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Tennessee Valley Authority, Sequoyah Nuclear Plant, P.O. Box 2000, Soddy Daisy, TN 37384

June 15, 2022

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Subject: **Sequoyah Nuclear Plant, Discharge Monitoring Report (DMR), May 2022**

Attached is the May 2022 DMR for Sequoyah Nuclear Plant.

Respectfully,

A handwritten signature in black ink, appearing to read 'T. R. Markum', is positioned above the typed name.

Travis R. Markum  
Environmental Scientist

**DMR Copy of Record**

<b>Permit</b>		<b>Permittee:</b> Tennessee Valley Authority (TVA)		<b>Facility:</b> TVA SEQUOYAH NUCLEAR PLANT (SQN)	
<b>Permit #:</b> TN0026450	<b>Major:</b> Yes	<b>Permittee Address:</b> Sequoyah Access Road, PO Box 2000 Soddy Daisy, TN 37379	<b>Facility Location:</b> SEQUOYAH ACCESS ROAD SODDY DAISY, TN 37379		
<b>Permitted Feature:</b> 101 External Outfall	<b>Discharge:</b> 101-G (no description)				

<b>Report Dates &amp; Status</b>		<b>Monitoring Period:</b> From 05/01/22 to 05/31/22	<b>DMR Due Date:</b> 06/15/22	<b>Status:</b> NetDMR Validated
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**Considerations for Form Completion**  
Primary discharge from Diffuser Pond.

<b>Principal Executive Officer</b>		<b>Title:</b> Vice President	<b>Telephone:</b> 423-843-7001
<b>First Name:</b> Thomas	<b>Last Name:</b> Marshall		

**No Data Indicator (NODI)**  
Form NODI: --

Code	Parameter Name	Monitoring Location	Season #	Param. NODI	Quantity or Loading					Quality or Concentration					# of Ex.	Frequency of Analysis	Sample Type					
					Qualifier 1	Value 1	Qualifier 2	Value 2	Units	Qualifier 1	Value 1	Qualifier 2	Value 2	Qualifier 3				Value 3	Units			
00010	Temperature, water deg. centigrade	1 - Effluent Gross	0	--	Sample							=	39.9		04 - deg C	99/99 - Continuous	RC - Recorder (auto)					
					Permit Req.												Req Mon DAILY MX	04 - deg C	RC - Recorder (auto)			
					Value NODI																	
00010	Temperature, water deg. centigrade	Z - Instream Monitoring	0	--	Sample							=	25.6		04 - deg C	99/99 - Continuous	CA - CALCTD					
					Permit Req.												<=	30.5 DAILY MX	04 - deg C	CA - CALCTD		
					Value NODI																	
00016	Temp. diff. between samp. & upstrm deg. C	1 - Effluent Gross	1	--	Sample							=	1.7		04 - deg C	99/99 - Continuous	CA - CALCTD					
					Permit Req.												<=	3.0 DAILY MX	04 - deg C	CA - CALCTD		
					Value NODI																	
50050	Flow, in conduit or thru treatment plant	1 - Effluent Gross	0	--	Sample	=	1726.3	=	1759.3	03 - MGD						99/99 - Continuous	RC - Recorder (auto)					
					Permit Req.		Req Mon MO AVG		Req Mon DAILY MX	03 - MGD								99/99 - Continuous	RC - Recorder (auto)			
					Value NODI																	
50060	Chlorine, total residual	1 - Effluent Gross	0	--	Sample							<=	0.027 MO AVG		<=	0.047 DAILY MX	19 - mg/L	01/07 - Weekly	GR - GRAB			
					Permit Req.																	
					Value NODI																	
82234	Temperature rate of change deg. C/hr	Z - Instream Monitoring	0	--	Sample			=	0.1	62 - deg C/hr						99/99 - Continuous	CA - CALCTD					
					Permit Req.			<=	2.0 DAILY MX	62 - deg C/hr								99/99 - Continuous	CA - CALCTD			
					Value NODI																	
TRP3B	IC25 Static Renewal 7 Day Chronic Chrceriodaphnia	1 - Effluent Gross	0	--	Sample							>	100.0		23 - %	01/30 - Monthly	CP - COMPOS					
					Permit Req.														>	69.0 MINIMUM	23 - %	CP - COMPOS
					Value NODI																	
TRP6C	IC25 Static Renewal 7 Day Chronic Chrpimephales	1 - Effluent Gross	0	--	Sample							>	100.0		23 - %	01/30 - Monthly	CP - COMPOS					
					Permit Req.														>	69.0 MINIMUM	23 - %	CP - COMPOS
					Value NODI																	

**Submission Note**  
If a parameter row does not contain any values for the Sample nor Effluent Trading, then none of the following fields will be submitted for that row: Units, Number of Excursions, Frequency of Analysis, and Sample Type.

**Edit Check Errors**  
No errors.

**Comments**

Method Detection Limit for Total Residual Chlorine is 0.05 mg/L.

**Attachments**

Name	Type	Size
SQN_May_2022_Biomonitoring_Report.pdf	pdf	4887351.0

**Report Last Saved By**

**Tennessee Valley Authority (TVA)**

User: TRMARKUM  
Name: Travis Markum  
E-Mail: trmarkum@tva.gov  
Date/Time: 2022-06-13 09:51 (Time Zone: -05:00)

**Report Last Signed By**

User: TMCMUTUA  
Name: Tony McMutuary  
E-Mail: tmcmutuary@tva.gov  
Date/Time: 2022-06-13 16:01 (Time Zone: -05:00)

## DMR Copy of Record

Permit																						
Permit #:	TN0026450	Permittee:	Tennessee Valley Authority (TVA)							Facility:	TVA SEQUOYAH NUCLEAR PLANT (SQN)											
Major:	Yes	Permittee Address:	Sequoyah Access Road, PO Box 2000 Soddy Daisy, TN 37379							Facility Location:	SEQUOYAH ACCESS ROAD SODDY DAISY, TN 37379											
Permitted Feature:	103 Internal Outfall	Discharge:	103-G (no description)																			
Report Dates & Status																						
Monitoring Period:	From 05/01/22 to 05/31/22		DMR Due Date:	06/15/22						Status:	NetDMR Validated											
Considerations for Form Completion																						
Internal Monitoring Point for various flows from Low Volume Waste Treatment Pond to Diffuser Pond, which eventually discharges through Outfall 101.																						
Principal Executive Officer																						
First Name:	Thomas		Title:	Vice President							Telephone:	423-843-7001										
Last Name:	Marshall																					
No Data Indicator (NODI)																						
Form NODI:	--																					
Code	Parameter Name	Monitoring Location	Season #	Param. NODI	Quantity or Loading					Quality or Concentration						# of Ex.	Frequency of Analysis	Sample Type				
					Qualifier 1	Value 1	Qualifier 2	Value 2	Units	Qualifier 1	Value 1	Qualifier 2	Value 2	Qualifier 3	Value 3				Units			
00400	pH	IM - Internal Monitoring Point	0	--	Sample						=	7.8			=	7.8	12 - SU	01/30 - Monthly	GR - GRAB			
					Permit Req.					>=	6.0 MINIMUM			<=	9.0 MAXIMUM	12 - SU	01/30 - Monthly			GR - GRAB		
					Value NODI																	
00530	Solids, total suspended	IM - Internal Monitoring Point	0	--	Sample									=	12.6	=	12.6	19 - mg/L	01/30 - Monthly	GR - GRAB		
					Permit Req.							<=	30.0 MO AVG	<=	100.0 DAILY MX	19 - mg/L	01/30 - Monthly	GR - GRAB				
					Value NODI																	
00556	Oil & Grease	IM - Internal Monitoring Point	0	--	Sample									<	5.1	<	5.1	19 - mg/L	01/30 - Monthly	GR - GRAB		
					Permit Req.							<=	15.0 MO AVG	<=	20.0 DAILY MX	19 - mg/L	01/30 - Monthly	GR - GRAB				
					Value NODI																	
50050	Flow, in conduit or thru treatment plant	IM - Internal Monitoring Point	0	--	Sample	=	1.044	=	1.044	03 - MGD									01/30 - Monthly	IN - INSTAN		
					Permit Req.		Req Mon MO AVG		Req Mon DAILY MX	03 - MGD								01/30 - Monthly			IN - INSTAN	
					Value NODI																	
Submission Note																						
If a parameter row does not contain any values for the Sample nor Effluent Trading, then none of the following fields will be submitted for that row: Units, Number of Excursions, Frequency of Analysis, and Sample Type.																						
Edit Check Errors																						
No errors.																						
Comments																						
Attachments																						
No attachments.																						
Report Last Saved By																						
Tennessee Valley Authority (TVA)																						
User:	TRMARKUM																					
Name:	Travis Markum																					
E-Mail:	trmarkum@tva.gov																					
Date/Time:	2022-06-13 08:28 (Time Zone: -05:00)																					
Report Last Signed By																						
User:	TMCMUTUA																					
Name:	Tony McMutuary																					
E-Mail:	tmcmutuary@tva.gov																					
Date/Time:	2022-06-13 16:01 (Time Zone: -05:00)																					

## DMR Copy of Record

Permit																				
Permit #:		TN0026450			Permittee:				Tennessee Valley Authority (TVA)				Facility:		TVA SEQUOYAH NUCLEAR PLANT (SQN)					
Major:		Yes			Permittee Address:				Sequoyah Access Road, PO Box 2000 Soddy Daisy, TN 37379				Facility Location:		SEQUOYAH ACCESS ROAD SODDY DAISY, TN 37379					
Permitted Feature:		107 Internal Outfall			Discharge:				107-G (no description)											
Report Dates & Status																				
Monitoring Period:		From 05/01/22 to 05/31/22			DMR Due Date:				06/15/22				Status:		NetDMR Validated					
Considerations for Form Completion																				
Metal Cleaning Waste Pond discharge. No monitoring required for stormwater decanting. Daily monitoring required only during dewatering events.																				
Principal Executive Officer																				
First Name:		Thomas			Title:				Vice President				Telephone:		423-843-7001					
Last Name:		Marshall																		
No Data Indicator (NODI)																				
Form NODI:		--																		
Code	Parameter Name	Monitoring Location	Season #	Param. NODI	Sample Permit Req.	Quantity or Loading					Quality or Concentration					# of Ex.	Frequency of Analysis	Sample Type		
						Qualifier 1	Value 1	Qualifier 2	Value 2	Units	Qualifier 1	Value 1	Qualifier 2	Value 2	Qualifier 3	Value 3	Units			
00400	pH	IM - Internal Monitoring Point	0	--	Sample Permit Req.						>=	6.0 MINIMUM			<=	9.0 MAXIMUM	12 - SU		01/01 - Daily	GR - GRAB
					Value NODI							C - No Discharge				C - No Discharge				
00530	Solids, total suspended	IM - Internal Monitoring Point	0	--	Sample Permit Req.						<=	30.0 MO AVG			<=	100.0 DAILY MX	19 - mg/L		01/01 - Daily	CP - COMPOS
					Value NODI							C - No Discharge				C - No Discharge				
00556	Oil & Grease	IM - Internal Monitoring Point	0	--	Sample Permit Req.						<=	15.0 MO AVG			<=	20.0 DAILY MX	19 - mg/L		01/01 - Daily	GR - GRAB
					Value NODI							C - No Discharge				C - No Discharge				
01042	Copper, total [as Cu]	IM - Internal Monitoring Point	0	--	Sample Permit Req.						<=	1.0 MO AVG			<=	1.0 DAILY MX	19 - mg/L		01/01 - Daily	CP - COMPOS
					Value NODI							C - No Discharge				C - No Discharge				
01045	Iron, total [as Fe]	IM - Internal Monitoring Point	0	--	Sample Permit Req.						<=	1.0 MO AVG			<=	1.0 DAILY MX	19 - mg/L		01/01 - Daily	CP - COMPOS
					Value NODI							C - No Discharge				C - No Discharge				
Submission Note																				
If a parameter row does not contain any values for the Sample nor Effluent Trading, then none of the following fields will be submitted for that row: Units, Number of Excursions, Frequency of Analysis, and Sample Type.																				
Edit Check Errors																				
No errors.																				
Comments																				
Attachments																				
No attachments.																				
Report Last Saved By																				
Tennessee Valley Authority (TVA)																				
User:		TRMARKUM																		
Name:		Travis Markum																		
E-Mail:		tmarkum@tva.gov																		
Date/Time:		2022-06-13 08:23 (Time Zone: -05:00)																		
Report Last Signed By																				
User:		TMCMUTUA																		
Name:		Tony McMutuary																		
E-Mail:		tmcmutuary@tva.gov																		
Date/Time:		2022-06-13 16:01 (Time Zone: -05:00)																		

## DMR Copy of Record

### Permit

<b>Permit #:</b>	<b>TN0026450</b>	<b>Permittee:</b>	Tennessee Valley Authority (TVA)	<b>Facility:</b>	TVA SEQUOYAH NUCLEAR PLANT (SQN)
<b>Major:</b>	Yes	<b>Permittee Address:</b>	Sequoyah Access Road, PO Box 2000 Soddy Daisy, TN 37379	<b>Facility Location:</b>	SEQUOYAH ACCESS ROAD SODDY DAISY, TN 37379
<b>Permitted Feature:</b>	110 External Outfall	<b>Discharge:</b>	<b>110-G</b> (no description)		

### Report Dates & Status

<b>Monitoring Period:</b>	<b>From 05/01/22 to 05/31/22</b>	<b>DMR Due Date:</b>	<b>06/15/22</b>	<b>Status:</b>	<b>NetDMR Validated</b>
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### Considerations for Form Completion

Outfall 110 is closed. Only active in the event the plant goes into closed mode.

### Principal Executive Officer

<b>First Name:</b>	Thomas	<b>Title:</b>	Vice President	<b>Telephone:</b>	423-843-7001
<b>Last Name:</b>	Marshall				

### No Data Indicator (NODI)

Form NODI: --

Code	Parameter Name	Monitoring Location	Season #	Param. NODI	Quantity or Loading					Quality or Concentration					# of Ex.	Frequency of Analysis	Sample Type	
					Qualifier 1	Value 1	Qualifier 2	Value 2	Units	Qualifier 1	Value 1	Qualifier 2	Value 2	Qualifier 3				Value 3
00010	Temperature, water deg. centigrade	1 - Effluent Gross	0	--	Sample												99/99 - Continuous	CA - CALCTD
					Permit Req.				Req Mon DAILY MX	04 - deg C								
					Value NODI				C - No Discharge									
00010	Temperature, water deg. centigrade	Z - Instream Monitoring	0	--	Sample												99/99 - Continuous	CA - CALCTD
					Permit Req.								<=	30.5 DAILY MX	04 - deg C			
					Value NODI									C - No Discharge				
00016	Temp. diff. between samp. & upstrm deg. C	1 - Effluent Gross	1	--	Sample												99/99 - Continuous	CA - CALCTD
					Permit Req.													
					Value NODI													
50050	Flow, in conduit or thru treatment plant	1 - Effluent Gross	0	--	Sample												99/99 - Continuous	RC - Recorder (auto)
					Permit Req.		Req Mon MO AVG		Req Mon DAILY MX	03 - MGD								
					Value NODI		C - No Discharge		C - No Discharge									
50060	Chlorine, total residual	1 - Effluent Gross	0	--	Sample												05/WK - Five Per Week	GR - GRAB
					Permit Req.						<=	0.027 MO AVG		<=	0.047 DAILY MX	19 - mg/L		
					Value NODI							C - No Discharge			C - No Discharge			
82234	Temperature rate of change deg. C/hr	Z - Instream Monitoring	0	--	Sample												99/99 - Continuous	CA - CALCTD
					Permit Req.													
					Value NODI													
TRP3B	IC25 Static Renewal 7 Day Chronic Chrcceriodaphnia	1 - Effluent Gross	0	--	Sample												01/30 - Monthly	GR - GRAB
					Permit Req.						>=	69.0 MINIMUM				23 - %		
					Value NODI							C - No Discharge						
TRP6C	IC25 Static Renewal 7 Day Chronic Chrpimephales	1 - Effluent Gross	0	--	Sample												01/30 - Monthly	GR - GRAB
					Permit Req.						>=	69.0 MINIMUM				23 - %		
					Value NODI							C - No Discharge						

### Submission Note

If a parameter row does not contain any values for the Sample nor Effluent Trading, then none of the following fields will be submitted for that row: Units, Number of Excursions, Frequency of Analysis, and Sample Type.

### Edit Check Errors

No errors.

### Comments

### Attachments

No attachments.

### Report Last Saved By

Tennessee Valley Authority (TVA)

User: TRMARKUM  
 Name: Travis Markum  
 E-Mail: trmarkum@tva.gov  
 Date/Time: 2022-06-13 08:25 (Time Zone: -05:00)

*Report Last Signed By*

User:	TMCMUTUA
Name:	Tony McMutuary
E-Mail:	tmcmutuary@tva.gov
Date/Time:	2022-06-13 16:01 (Time Zone: -05:00)

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Permit																					
Permit #:	TN0026450	Permittee:	Tennessee Valley Authority (TVA)							Facility:	TVA SEQUOYAH NUCLEAR PLANT (SQN)										
Major:	Yes	Permittee Address:	Sequoyah Access Road, PO Box 2000 Soddy Daisy, TN 37379							Facility Location:	SEQUOYAH ACCESS ROAD SODDY DAISY, TN 37379										
Permitted Feature:	118 External Outfall	Discharge:	118-G (no description)																		
Report Dates & Status																					
Monitoring Period:	From 05/01/22 to 05/31/22							DMR Due Date:	06/15/22							Status:	NetDMR Validated				
Considerations for Form Completion																					
Principal Executive Officer																					
First Name:	Thomas							Title:	Vice President							Telephone:	423-843-7001				
Last Name:	Marshall																				
No Data Indicator (NODI)																					
Form NODI:	--																				
Code	Parameter Name	Monitoring Location	Season #	Param. NODI	Quantity or Loading					Quality or Concentration					# of Ex.	Frequency of Analysis	Sample Type				
					Qualifier 1	Value 1	Qualifier 2	Value 2	Units	Qualifier 1	Value 1	Qualifier 2	Value 2	Qualifier 3				Value 3	Units		
00300	Oxygen, dissolved [DO]	1 - Effluent Gross	0	--	Sample																
					Permit Req.						>=	2.0 MINIMUM					19 - mg/L	02/07 - Twice Every Week	GR - GRAB		
					Value NODI							C - No Discharge									
00530	Solids, total suspended	1 - Effluent Gross	0	--	Sample																
					Permit Req.									<=	100.0 DAILY MX		19 - mg/L	02/07 - Twice Every Week	GR - GRAB		
					Value NODI										C - No Discharge						
00545	Solids, settleable	1 - Effluent Gross	0	--	Sample																
					Permit Req.									<=	1.0 DAILY MX		25 - mL/L	01/30 - Monthly	GR - GRAB		
					Value NODI										C - No Discharge						
50050	Flow, in conduit or thru treatment plant	1 - Effluent Gross	0	--	Sample																
					Permit Req.		Req Mon MO AVG		Req Mon DAILY MX	03 - MGD									01/BA - Once Per Batch	ES - ESTIMA	
					Value NODI		C - No Discharge		C - No Discharge												
Submission Note																					
If a parameter row does not contain any values for the Sample nor Effluent Trading, then none of the following fields will be submitted for that row: Units, Number of Excursions, Frequency of Analysis, and Sample Type.																					
Edit Check Errors																					
No errors.																					
Comments																					
Attachments																					
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Name:	Tony McMutuary																				
E-Mail:	tmcmutuary@tva.gov																				
Date/Time:	2022-06-13 16:01 (Time Zone: -05:00)																				



**TENNESSEE VALLEY AUTHORITY  
TOXICITY TEST REPORT**

**INTRODUCTION / EXECUTIVE SUMMARY**

Report Date: May 26, 2022

1. Facility / Discharger: Sequoyah Nuclear Plant / TVA
2. County / State: Hamilton / Tennessee
3. NPDES Permit #: TN0026450
4. Type of Facility: Nuclear-Fueled Electric Generating Plant
5. Design Flow (MGD): 1,579
6. Receiving Stream: Tennessee River (TRM 483.6)
7. 1Q10: 2,456
8. Outfall Tested: 101
9. Dates Sampled: May 01 – 06, 2022
10. Average Flow on Days Sampled (MGD): 1751.774, 1751.317, 1747.124
11. Pertinent Site Conditions: Production / operation data will be provided upon request.
12. Test Dates: May 03 – 10, 2022
13. Test Type: Short-term Chronic Definitive
14. Test Species: Fathead Minnows (*Pimephales promelas*)  
Daphnids (*Ceriodaphnia dubia*)
15. Concentrations Tested (%):  
*Pimephales promelas*: UV treated Outfall 101: 17.25, 34.5, 69, 84.5, 100  
UV treated Intake: 100  
  
*Ceriodaphnia dubia*: Non-treated Outfall 101: 17.25, 34.5, 69, 84.5, 100  
Non-treated Intake: 100
16. Permit Limit Endpoint (%): Outfall 101: IC<sub>25</sub> = 69%
17. Test Results: Outfall 101: *Pimephales promelas*: IC<sub>25</sub> > 100%  
*Ceriodaphnia dubia*: IC<sub>25</sub> > 100%



18. Facility Contact: Travis Markum Phone #: (865) 748-3294
19. Consulting / Testing Lab: Environmental Testing Solutions, Inc.
20. Lab Contact: Jim Sumner Phone #: (828) 350-9364
21. TVA Contact: Rick Sherrard Phone #: (423) 876-6743
22. Notes: Exposures to samples collected May 01 – 06, 2022 from Outfall 101 resulted in no toxic effects to fathead minnows or daphnids. The resulting IC<sub>25</sub> values, for both species, were >100 percent. Exposure of minnows and daphnids to intake samples resulted in no significant differences from the controls during this study period.



## METHODS SUMMARY

### Samples:

1. Sampling Point: Outfall 101, Intake
2. Sample Type: Composite
3. Sample Information:

Sample ID	Date (MM-DD-YY) Time (ET) Collected	Date (MM-DD-YY) Time (ET) Received	Arrival Temp. (°C)	Initial TRC* (mg/L)	Date (MM-DD-YY) Time (ET) Last Used By
101	05-01-22 / 0700 to 05-02-22 / 0600	05-02-22 / 1301	0.9	<0.10	05-03-22 / 0922 05-04-22 / 0823
Intake	05-01-22 / 0700 to 05-02-22 / 0600	05-02-22 / 1301	1.1	<0.10	05-03-22 / 0922 05-04-22 / 0823
101	05-03-22 / 0700 to 05-04-22 / 0600	05-04-22 / 1240	1.3	<0.10	05-05-22 / 0826 05-06-22 / 0823
Intake	05-03-22 / 0700 to 05-04-22 / 0600	05-04-22 / 1240	1.6	<0.10	05-05-22 / 0826 05-06-22 / 0823
101	05-05-22 / 0700 to 05-06-22 / 0600	05-06-22 / 1355	1.7, 1.6 <sup>†</sup>	<0.10	05-07-22 / 0912 05-08-22 / 0820 05-09-22 / 0820
Intake	05-05-22 / 0700 to 05-06-22 / 0600	05-06-22 / 1355	1.3	<0.10	05-07-22 / 0912 05-08-22 / 0820 05-09-22 / 0820

\*TRC = Total Residual Chlorine

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

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

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



	<i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>
<u>Test Organisms:</u>		
1. Source:	<u>In-house Cultures</u>	<u>In-house Cultures</u>
2. Age:	<u>&lt; 24-hours old</u>	<u>&lt; 24-hours old</u>
<u>Test Method Summary:</u>		
1. Test Conditions:	<u>Static, Renewal</u>	<u>Static, Renewal</u>
2. Test Duration:	<u>7 days</u>	<u>Until at least 60% of control females have 3 broods</u>
3. Control / Dilution Water:	<u>Moderately Hard Synthetic</u>	<u>Moderately Hard Synthetic</u>
4. Number of Replicates:	<u>4</u>	<u>10</u>
5. Organisms per Replicate:	<u>10</u>	<u>1</u>
6. Test Initiation: (Date/Time):	<u>05-03-22 0720 ET</u>	<u>05-03-22 0922 ET</u>
7. Test Termination: (Date/Time):	<u>05-10-22 0627 ET</u>	<u>05-10-22 0826 ET</u>
8. Test Temperature: Outfall 101:	<u>Mean = 24.8°C</u> <u>(24.4 – 25.1°C)</u>	<u>Mean = 24.9°C</u> <u>(24.7 – 25.2°C)</u>
9. Physical / Chemical Measurements:	<u>Alkalinity, hardness, total residual chlorine, and conductivity were measured at the laboratory in each 100% sample. Daily temperatures were measured in one replicate for each test concentration. Pre- and post-exposure test solutions were analyzed daily for pH and dissolved oxygen.</u>	
10. Statistics:	<u>Statistics were performed according to methods prescribed by EPA using ToxCalc version 5.0 statistical software (Tidepool Scientific Software, McKinneyville, CA).</u>	



**TOXICITY TEST RESULTS** (see Appendix C for Bench Sheets)

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

Conducted May 03 – 10, 2022 using effluent from Outfall 101.

Test Solutions (% Effluent)	Percent Surviving (time interval used – days)						
	1	2	3	4	5	6	7
Control, UV-treated	100	100	100	100	100	100	100
17.25%	100	100	100	100	100	100	100
34.5%	100	100	100	100	100	100	100
69%	100	100	100	100	100	100	100
84.5%	100	100	100	100	100	100	100
100.0%	100	100	100	100	100	100	100
Intake	100	100	100	100	100	100	100
Control, Non-treated	100	100	100	100	100	100	100

Test Solutions (% Effluent)	Mean Dry Weight (mg) (replicate number)				
	1	2	3	4	Mean
Control, UV-treated	0.858	0.868	0.931	0.794	0.863
17.25%	0.736	0.846	0.893	0.819	0.824
34.5%	0.753	0.782	0.732	0.970	0.809
69%	0.791	0.842	0.707	0.738	0.770
84.5%	0.827	0.860	0.751	0.817	0.814
100.0%	0.753	0.769	0.721	0.894	0.784
Intake	0.801	0.843	0.855	0.928	0.857
Control, Non-treated	0.841	0.917	0.788	0.886	0.858
IC <sub>25</sub> Value: <u>&gt; 100%</u> Permit Limit: <u>69%</u>			Calculated TU Estimates: <u>&lt; 1.0 TUc*</u>		
95% Confidence Limits: Upper Limit: <u>NA</u> Lower Limit: <u>NA</u>			Permit Limit: <u>1.4 TUc</u>		

\*TUa = 100/LC<sub>50</sub>: TUc = 100/ IC<sub>25</sub>



TOXICITY TEST RESULTS (see Appendix C for Bench Sheets)

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

Conducted May 03 – 10, 2022 using effluent from Outfall 101.

Test Solutions (% Effluent)	Percent Surviving (time interval used – days)						
	1	2	3	4	5	6	7
Control	100	100	100	100	100	100	100
17.25%	100	100	100	100	100	100	100
34.5%	100	100	100	100	100	100	100
69%	100	100	100	100	100	100	100
84.5%	100	100	100	100	100	100	100
100.0%	100	100	100	100	100	100	100

Test Solutions (% Effluent)	Reproduction (#young/female/7 days) Data (replicate number)										
	1	2	3	4	5	6	7	8	9	10	Mean
Control	28	32	30	31	28	31	29	34	31	31	30.5
17.25%	32	36	32	37	28	31	34	33	36	30	32.9
34.5%	32	33	34	34	34	31	33	36	33	31	33.1
69%	36	34	35	34	34	34	35	31	35	34	34.2
84.5%	40	37	37	32	40	33	38	37	33	35	36.2
100.0%	36	40	38	38	38	36	35	37	38	38	37.4
IC <sub>25</sub> Value: <u>&gt; 100%</u> Permit Limit: <u>69%</u>						Calculated TU Estimates: <u>&lt; 1.0 TUc*</u>					
95% Confidence Limits: Upper Limit: <u>NA</u> Lower Limit: <u>NA</u>						Permit Limit: <u>1.4 TUc</u>					

\*TU<sub>a</sub> = 100/LC<sub>50</sub>; TU<sub>c</sub> = 100/ IC<sub>25</sub>



TOXICITY TEST RESULTS (see Appendix C for Bench Sheets)

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

Conducted May 03 – 10, 2022 using water from Intake

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

Test Solutions (% Effluent)	Reproduction (#young/female/7 days) Data (replicate number)										
	1	2	3	4	5	6	7	8	9	10	Mean
Control	30	32	29	29	32	28	30	33	31	30	30.4
Intake	37	38	38	35	36	36	36	33	35	36	36.0
IC <sub>25</sub> Value: <u>&gt; 100%</u> Permit Limit: <u>N/A</u>						Calculated TU Estimates: <u>&lt; 1.0 TUc*</u> Permit Limit: <u>N/A</u>					
95% Confidence Limits: Upper Limit: <u>NA</u> Lower Limit: <u>NA</u>											

\*TU<sub>a</sub> = 100/LC<sub>50</sub>; TU<sub>c</sub> = 100/ IC<sub>25</sub>

REFERENCE TOXICANT TEST RESULTS (see Appendix A and D)

Species	Date	Time	Duration	Toxicant	Results (IC <sub>25</sub> )
<i>Pimephales promelas</i>	May 03 – 10, 2022	0710	7 days	KCl	0.63 g/L
<i>Ceriodaphnia dubia</i>	May 03 – 10, 2022	0911	7 days	NaCl	1.09 g/L





**PHYSICAL/CHEMICAL SUMMARY**

Water Chemistry Mean Values and Ranges for UV-treated *Pimephales promelas* and Non-treated *Ceriodaphnia dubia*, Sequoyah Nuclear Plant (SQN), Effluent Outfall 101 and Intake performed May 03-10, 2022.

Test	Sample ID	Temperature (°C)		Dissolved Oxygen (mg/L)		pH (S.U.)		Conductance (µmhos/cm)	Alkalinity (mg/L CaCO <sub>3</sub> )	Hardness (mg/L CaCO <sub>3</sub> )	*Total Residual Chlorine (mg/L)
		Initial	Final	Initial	Final	Initial	Final				
<i>Pimephales promelas</i>	Control, Non-treated	24.8	24.7	7.7	7.1	7.73	7.53	300	62	87	-
		24.7 - 24.9	24.4 - 24.9	7.7 - 7.8	5.5 - 7.9	7.66 - 7.80	7.33 - 7.73	288 - 310	60 - 63	86 - 88	-
	Control, UV-treated	24.8	24.7	7.9	7.1	7.83	7.55	305	61	86	-
		24.7 - 24.8	24.5 - 24.9	7.7 - 8.0	5.7 - 7.9	7.79 - 7.98	7.41 - 7.78	292 - 317	61 - 61	84 - 88	-
	17.25%	24.8	24.7	7.9	7.1	7.84	7.51	282	-	-	-
		24.7 - 24.9	24.6 - 25.1	7.7 - 8.0	5.7 - 7.9	7.79 - 7.99	7.33 - 7.72	271 - 290	-	-	-
	34.5%	24.8	24.7	7.9	7.1	7.83	7.54	259	-	-	-
		24.7 - 24.9	24.6 - 24.9	7.8 - 8.0	5.7 - 7.9	7.75 - 7.99	7.45 - 7.70	248 - 270	-	-	-
	69%	24.9	24.8	7.9	7.0	7.82	7.50	213	-	-	-
		24.8 - 25.0	24.6 - 24.9	7.8 - 8.1	5.6 - 8.0	7.69 - 7.99	7.35 - 7.64	205 - 221	-	-	-
84.5%	24.9	24.7	8.0	7.0	7.81	7.49	186	-	-	-	
	24.8 - 25.0	24.4 - 25.1	7.9 - 8.1	5.6 - 8.0	7.66 - 7.98	7.33 - 7.64	176 - 193	-	-	-	
100%	25.0	24.7	8.0	7.1	7.80	7.49	168	66	70	<0.10	
	24.9 - 25.0	24.4 - 24.9	8.0 - 8.1	5.5 - 8.0	7.64 - 7.97	7.32 - 7.64	156 - 176	65 - 67	69 - 71	<0.10	
Intake	25.0	24.8	8.1	7.2	7.79	7.50	164	65	70	<0.10	
	24.9 - 25.0	24.6 - 24.8	8.0 - 8.2	5.8 - 8.2	7.72 - 7.95	7.32 - 7.64	156 - 170	64 - 68	67 - 76	<0.10	
<i>Ceriodaphnia dubia</i>	Control, Non-treated	24.8	25.1	7.7	7.8	7.73	7.80	300	62	87	-
		24.8 - 24.9	24.9 - 25.2	7.7 - 7.8	7.6 - 7.9	7.66 - 7.80	7.74 - 7.89	288 - 310	60 - 63	86 - 88	-
	17.25%	24.8	24.9	7.9	7.8	7.82	7.79	286	-	-	-
		24.8 - 24.9	24.8 - 25.1	7.7 - 8.0	7.6 - 8.0	7.73 - 8.01	7.74 - 7.83	274 - 297	-	-	-
	34.5%	24.9	25.0	7.9	7.8	7.82	7.78	261	-	-	-
		24.8 - 25.0	24.8 - 25.2	7.7 - 8.1	7.6 - 8.2	7.74 - 8.01	7.73 - 7.82	251 - 266	-	-	-
	69%	24.9	24.9	7.9	7.8	7.80	7.77	214	-	-	-
		24.8 - 25.0	24.7 - 25.0	7.7 - 8.0	7.5 - 8.0	7.72 - 8.00	7.72 - 7.80	206 - 224	-	-	-
	84.5%	25.0	24.9	7.9	7.8	7.80	7.76	190	-	-	-
		24.9 - 25.0	24.7 - 25.0	7.8 - 8.0	7.5 - 8.1	7.68 - 7.99	7.71 - 7.80	179 - 199	-	-	-
100%	25.0	25.0	8.0	7.8	7.79	7.76	170	66	69	<0.10	
	24.9 - 25.0	24.7 - 25.2	7.9 - 8.1	7.5 - 8.2	7.65 - 7.98	7.71 - 7.80	160 - 179	65 - 67	67 - 71	<0.10	
Intake	25.0	24.9	8.1	7.8	7.80	7.76	167	66	68	<0.10	
	25.0 - 25.1	24.8 - 25.1	7.9 - 8.2	7.7 - 8.2	7.73 - 7.96	7.71 - 7.81	159 - 173	64 - 69	67 - 69	<0.10	

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

Overall temperature (°C)	Average	Minimum	Maximum
<i>Pimephales promelas</i>	24.8	24.4	25.1
<i>Ceriodaphnia dubia</i>	24.9	24.7	25.2



## SUMMARY / CONCLUSIONS

Exposures to samples collected May 01 – 06, 2022 from Outfall 101 resulted in no toxic effects to fathead minnows or daphnids. The resulting IC<sub>25</sub> values, for both species, were >100 percent. Exposure of minnows and daphnids to intake samples resulted in no significant differences from the controls during this study period.

