0.429	0.366	0.362	0.36
1000	0.518	0.482	0.583	0.528
2000	0.569	0.404	0.499	0.336
4000	0.153	0	0.004	0.116
7000	0	0	0	0.01
10000	0	0	0	0

Conc-mg/L	Mean	N-Mean	Transformed (None) Data Mean	Min	Max	Var	SD	T Statistic	Rank Sum	Critical	Probit Data NRESP	NDOSE
Control	0.3793	1.000	0.3793	0.36	0.429	0.00111	0.0333					
1000	0.5278	1.392	0.5278	0.482	0.583	0.00175	0.0418					
2000	0.452	1.192	0.452	0.336	0.569	0.01055	0.1027					
4000	0.0683	0.180	0.0683	0.	0.153	0.00608	0.078					
7000	0.0025	0.007	0.0025	0	0.01	2.5E-05	0.005					
10000	0	0.000										

Conc-mg/L	Isotonic	Prop Response N-Mean	Isotonic
Control	0.4535		
1000	0.4535	-0.392	0.000
2000	0.452	-0.192	0.003
4000	0.0683	0.820	0.850
7000	0.0025	0.993	0.994
10000	0	1.000	1.000

Linear Interpolation(ICp) with
80 bootstrap resamples



Point	Estimate	SD	95% Fiducial Limits		Skew
IC10	2228.5	216.44	1649	2510.404	-1.527
IC15	2346.7	164.1	1902.9	2556.046	-1.592
IC25	2583.1	133.3	2218.7	2749.257	-1.035
IC40	2937.6	121.67	2614.1	3098.385	-0.416
IC50	3173.9	121.04	2863.6	3345.324	0.056

Reviewed by: PP

FATHEAD MINNOW
LARVAL SURVIVAL AND GROWTH TEST
EPA 600/4-91/002, METHOD 1000.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Test Type: Reference Toxicant
Date/Time Test Terminated: 2/16/96 2:00 PM
Toxicant: Sodium Chloride
Organism Batch Number: 0208
Bio. Log No: 3094
Initial Organism Age: <24 Hrs.
Date/Time Test Initiated: 2/9/96 2:00 PM
Dilution Water Used: 9:1 RW
Dilution Water Batch Number on Day: 1: 016 I 2: 017C 3: 017C 4: 016 I 5: 016 I 6: 018F 7: 019
Time of Day Renewed on Day: 1: 2:00 2: 12:00 3: 12:15 4: 2:00 5: 1:00 6: 4:00 7: 1:00

Test Conc. (mg/L)	Test Cont. No.	No. of Live Larvae (Days) Sample Dates 2/9 (1)	2/9 (2)	2/9 (3)	2/9 (4)	2/9 (5)	2/14 (6)	2/14 (7)	Tin No.	Wt. of Tin & Larvae (mg)	Wt. of Tin (mg)	Total Wt. of Larvae (mg)	Mean Wt. of Larvae Using Start Number (mg)	Mean Wt. of Larvae Using End Number (mg)	Average Wt. for Treatment (mg)
Control	1	10	10	10	10	10	10	10	1	972.82	968.53	4.29	0.429	0.429	Start No.
	2	10	9	9	9	9	9	9	2	975.94	972.28	3.66	0.366	0.407	0.379
	3	10	10	10	10	10	10	10	3	981.77	978.15	3.62	0.362	0.362	End No.
	4	10	~~9~~ 10	10	10	9	9	9	4	984.20	980.60	3.60	0.360	0.400	0.400
1000	5	10	10	10	10	10	10	10	5	983.20	978.02	5.18	0.518	0.518	Start No.
	6	10	10	10	10	10	10	10	6	980.40	975.58	4.82	0.482	0.482	0.528
	7	10	10	10	10	10	10	10	7	976.83	971.00	5.83	0.583	0.583	End No.
	8	10	10	9	9	9	9	9	8	974.63	969.35	5.28	0.528	0.587	0.542
2000	9	10	10	10	10	10	9	9	9	977.21	971.52	5.69	0.569	0.632	Start No.
	10	9	9	9	9	9	9	9	10	983.42	979.38	4.04	0.404	0.449	0.452
	11	9	9	9	9	9	9	9	11	972.77	967.78	4.99	0.499	0.554	End No.
	12	10	9	9	8	8	8	8	12	975.99	972.63	3.36	0.336	0.420	0.514
4000	13	10	~~9~~ 10	10	8	5	5	~~4~~ 5	13	984.79	983.26	1.53	0.153	0.382	Start No.
	14	10	8	5	2	1	0	—	—	—	~~983.46~~	—	—	—	0.068
	15	9	8	5	4	4	3	1	14	983.46	983.42	0.04	0.004	0.040	End No.
	16	10	8	6	4	4	4	~~4~~ 4	15	982.05	980.89	1.16	0.116	0.290	0.178
7000	17	8	1	0	—	—	—	—	—	—	—	—	—	—	Start No.
	18	8	2	0	—	—	—	—	—	—	—	—	—	—	0.002
	19	4	0	—	—	—	—	—	—	—	—	—	—	—	End No.
	20	7	2	2	2	2	2	~~1~~ 1	16	971.70	971.60	0.10	0.010	0.100	0.025
Analyst		RN	BR	RN	TT	RN	JS	JS		SY	JS	SY	SY	SY	SY

Notes:

Approved By RP

CHEMICAL AND PHYSICAL ANALYSIS DATA SHEET / FRESH WATER

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

DISCHARGER/LOCATION: Reference Toxicant (NaCl)
BIOLOGY LOG NUMBER: 3094
TEST INITIATION DATE/TIME: 2/9/96 2:00Pm
TEST ORGANISM (Check one): ____ *Ceriodaphnia dubia* (Method 1002.0)[1] ____ *Pimephales promelas* (Method 1000.0)[1]
SAMPLE DATE: Day 1 2/9/96 Day 2 2-9 Day 3 2-9 Day 4 2-9 Day 5 2-9 Day 6 2-14 Day 7 2-14

EFFLUENT CONC. (%)	pH (Standard Units) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.7	7.3	7.8	7.3	7.8	7.2	7.8	7.2	7.9	7.0	7.8	7.2	7.7	7.3
1000	7.6	7.3	7.8	7.3	7.8	7.3	7.8	7.2	7.8	7.0	8.0	7.3	7.9	7.2
2000	7.6	7.4	7.8	7.4	7.8	7.2	7.8	7.2	7.8	7.2	8.1	7.3	8.0	7.3
4000	7.8	7.4	7.8	7.5	8.0	7.3	7.8	7.3	7.8	7.3	8.1	7.4	8.0	7.5
7000	7.8	7.4	7.8	7.4	8.0	7.3	7.8	7.4		7.5	7.9	7.4	7.8	7.4
10000	7.8	7.4	7.8	7.4	8.0	—	7.8	—	—	—	—	—	—	—
Analyst:	JS	RN	RN	BR	BR	RN	RN	TF	TF	RN	SY	JS	JS	JS

EFFLUENT CONC. (%)	DISSOLVED OXYGEN (mg/L) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.9	5.2	8.0	4.7	8.1	3.6	7.9	5.2	8.1	4.2	7.0	4.3	7.6	[illegible]
1000	8.0	5.4	7.8	5.1	8.0	4.1	7.9	5.2	8.1	4.3	8.0	4.6	7.8	[illegible]
2000	8.0	5.9	8.0	5.6	8.0	4.3	7.9	5.9	8.1	5.0	7.9	5.2	7.8	[illegible]
4000	8.1	6.0	8.1	5.9	8.0	4.3	8.0	5.6	8.2	5.3	7.9	5.6	7.9	[illegible]
7000	8.1	6.0	8.2	5.8	8.1	4.6	8.0	5.1		6.2	7.9	6.2	8.0	6 [illegible]
10000	8.1	6.1	8.3	5.9	8.1	—	8.0	—	—	—	—	—	—	—
Analyst:	JS	RN	RN	BR	BR	RN	RN	TF	TF	RN	SY	JS	JS	JS

EFFLUENT CONC. (%)	SPECIFIC CONDUCTANCE (micromhos/cm) TEST DAY 1	2	3	4	5	6	7	TOTAL ALKALINITY (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7
Control	340	349	355	352	356	370	360	95	105	105	95	95	89	98
1000	2330	2230	2260	2350	2330	2350	2300							
2000	4240	4110	4170	4140	3840	4230	4210							
4000	7920	7780	7830	7800	7760	7900	7920							
7000	13490	13320	13320	13350		13190	13520							
10000	18290	18080	18110	—	—	—	—	80	80	80	80	80	80	80
Analyst:	JS	RN	BR	RN	TF	SY	JS	SH	SH	SH	SH	SH	SH	SH

EFFLUENT CONC. (%)	TOTAL HARDNESS (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7	TOTAL RESIDUAL CHLORINE (mg/L) TEST DAY 1	2	3	4	5	6	7
Control	120	131	131	120	120	132	118							
1000														
2000														
4000														
7000														
10000														
	144	144	144	144	144	144	144	N/A						
Analyst:	SH	SH	SH	SH	SH	SH	SH							

Was Treatment With Sodium Thiosulfate? ____ Yes ✓ No

[1] Toxicity Test Method Manual: EPA 600/4-89/001; Method numbers for chemical parameters are listed on appropriate chemical bench sheets.

Approved by: RP

dbm\dat\aproc\bmms\95-010

SHORT-TERM CHRONIC TOXICITY TEST TEMPERATURE RECORD

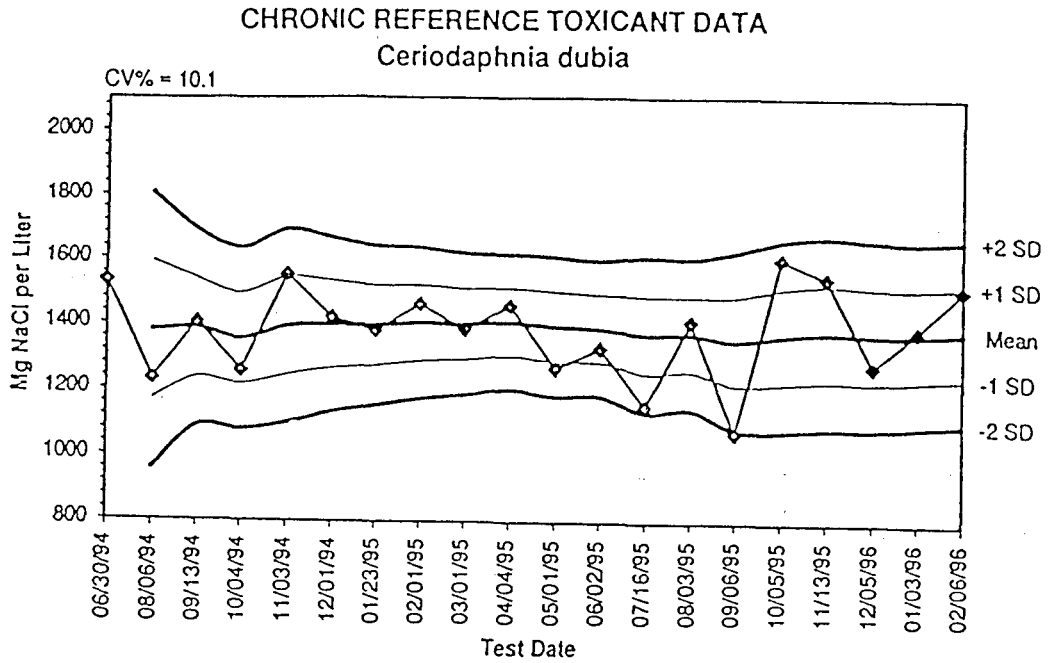
Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharge: Reference Toxicant (NaCl)
Location:
Bio Log No.: 3094

Test Initiation Date / Time: 2/9/96 2:00 PM
Test Protocol Temperature: 25 ± 1°C
Test Organism: (circle one) C. dubia, (P. promelas) M. beryllina, M. bahia
Other:

Sample Identification	Temperature (°C)								
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Control	26.0	24.1	25.1	24.5	24.1	24.6	24.4 ~~24.5~~	24.6	
1000 mg/L	26.0	24.2	25.1	24.2	24.2	25.0	24.6 ~~24.4~~	24.6	
2000 mg/L	25.9	24.2	25.1	24.3	24.2	25.1	24.4 ~~24.5~~	24.6	
4000 mg/L	25.8	24.2	25.0	24.6 ~~26.4~~	24.2	25.3	24.4 ~~24.5~~	24.8	
7000 mg/L	25.8	24.3	25.2	24.6	24.3	25.5	24.8 ~~24.6~~	24.8	
10000 mg/L	25.8	24.3	25.2	—	—	—	—	—	
Analyst	JS	RN	BR	RN	TF	SY	~~RN~~ JS	JS	

Comments:



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
06/30/94	1530.0000					
08/06/94	1231.0000	1380.5000	1169.0751	957.6501	1591.9249	1803.3499
09/13/94	1404.0000	1388.3333	1238.2189	1088.1045	1538.4477	1688.5621
10/04/94	1259.0000	1356.0000	1217.4191	1078.8382	1494.5809	1633.1618
11/03/94	1552.0000	1395.2000	1246.5841	1097.9681	1543.8159	1692.4319
12/01/94	1424.0000	1400.0000	1266.5549	1133.1098	1533.4451	1666.8902
01/23/95	1383.0000	1397.5714	1275.5839	1153.5964	1519.5589	1641.5464
02/01/95	1464.0000	1405.8750	1290.5203	1175.1657	1521.2297	1636.5843
03/01/95	1386.0000	1403.6667	1295.5591	1187.4515	1511.7743	1619.8818
04/04/95	1461.0000	1409.4000	1305.8752	1202.3505	1512.9248	1616.4495
05/01/95	1270.0000	1396.7273	1289.8993	1183.0713	1503.5553	1610.3832
06/02/95	1331.0000	1391.2500	1287.6414	1184.0327	1494.8586	1598.4673
07/16/95	1155.0000	1373.0769	1254.1922	1135.3075	1491.9616	1610.8464
08/03/95	1416.0000	1376.1429	1261.3475	1146.5521	1490.9382	1605.7336
09/06/95	1076.0000	1356.1333	1221.0689	1086.0044	1491.1978	1626.2623
10/05/95	1606.0000	1371.7500	1227.0837	1082.4174	1516.4163	1661.0826
11/13/95	1549.0000	1382.1765	1235.6555	1089.1345	1528.6975	1675.2185
12/05/96	1282.0000	1376.6111	1232.5171	1088.4232	1520.7051	1664.7991
01/03/96	1391.0000	1377.3684	1237.2953	1097.2223	1517.4415	1657.5146
02/06/96	1515.0000	1384.2500	1244.4826	1104.7151	1524.0174	1663.7849

COMMONWEALTH TECHNOLOGY, INC.
Laboratory Division

SURVIVAL AND REPRODUCTION DEFINITIVE TEST

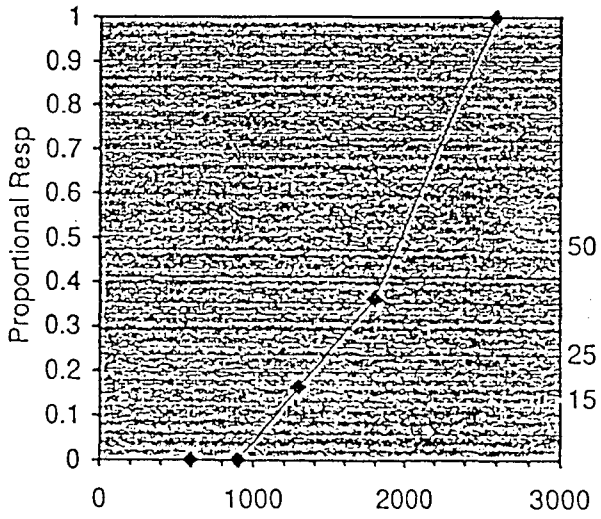
Start Date:	06 Feb-96 13:00	Protocol ID:	EPA/600/4-89/001	Sample ID:	3078
End Date:	12 Feb-96 13:15	Analyst Name:	Yarnell	Permit ID:	N/A
Sample Date:		Response:	Reproduction	Test Species:	Ceriodaphnia dubia
Comments:	Reference Toxicant NaCl				

Conc-mg/L	1	2	3	4	5	6	7	8	9	10
Control	27	24	25	28	29	33	30	31	27	29
600	31	27	28	34	24	28	29	27	33	28
900	26	26	28	30	29	23	31	34	32	31
1300	26	20	24	24	24	26	26	24	21	25
1800	20	20	21	15	16	19	15	18	19	20
2600	0	0	0	0	0	0	0	0	0	0

			Transformed (None) Data					T	Rank		Probit Data	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	Var	SD	Statistic	Sum	Critical	NRESP	NDOSE
Control	28.3	1.000	28.3	24	33	7.34444	2.7101					
600	28.9	1.021	28.9	24	34	8.98889	2.9981					
900	29	1.025	29	23	34	10.8889	3.2998					
1300	24	0.848	24	20	26	4.22222	2.0548					
1800	18.3	0.647	18.3	15	21	4.9	2.2136					
2600	0	0.000										

		Prop Response	
Conc-mg/L	Isotonic	N-Mean	Isotonic
Control	28.733		
600	28.733	-0.021	0.000
900	28.733	-0.025	0.000
1300	24	0.152	0.165
1800	18.3	0.353	0.363
2600	0	1.000	1.000

Linear Interpolation(ICp) with
80 bootstrap resamples



Point	Estimate	SD	95% Fiducial Limits		Skew
IC10	1142.8	63.715	1015.6	1227.5	-2.224
IC15	1264.2	65.055	1148.9	1363.846	-1.186
IC25	1514.9	49.624	1406.9	1606.25	0.191
IC40	1846.3	30.385	1772.3	1892.5	-0.121
IC50	1971.9	24.148	1919.5	2010.417	0.126

Reviewed by: PP

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST DATA SHEET

EPA 600/4-91/002, Method 1002.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Test Type: Reference Toxicant
Toxicant: Sodium Chloride
Bio No.: 3078
Date/Time Initial Sample Collected: 2/6/96 11:30AM
Time Renewed on Day: 1: 10 AM 2: 2PM 3: 2PM

Date/Time Test Initiated: 2/6/96 1:00Pm
Date/Time Test Terminated: 2/12/96 1:15Pm
Dilution Water Used: 9:1RW
Source Culture Date: 0129
4: 10:30 5: 12 Pm 6: 1:15pm 7: 1pm

NaCl Conc. (mg/L)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult)								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		Sample Date or Dilution Water Batch Number									
		014B	014B	014B	014B	014B	014B				
		1	2	3	4	5	6	7*	8*		
Control (0)	1	0	0	4	0	7	16			27	
	2	0	0	4	0	6	14			24	
	3	0	0	4	0	7	14			25	
	4	0	0	4	0	10	14			28	
	5	0	0	4	0	12	13			29	
	6	0	0	5	0	11	17			33	
	7	0	0	4	0	12	14			30	
	8	0	0	5	0	11	15			31	
	9	0	0	5	0	10	12			27	
	10	0	0	5	0	9	15			29	28.3
No. of Live Adults		10	10	10	10	10	10				

NaCl Conc. (mg/L)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult)								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		Sample Date or Dilution Water Batch Number									
		2/6/96	2/6	2/6	2/6	2/6	2/6				
		1	2	3	4	5	6	7	8		
600 mg/L	11	0	0	4	0	11	16			31	
	12	0	0	4	0	10	13			27	
	13	0	0	4	0	10	14			28	
	14	0	0	5	0	10	19			~~32~~ 34	
	15	0	0	4	0	7	13			24	
	16	0	0	5	0	7	16			28	
	17	0	0	4	0	9	16			29	
	18	0	0	4	0	7	16			27	
	19	0	0	5	0	11	17			33	
	20	0	0	5	0	10	13			28	289
No. of Live Adults		10	10	10	10	10	10				
Analyst		LS	JH	SY	RW	BC	JS			JS	JS

Comments:
* If necessary

Approved By: P.P

pwp\data\proc\nov\cmc\cm-n.sh1

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST DATA SHEET

EPA 600/4-91/002, Method 1002.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Test Type: Reference Toxicant
Toxicant: Sodium Chloride
Bio No.: 3078
Date/Time Initial Sample Collected: 2/6/96 11:30 AM

Date/Time Test Initiated: 2/6/96 1:00 PM
Date/Time Test Terminated: 2/12/96 1:15 PM
Dilution Water Used: 9:1 RW
Source Culture Date: 0129

NaCl Conc. (mg/l)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult) — Sample Date or Dilution Water Batch Number								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		2/6/96	2/6	2/6	2/6	2/6	2/6				
		1	2	3	4	5	6	7	8		
900 mg/L	21	0	0	4	0	6	16			26	
	22	0	0	4	0	6	16			26	
	23	0	0	4	0	11	13			28	
	24	0	0	4	0	12	14			30	
	25	0	0	4	0	10	15			29	
	26	0	0	4	0	6	13			23	
	27	0	0	4	0	12	15			31	
	28	0	0	5	0	13	16			34	
	29	0	0	4	0	12	16			32	
	30	0	0	4	0	10	17			31	290
No. of Live Adults		10	10	10	10	10	10				

NaCl Conc. (mg/L)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult) — Sample Date or Dilution Water Batch Number								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		2/6/96	2/6	2/6	2/6	2/6	2/6				
		1	2	3	4	5	6	7	8		
1300 mg/L	31	0	0	4	0	9	13			26	
	32	0	0	4	0	7	9			20	
	33	0	0	4	0	7	13			24	
	34	0	0	4	0	7	13			24	
	35	0	0	4	0	8	12			24	
	36	0	0	5	0	8	13			26	
	37	0	0	4	0	7	15			26	
	38	0	0	4	0	7	13			24	
	39	0	0	4	0	6	11			21	
	40	0	0	5	0	9	11			25	~~246~~ 240
No. of Live Adults		10	10	10	10	10	10				2-13-96
Analyst		LS	SH	SH	RN	BR	JS			JS	JS

Comments:

Approved By: PP

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST DATA SHEET

EPA 600/4-91/002, Method 1002.0

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Test Type: Reference Toxicant
Toxicant: Sodium Chloride
Bio No.: 3078
Date/Time Initial Sample Collected: 2/6/96 11:30AM

Date/Time Test Initiated: 2/6/96 1:00PM
Date/Time Test Terminated: 2/12/96 1:15PM
Dilution Water Used: 9:1RW
Source Culture Date: 0129

NaCl Conc. (mg/L)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult) — Sample Date or Dilution Water Batch Number								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		2/6/96	2/6	2/6	2/6	2/6	2/6				
		1	2	3	4	5	6	7	8		
1800 mg/L	41	0	0	4	0	5	11			20	
	42	0	0	3	0	5	12			20	
	43	0	0	5	0	6	10			21	
	44	0	0	3	0	4	8			15	
	45	0	0	3	0	4	9			16	
	46	0	0	3	0	6	10			19	
	47	0	0	3	0	3	9			15	
	48	0	0	4	0	4	10			18	
	49	0	0	3	0	5	11			19	
	50	0	0	4	0	6	10			20	183
No. of Live Adults		10	10	10	10	10	10				

NaCl Conc. (mg/L)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult) — Sample Date or Dilution Water Batch Number								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		2/6/96	2/6								
		1	2	3	4	5	6	7	8		
2600 mg/L	51	0	X							0	
	52	0	X							0	
	53	0	X							0	
	54	0	X							0	
	55	0	X							0	
	56	0	X							0	
	57	0	X							0	
	58	0	X							0	
	59	0	X							0	
	60	0	X							0	0
No. of Live Adults		10	0	0							
Analyst		LS	SH	SY	RN		JS			JS	JS

Comments:

Approved By: [illegible]

CHEMICAL AND PHYSICAL ANALYSIS DATA SHEET / FRESH WATER

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

DISCHARGER/LOCATION: Reference Toxicant (NaCl)
BIOLOGY LOG NUMBER: 3078
TEST INITIATION DATE/TIME: 2/6/96 1:00pm
TEST ORGANISM (Check one): ✓ *Ceriodaphnia dubia* (Method 1002.0)[1] ____ *Pimephales promelas* (Method 1000.0)[1]
SAMPLE DATE: Day 1 2/6/96 Day 2 2-6 Day 3 2-6 Day 4 2-6 Day 5 2-6 Day 6 2-6 Day 7 ____

EFFLUENT CONC. (%)	pH (Standard Units) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.6	7.8	7.8	8.0	7.9	7.8	7.7	8.0	7.8		7.8	7.8		
100 mg/L	7.8	7.9	7.8	8.0	7.8	7.8	7.7	7.9	7.8		7.8	7.8		
200 mg/L	7.8	7.9	7.8	8.0	7.8	7.8	7.7	8.0	7.8	8.0	7.8	7.8		
300 mg/L	7.8	7.9	7.8	8.0	7.8	7.9	7.7	8.0	7.8	8.1	7.9	7.8		
400 mg/L	7.8	7.9	7.9	8.0										
Analyst	JS	LS	LS	SH	SH	SY	SY	RN	RN	BR	BL	JS		

EFFLUENT CONC. (%)	DISSOLVED OXYGEN (mg/L) TEST DAY 1 PRE	1 POST	2 PRE	2 POST	3 PRE	3 POST	4 PRE	4 POST	5 PRE	5 POST	6 PRE	6 POST	7 PRE	7 POST
Control	7.7	7.2	7.7	7.9	8.0	7.9	8.0	8.0	8.0	NM[2]	8.2	7.2		
100 mg/L	7.9	7.5	7.7	7.8	8.0	8.0	8.1	8.1	8.1	NM[2]	7.9	7.4		
200 mg/L	7.8	7.7	7.9	7.7	8.0	8.2	8.1	8.1	8.0	8.0	8.0	7.6		
300 mg/L	7.9	7.7	8.0	7.7	8.1	8.2	8.1	8.2	8.1	7.9	7.9	7.5		
400 mg/L	7.9	7.8	7.9	7.7	8.1	8.2	8.1	8.2	8.1	7.9	8.0	7.6		
Analyst	JS	LS	LS	SH	SH	SY	SY	RN	RN	BL	BL	JS		

EFFLUENT CONC. (%)	SPECIFIC CONDUCTANCE (micromhos/cm) TEST DAY 1	2	3	4	5	6	7
Control	365	368	369	353	365	364	
100 mg/L	1561	1565	1558	1552	1555	1509	
200 mg/L	2120	2120	2120	2120	2120	2070	
300 mg/L	2880	2900	2870	2880	2880	2850	
400 mg/L	3840	3870	3870	3850	3840	3800	
500 mg/L	5320	5320					
Analyst	JS	LS	SH	SY	RN	BL	

EFFLUENT CONC. (%)	TOTAL ALKALINITY (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7
Control	85	85	85	85	85	85	
500 mg/L	92	92	92	92	92	92	
Analyst	SH	SH	SH	SH	SH	SH	

EFFLUENT CONC. (%)	TOTAL HARDNESS (mg/L $CaCO_3$) TEST DAY 1	2	3	4	5	6	7
Control	127	127	127	127	127	127	
500 mg/L	128	128	128	128	128	128	
Analyst	SH	SH	SH	SH	SH	SH	

EFFLUENT CONC. (%)	TOTAL RESIDUAL CHLORINE (mg/L) TEST DAY 1	2	3	4	5	6	7
	N/A						

Sample Treatment With Sodium Thiosulfate? ____ Yes ✓ No

[1] Toxicity Test Method Manual: EPA 600/4-89/001; Method numbers for chemical parameters are listed on appropriate chemical bench sheets.

[2] NM = Accidentally tossed, not measured. -PO

Approved by: PO

cbm\dataproc\bmms\95-0:0

SHORT-TERM CHRONIC TOXICITY TEST TEMPERATURE RECORD

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharge: Reference Toxicant
Location:
Bio Log No.: 3078

Test Initiation Date / Time: 2-6-96 / 10 a.m.
Test Protocol Temperature: 25 ± 1°C
Test Organism: (circle one) C. dubia, P. promelas, M. beryllina, M. bahia
Other:

Sample Identification	Temperature (°C)								
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Control	25.9	24.2	24.3	25.1	24.3	24.2	24.5		
600 mg/L	25.9	24.7	24.2	25.3	24.4	24.4	24.4		
900 mg/L	25.9	25.1	24.1	25.6	24.6	24.6	24.6		
1300 mg/L	25.9	25.2	24.1	25.5	24.7	24.6	24.6		
1800 mg/L	25.9	25.1	24.2	25.6	24.7	24.6	24.8		
2600 mg/L	25.9	25.1	24.2						
Analyst	TS	LS	SH	SY	RN	BR	TS		

Comments:

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST DATA SHEET

Commonwealth Technology, Inc.
2520 Regency Road
Lexington, Kentucky 40503-2921
(606) 276-3506

Discharger: TVA - OUTFALL 112
Location: WATTS BAR NUCLEAR PLANT
Bio No.: 3175
Date/Time Initial Sample Collected: 2-22-96 10AM

Date/Time Test Initiated: 2-23-96 3:15PM
Date/Time Test Terminated: 2/29/96 2:20PM
Dilution Water Used: 9:1 RW
Source Culture Date: 0209

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult)								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		Sample Date or Dilution Water Batch Number									
		2-22	2-23	2-24	2-25	2/26	2/27				
		1	2	3	4	5	6	7*	8*		
Intake 100%	61	0	0	4	0	8	10			22	
	62	0	0	3	0	7	11			21	
	63	0	0	4	0	8	13			25	
	64	0	0	3	0	7	12			22	
	65	0	0	0	4	8	11			23	
	66	0	0	0	3	7	11			21	
	67	0	0	0	5	7	13			~~23~~ 25	SJ 2-29-96
	68	0	0	4	0	6	12			22	
	69	0	0	4	0	7	13			24	
	70	0	0	4	0	8	13			25	~~228~~
No. of Live Adults		10	10	10	10	10	10				230

Effluent Conc. (%)	Test Container No.	Number of Live Young For Each Test Day (X denotes dead adult)								Total No. of Live Young Per Rep.	Total No. of Live Young Per Conc.
		Sample Date or Dilution Water Batch Number									
		1	2	3	4	5	6	7	8		
No. of Live Adults											
Analyst		SJ	SJ	SJ	SJ	SJ	SJ			SJ	SJ

Comments:
* If necessary

Approved By: RP

mphtcomm93-036

ENCLOSURE
NATIONAL POLLUTION DISCHARGE ELIMINATION
SYSTEM (NPDES) PERMIT NUMBER TN0020168