



## Tampa Electric Laboratory Services

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Polk Power Station

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**Report Date:**

12/13/16 12:33

**Work Order - L16K112**

**Project - NPDES-Cooling Reservoir-Quarterly**

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### Case Narrative

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The attached analysis was subcontracted to Hydrosphere Research.

A handwritten signature in black ink, appearing to read "Rory Lacey", written over a light gray rectangular background.

Rory Lacey, Environmental Technician

Laboratory Services certifies that the test result in this report meet all requirements of the NELAC standards, unless indicated otherwise in the body of the report. Unless otherwise noted, all methods followed are per the most current published version of 40 CFR Part 136, Table B. Results reported on this report pertain to the above referenced sample only.



*Providing Environmental and Product Toxicity Testing Since 1986*

**Prepared for:**  
**Tampa Electric**  
**Polk Power Station**  
**5012 Causeway Boulevard**  
**Tampa, FL 33619**



**Prepared by:**  
Hydrosphere Research

**Test Location:**  
11842 Research Circle  
Alachua, FL 32615

**Contact Information:**  
Craig Watts, Lab Director  
(386) 462-7889  
[cwatts@hydrosphere.net](mailto:cwatts@hydrosphere.net)  
[www.hydrosphere.net](http://www.hydrosphere.net)

**Test Number:**  
TMP-PO 16222

**Permit Number:**  
FL0043869

**Initiated:**  
November 29, 2016

**Test Type:**  
7-day Chronic Definitive Bioassays

# Report of Routine Bioassays Performed for the Tampa Electric Polk Power Station

## Abstract

To comply with the routine whole effluent biomonitoring requirements of the National Pollutant Discharge Elimination System (NPDES) permit FL0043869, composite samples were collected from the Tampa Electric Polk Power Station, Polk County, Florida. Using these samples, Hydrosphere Research conducted a series of 7-day chronic definitive bioassay tests. In addition, Hydrosphere Research conducted a series of 7-day chronic definitive bioassay tests using UV sterilized samples.

The results are summarized in the accompanying report. All test results contained herein comply with the requirements of the National Environmental Laboratory Accreditation Conference (NELAC). The results discussed in this report relate only to the samples as identified on the Chain of Custody forms in Appendix A. Laboratory Bench Sheets and Statistical Analyses are in Appendix B, and the Standard Reference Toxicity Tests are in Appendix C.

## Introduction

To comply with the routine whole effluent biomonitoring requirements of NPDES permit FL0043869, composite samples were collected from Outfall 001 at the Tampa Electric Polk Power Station, Polk County, Florida.

Using these samples, Hydrosphere Research conducted a series of 7-day chronic definitive bioassay tests using the water flea (*Ceriodaphnia dubia*) and the fathead minnow (*Pimephales promelas*). In an effort to address possible pathogenic interference, Hydrosphere Research also conducted a series of 7-day chronic definitive bioassay tests with UV sterilized samples.

## Materials and Methods

### Test Sample

Grab samples were collected from Outfall 001 at the Tampa Electric Polk Power Station on November 27, 28, 29, 30, December 1, and 2, 2016. The samples were contained in ½ gallon HDPE containers, which were intact upon arrival. Hydrosphere Research received these samples in good condition. The samples were composited in the lab.

Upon receipt, the effluent temperature of each sample met the sample acceptance criteria. The effluent water quality values fell into expected ranges for pH, conductivity, and dissolved oxygen. All other chemical characterization data for the effluent samples upon arrival in the laboratory are provided on the Sample Data Bench Sheet, located in Appendix B.

The Chain of Custody forms are located in Appendix A. Each effluent sample tested was assigned a unique sample identification number.

### Test Methods

The test conditions are presented in Table 1. The dilution series used is specified in the permit. The toxicity tests were performed according to the methods listed in the table below. All tests were in compliance with NELAC standards.

**Table 1. Test Methods**

Test Type	Species	Dilution Series (%)	Test Method
7-day chronic static renewal definitive	<i>C. dubia</i>	0, 6.25, 12.5, 25, 50, and 100	EPA-821-R-02-013, Method 1002.0
7-day chronic static renewal definitive	<i>P. promelas</i>	0, 6.25, 12.5, 25, 50, and 100	EPA-821-R-02-013, Method 1000.0

### UV Treatment

Hydrosphere Research prepared subsamples that were UV sterilized prior to test initiation. Each sample was placed in a UV sterilization chamber for 5 minutes in an effort to mitigate any pathogenic interference.

### Test Organisms

The *C. dubia* and *P. promelas* test organisms were cultured in-house. All organisms appeared to be in normal condition at the test initiation.

### Toxicity Test Monitoring

Each test was monitored at the test initiation and daily thereafter for mortality, temperature, dissolved oxygen, pH, and conductivity. The bioassay tests were initiated on November 29, 2016.

### Standard Reference Toxicity Tests

A reference toxicant test was conducted for each test species to evaluate the sensitivity of the test organisms for the chronic tests. The test organisms used for each reference toxicant test were the same as those used for the effluent tests. The test conditions and dilution series were specific for each reference toxicant test conducted.

### Test Location

The bioassay tests were performed at Hydrosphere Research, 11842 Research Circle, Alachua, FL 32615; telephone number (386) 462-7889. The laboratory is NELAC/P certified by the State of Florida Department of Health and Rehabilitation Services (E82295).

### Statement of Quality Assurance

This report was reviewed by the Hydrosphere Research Quality Assurance Officer and the Laboratory Director to ensure that the procedures outlined in the Hydrosphere Research Quality Manual were followed. Testing was conducted using generally accepted lab practices. Hydrosphere Research believes the results are true and accurate and meet all NELAC standards.



## Results & Discussion

### Toxicity Test Results

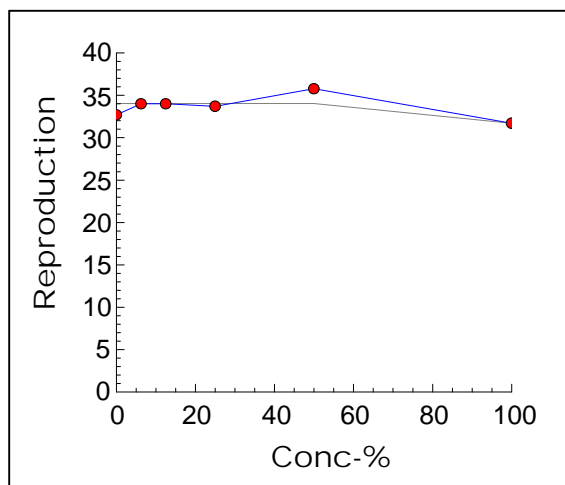
Water quality values remained within acceptable limits during the test period. The results of the control exposures met the test acceptability requirements specified in the method. The bioassay tests were initiated within 36 hours of the first sample's collection time and were acceptable tests based on controls and test conditions. Copies of the relevant laboratory raw data pertaining to the toxicity tests are provided in Appendix B.

The toxicity test results are summarized in Table 2 and the corresponding graphs below:

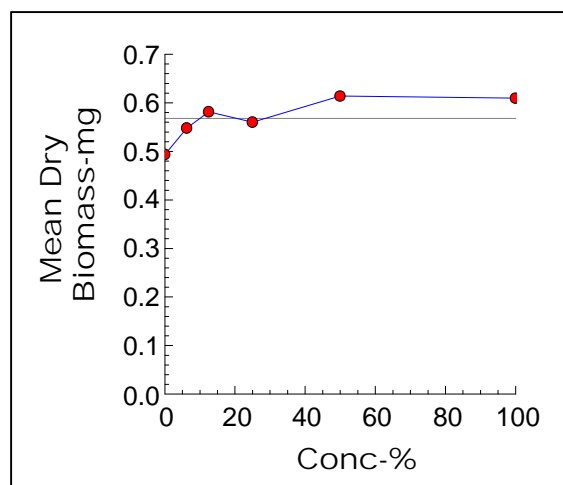
**Table 2. Chronic Test Results**

Percent Effluent	<i>C. dubia</i>		<i>P. promelas</i>	
	Final Survival (%)	Three Brood Totals (Average # of neonates / female)	Final Survival (%)	Average Dry Weight (mg/fish)
Control	100	32.7	85	0.494
6.25	100	34.0	74.4	0.548
12.5	100	34.0	89.7	0.582
25	100	33.7	79.5	0.560
50	100	35.8	92.5	0.614
100	100	31.7	87.5	0.610
IC <sub>25</sub>	--	>100%	--	>100%
Report on DMR	--	>100%	--	>100%

**Figure 1. *C. dubia* Reproduction**



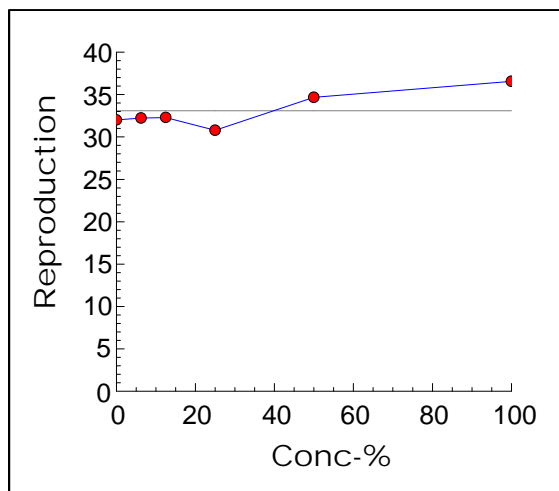
**Figure 2. *P. promelas* Growth**



**Table 3. Chronic Test Results with UV Sterilization**

Percent Effluent	<i>C. dubia</i>	
	Final Survival (%)	Three Brood Totals (Average # of neonates / female)
Control	100	32.0
6.25	100	32.2
12.5	100	32.3
25	100	30.8
50	100	34.7
100	100	36.6
IC <sub>25</sub>	--	>100%
Report on DMR	--	>100%

**Figure 1. *C. dubia* Reproduction**



All statistical calculations were made using CETIS<sup>®</sup> (Tidepool Scientific Software, McKinleyville, CA). The statistical results are located in Appendix B.

The samples provided did not demonstrate chronic toxicity to either test species. The untreated sample produced an IC<sub>25</sub> >100% effluent for both species. The UV Sterilized sample produced an IC<sub>25</sub> >100% effluent for *C. dubia*. The *P. promelas* test using the UV Sterilized sample was invalid due to invalid test controls. The invalid data is in Appendix D.

While both *C. dubia* tests produced an IC<sub>25</sub> >100% effluent, the 100% untreated effluent produced a -3.1% effect when compared to the control. The 100% UV treated effluent sample demonstrated an improvement as the effect was +14.2% when compared to the control.

During these tests, dissolved oxygen, temperature, pH, and conductivity remained within the limits established in the test methods.

The cooler received on November 28, 2016, was missing an intact chain-of-custody seal. The client was contacted and advised Hydrosphere to use the samples. The Hydrosphere Sample Rejection/Acceptance Form is included with the chain-of-custody forms in Appendix A.

Otherwise no unusual observations or deviations from standard test protocol were noted. These test results only relate to the samples described in this report and meet all requirements of NELAC.

### Standard Reference Toxicity Test Results

The results of the standard reference toxicant tests, provided in Appendix C, indicate that the test organisms were of normal sensitivity for this laboratory. The control charts, bench sheets, and statistical analysis for the standard reference toxicant test are located in Appendix C.

## Conclusion

Hydrosphere Research initiated a series of 7-day chronic definitive bioassay tests using the water flea (*C. dubia*) and the fathead minnow (*P. promelas*) on November 29, 2016. The tests were conducted to satisfy the requirements of NPDES permit FL0043869.

The samples provided did not demonstrate chronic toxicity to either test species. The untreated sample tests produced an  $IC_{25} > 100\%$  effluent for both species. The UV Sterilized sample test for *C. dubia* produced an  $IC_{25} > 100\%$  effluent.

## References

U.S. Environmental Protection Agency. *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms*. Fourth Edition. EPA-821-R-02-013. October 2002.

*Handbook of Analytical Quality Control in Water and Wastewater Laboratories*. EPA-600/4-79-019. March 1979.

Chemical and physical parameters reported herein were determined by methods described in *Methods for Chemical Analysis of Water and Waste*. EPA 600/4-79-020. March 1983.

## NPDES Forms

The NPDES forms can be found in the following four pages, comprised of Table 4. NPDES Whole Effluent Toxicity Testing Report Form, Table 5. Summary of Test Conditions, Table 6. Acute Test Results, and Table 7. Chronic Test Results.



**Table 4. NPDES Whole Effluent Toxicity Testing Report Form**

All blanks on this form are to be filled in.		
Blanks that are not used should be filled in with "N/A" or a line drawn through the blank. Please print.		
Attachments: Please attach the following items to this report form and indicate with an "x" in box.		
1.	All Chain-of-Custody Forms	X
2.	All Reference Toxicant Data for each Organism used in Test and Current Control Charts for each Organism	X
3.	All Raw Data (Bench Sheets) Pertaining to the Tests (i.e., all physical, chemical, and biological measurements)	X
4.	All Result Calculations	X
5.	Discharge Monitoring Reports (DMR) when Applicable	NA

Facility/industry/client name:	Tampa Electric – Polk Power Station		
Permit number:	FL0043869	County:	Polk

Consultant company name:	Hydrosphere Research	Telephone:	(386) 462-7889
Dates test(s) conducted--Begin:	11/29/16	End:	12/06/16
Persons conducting test(s) (print names):	E, Hill, K. Oliff, R. Salley		

Authorized signature:		Date:	12/13/16
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Laboratory report #/project #:	TMP-PO 16222	Sampler (print name):	F. Howard, R. Kelley, E. Richardson, M. Torres, E. Warren
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DMR monitoring period end date on which this test is reported (filled out by the Permittee--mm/dd/yy):			
Routine test:	X	Additional test:	NA
Failed routine test date:	NA		

Samples								
No.	Date & Time Collected	Lab Sample #	Grab	24-Hour Composite	Arrival Temperature (°C)	Initial Residual Chlorine	Lab Dechlorination	
							Y/N	Chemical Used
1.	11/28/16-1000	16222A	NA	X	0.5-0.6	<0.04	N	NA
2.	11/30/16-1000	16222B	NA	X	0.5	<0.04	N	NA
3.	12/02/16-1000	16222C	NA	X	0.5	<0.04	N	NA
4.	NA	NA	NA	NA	NA	NA	NA	NA
5.	NA	NA	NA	NA	NA	NA	NA	NA
6.	NA	NA	NA	NA	NA	NA	NA	NA
7.	NA	NA	NA	NA	NA	NA	NA	NA
8.	NA	NA	NA	NA	NA	NA	NA	NA
9.	NA	NA	NA	NA	NA	NA	NA	NA
10.	NA	NA	NA	NA	NA	NA	NA	NA

Refrigerant used for sample transportation:	Wet Ice	Blue Ice	Other (describe)	Samples Aerated	
	X	NA	NA	Yes (describe)	No
				X, All samples for 5 minutes	NA

Samples delivered by:	Bus	Hand	Common Carrier	Samples Filtered	
	NA	NA	X	Yes (describe)	No
				NA	X



**Table 5. Summary of Test Conditions**

Type of Test <sup>a</sup>	Test Concentrations <sup>b</sup> (% Effluent)	Test Species Used <sup>c</sup>	Age of Test Organism	Amount & Type of Food	How Often Fed	Test Chamber Volume	Volume of Effluent Used	Type of Chamber	# of Organisms/ Chamber	# of Replicates	Temp. Range (°C)
F	0, 6.25, 12.5, 25, 50, 100	CD	< 24 hours	0.133 ml YCT + 0.133 ml S. cap	1x/day	30 ml	20 ml	Plastic cup	1	10	25.0 ± 1.0
F	0, 6.25, 12.5, 25, 50, 100	FM	< 24 hours	0.15 ml Artemia	2x/day	1 liter	250 ml	Plastic cup	10	4	25.0 ± 1.0

G. "Other" type of test:	NA	Temperature readings:	Single	Multiple	Continuous
			NA	X	NA

Description of control water:	Moderately Hard Reconstituted	Photoperiod during test:	16 hours light / 8 hours dark
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Reference Toxicant Data <sup>d</sup>					
Name of Toxicant	Dates of Test		Species <sup>c</sup>	In-House or Commercially Obtained	LC <sub>50</sub> /IC <sub>25</sub>
	Begin	End			
KCl	11/01/16	11/08/16	CD	In-House	IC <sub>25</sub> = 394.9 mg/L
KCl	11/01/16	11/08/16	FM	In-House	IC <sub>25</sub> = 0.66 g/L

<sup>a</sup>Please fill the "Type of Test" box with the appropriate letter:

<sup>c</sup>Write appropriate letters for the following species in this column:

- A. 48-Hr/Non-Renewal/Single Concentration (Screen)
- B. 48-Hr/Non-Renewal/Multi-Concentration (Definitive)
- C. 96-Hr/Renewed Every 48 Hrs/Single Concentration (Screen)
- D. 96-Hr/Renewed Every 48 Hrs/Multi-Concentration (Definitive)
- E. 7-Day Chronic/Single Concentration (Screen)/Renewed Daily
- F. 7-Day Chronic/Multi-Concentration (Definitive)/Renewed Daily
- G. Other (described in the "G" box)

- CD - *Ceriodaphnia dubia*
- FM - *Pimephales promelas* (fathead minnow)
- SS - *Menidia beryllina* (inland silverside)
- MS - *Americamysis bahia* (formerly *Mysidopsis bahia*, mysid shrimp)
- CL - *Cyprinella leedsii* (bannerfin shiner)
- Other - Please describe: \_\_\_\_\_

<sup>b</sup>List all concentrations of effluent used (i.e., 0%, 6.25%, 12.5%, 25%, 50%, 100%).

<sup>d</sup>Attach all reference toxicant raw data & control charts for each organism/reference toxicant used for the test.

**Table 6. Acute Test Results**

Test Species	Test Concentrations <sup>b</sup> (% Effluent)	Grab Sample <sup>c</sup>	Composite Sample <sup>c</sup>	% Mortality <sup>d</sup> (48 Hours)	% Mortality <sup>d</sup> (96 Hours)	LC <sub>50</sub> <sup>e</sup>
Control <sup>a</sup>	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
Control <sup>a</sup>	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA

<sup>a</sup>List % Control Mortality in appropriate column (48 or 96 hr) for organisms (use abbreviations shown on footnote "c" of Table 5) that you list under the word "Control." Control mortality must not exceed 10% for a valid acute test.

<sup>b</sup>List all concentrations of effluent used (i.e., 0%, 6.25%, 12.5%, 25%, 50%, 100%).

<sup>c</sup>Record number that corresponds with the number of the sample in the "Date & Time Collected" column in sample section.

<sup>d</sup>List % Mortality for each organism and control if you are conducting a single concentration (Screen) test.

<sup>e</sup>If multi-concentration (Definitive) tests are conducted on grab or composite samples, record the calculated LC<sub>50</sub> in this column for each sample. Enter "N/A" in all % Mortality columns and LC<sub>50</sub> box at bottom of this table.

Species	LC <sub>50</sub> <sup>f</sup>
NA	NA
NA	NA

<sup>f</sup>If a single concentration (screen) test is conducted and >50% mortality occurs in any one of the four grab or composite samples, record <100% in this column. If <50% mortality occurs in all four grabs or composites, record >100% in this column. Draw a line through the LC<sub>50</sub> column in the above table.

**Table 7. Chronic Test Results**

Test Species <sup>a</sup>	Test Concentrations <sup>b</sup> (% Effluent)	IC <sub>25</sub>	
		Growth <sup>c</sup>	Reproduction <sup>c</sup>
CD	0, 6.25, 12.5, 25, 50, 100	NA	>100%
FM	0, 6.25, 12.5, 25, 50, 100	>100%	NA
CD (UV)	0, 6.25, 12.5, 25, 50, 100	NA	>100%

<sup>a</sup>Use abbreviations shown on footnote "c" of Table 5.

<sup>b</sup>List all concentrations of effluent used (i.e., 0%, 6.25%, 12.5%, 25%, 50%, 100%).

<sup>c</sup>For single concentration tests (Screen), if there is a significant difference (P = 0.05) between survival, growth, reproduction, or fecundity in 100% or IWC, and control, record <100% in proper column. If there is not a significant difference between survival, growth, reproduction, or fecundity in 100% or IWC, and control, record >100% in proper column.

CD Survival in Control (≥80%)	100%, 100%
Average Number of Young per Female in CD Control (min 15 young/surviving female)	32.7, 32.0

FM Survival in Control (≥80%)	85%
Average FM Dry Weight in Control (min ADW 0.25 mg/FM in surviving controls)	0.494

MS Survival in Control (≥80%)	NA
Average MS Dry Weight in Control (min ADW 0.20 mg/MS in surviving controls)	NA

SS Survival in Control (≥80%)	NA
Average SS Dry Weight in Control (min immediate ADW 0.50 mg/SS in surviving controls)	NA

## **Appendix A. Chain of Custody**





# CHAIN OF CUSTODY

Please complete ALL fields other than the gray areas  
(which will be completed by Hydrosphere)

<b>Client Name</b> Tampa Electric Polk Power Station	<b>Client Shipping Address</b> 5012 Causeway Boulevard Tampa, FL 33619	
<b>Sample Kit Information</b> Cooler 2 of 6 Container Type: 1/2 gal bottle Number of Containers: 8 Method of Shipment:	<b>Prepared and Shipped by</b> CG	<b>Sample Kit Received By</b> ERIC WARREN <i>Eric Warren</i> Print Name Signature
	<b>Date</b> 11/14/16	<b>Date</b> _____ <b>Time</b> _____ <b>Condition of Seal Upon Receipt (Check One)</b> <input checked="" type="radio"/> Intact <input type="radio"/> Other (describe) _____

<b>Ship Samples Priority Overnight To:</b> Hydrosphere Research 11842 Research Circle Alachua, FL 32615 (386) 462-7889	<b>Refrigerant Used For Shipping</b> <input checked="" type="radio"/> Wet Ice <input type="radio"/> Other (describe) _____ Samples must arrive at the lab $\leq 6.0^{\circ}\text{C}$ (never frozen). Pack cooler completely with ice before shipping.	<b>Composite Sample Information</b> Samples/Hour <u>1/6</u> Volume/Sample <u>5AL</u> Total Hours <u>24</u> Total Volume <u>4 GAL</u> Initiated Date <u>11-27-16</u> Time <u>1600</u> Ended Date <u>11-28-16</u> Time <u>1000</u> Chilled During Collection <input checked="" type="radio"/> Yes <input type="radio"/> No

Outfall Number or Client Description	Date	Time (24 Hour Format)	Sample Type		# of Containers	Sampled By		For Lab Use	
			Comp.	Grab		Print Name	Signature	Temp (°C)	Lab Sample ID
001	11-27-16	1600		✓	2	Frank Howard	<i>Frank Howard</i>	0.6	16222 A
001	11-27-16	2200		✓	2	Rick Kelley	<i>Rick Kelley</i>	0.5	16222 B
001	11-28-16	0400		✓	2	Rick Kelley	<i>Rick Kelley</i>	0.5	16222 C
001	11-28-16	1000		✓	2	ERIC WARREN	<i>Eric Warren</i>	0.6	16222 D

**Additional Comments (if needed)** CHRONIC BIOASSAY (DAY #1 OF 3)  
TECO LAB ID: LUK112-01  
LUK112-02 (UV TREATMENT)  
C: samples were composited and relabeled as A per job folder instructions - RS 11/29

<b>Relinquished By (Print Clearly &amp; Sign)</b> ERIC WARREN <i>Eric Warren</i>	<b>Date</b> 11-28-16	<b>Time</b> 12/5	<b>Shipped via</b> Blue Streak
<b>Received By (Print Clearly &amp; Sign)</b> CG	<b>Date</b>	<b>Time</b>	<b>Relinquished By (Print Clearly &amp; Sign)</b> CG 11/29/16
<b>Received By Lab (Print Clearly &amp; Sign)</b> Christopher Griffin <i>Chris Griffin</i>	<b>Date</b> 08/30	<b>Time</b> 11/29/16	<b>Shipper's Tracking Number</b> 150-112116

See Provisions on back



# CHAIN OF CUSTODY

Please complete ALL fields other than the gray areas  
(which will be completed by Hydrosphere)

<b>Client Name</b> Tampa Electric Polk Power Station	<b>Client Shipping Address</b> 5012 Causeway Boulevard Tampa, FL 33619	
<b>Sample Kit Information</b> Cooler 2 of 6 Container Type: 1/2 gal bottle Number of Containers: 8 Method of Shipment:	<b>Prepared and Shipped by</b>	<b>Sample Kit Received By</b> <u>ERIC WARREN</u> <u>Eric Warren</u> Print Name Signature
	<b>Date</b>	<b>Date</b> _____ <b>Time</b> _____ Condition of Seal Upon Receipt (Check One) <input checked="" type="radio"/> Intact <input type="radio"/> Other (describe) _____

<b>Ship Samples Priority Overnight To:</b> Hydrosphere Research 11842 Research Circle Alachua, FL 32615 (386) 462-7889	<b>Refrigerant Used For Shipping</b> <input checked="" type="radio"/> Wet Ice <input type="radio"/> Other (describe) _____ Samples must arrive at the lab $\leq 6.0^{\circ}\text{C}$ (never frozen). Pack cooler completely with ice before shipping.	<b>Composite Sample Information</b> Samples/Hour <u>1/6</u> Volume/Sample <u>5AL</u> Total Hours <u>24</u> Total Volume <u>4 GAL</u> Initiated Date <u>11-29-16</u> Time <u>1600</u> Ended Date <u>11-30-16</u> Time <u>1000</u> Chilled During Collection <input checked="" type="radio"/> Yes <input type="radio"/> No
<b>Be Sure to Mark for Saturday Delivery if Appropriate</b>	<b>Samples Shipped Via</b> <input type="radio"/> FedEx <input type="radio"/> Greyhound <input type="radio"/> Client <input type="radio"/> UPS <input checked="" type="radio"/> Other <u>BLUESTREAK</u>	
<b>Sampling Location</b> <u>POLK POWER</u>		
<b>Permit Number</b>		
<b>County Samples Collected In</b> <u>POLK</u>		

Outfall Number or Client Description	Date	Time (24 Hour Format)	Sample Type		# of Containers	Sampled By		For Lab Use	
			Comp.	Grab		Print Name	Signature	Temp (°C)	Lab Sample ID
001	11-29-16	1600		✓	2	Mike Torres	<u>Mike Torres</u>	0.5	16222-B
001	11-29-16	2200		✓	2	Frank Howard	<u>Frank Howard</u>		
001	11-30-16	0400		✓	2	Frank Howard	<u>Frank Howard</u>		
001	11-30-16	1000		✓	2	ERIC WARREN	<u>Eric Warren</u>		

**Additional Comments (if needed)** CHRONIC BIOASSAY (DAY #2 OF 3) @ Samples composited in lab per Job Folder instruction - RS 12/1  
TECO LAB ID? L16K112-01  
L16K112-02 (UV TREATMENT)

<b>Relinquished By (Print Clearly &amp; Sign)</b> <u>ERIC WARREN</u> <u>Eric Warren</u>	<b>Date</b> <u>11-30-16</u> <b>Time</b> <u>1140</u>	<b>Shipped via</b> <u>Bluestreak</u>
<b>Received By (Print Clearly &amp; Sign)</b>	<b>Date</b> _____ <b>Time</b> _____	<b>Relinquished By (Print Clearly &amp; Sign)</b> <u>RS 12/1</u> <b>Date</b> _____ <b>Time</b> _____
<b>Received By Lab (Print Clearly &amp; Sign)</b> <u>Rachel Salley</u>	<b>Date</b> <u>12/1/16</u> <b>Time</b> <u>9.00</u>	<b>Shipper's Tracking Number</b> <u>151 112116</u>

See Provisions on back

# CHAIN OF CUSTODY

Please complete ALL fields other than the gray areas  
(which will be completed by Hydrosphere)

<b>Client Name</b> Tampa Electric Polk Power Station	<b>Client Shipping Address</b> 5012 Causeway Boulevard Tampa, FL 33619	
<b>Sample Kit Information</b> Cooler 2 of 6 Container Type: 1/2 gal bottle Number of Containers: 8 Method of Shipment:	<b>Prepared and Shipped by</b>  	<b>Sample Kit Received By</b> <u>ERIC WARREN</u> <u>Eric Warren</u> Print Name Signature
	<b>Date</b>  	<b>Date</b> <u>12-1-14</u> <b>Time</b> _____ Condition of Seal Upon Receipt (Check One) <input checked="" type="radio"/> Intact <input type="radio"/> Other (describe) _____

<b>Ship Samples Priority Overnight To:</b> Hydrosphere Research 11842 Research Circle Alachua, FL 32615 (386) 462-7889	<b>Refrigerant Used For Shipping</b> <input checked="" type="radio"/> Wet Ice <input type="radio"/> Other (describe) _____ Samples must arrive at the lab $\leq 6.0^{\circ}\text{C}$ (never frozen). Pack cooler completely with ice before shipping.	<b>Composite Sample Information</b> Samples/Hour <u>1/6</u> Volume/Sample <u>5AL</u> Total Hours <u>24</u> Total Volume <u>4 GAL</u> Initiated Date <u>12-1-14</u> Time <u>1600</u> Ended Date <u>12-2-14</u> Time <u>1000</u> Chilled During Collection <input checked="" type="radio"/> Yes <input type="radio"/> No
<b>Be Sure to Mark for Saturday Delivery if Appropriate</b> Sampling Location <u>POLK POWER</u> Permit Number _____ County Samples Collected In <u>POLK</u>	<b>Samples Shipped Via</b> <input type="radio"/> FedEx <input type="radio"/> Greyhound <input type="radio"/> Client <input type="radio"/> UPS <input checked="" type="radio"/> Other <u>BLUE STREAK</u>	

Outfall Number or Client Description	Date	Time (24 Hour Format)	Sample Type		# of Containers	Sampled By		For Lab Use	
			Comp.	Grab		Print Name	Signature	Temp (°C)	Lab Sample ID
001	12-1-14	1600		✓	2	ERIC B. RICHARDSON	[Signature]	0.5	16222-01
001	12-1-14	2200		✓	2	FRANK HOWARD	[Signature]		
001	12-2-14	0400		✓	2	FRANK HOWARD	[Signature]		
001	12-2-14	1000		✓	2	ERIC WARREN	Eric Warren		

**Additional Comments (if needed)** CHRONIC BIOASSAY (DAY #3 OF 3)  
 TEGO LAB ID: L16K112-01  
 L16K112-02 (UV TREATMENT)  
 ① Samples composited per lab instruction

<b>Relinquished By (Print Clearly &amp; Sign)</b> <u>ERIC WARREN</u> <u>Eric Warren</u>	<b>Date</b> <u>12-2-14</u>	<b>Time</b> <u>1140</u>	<b>Shipped via</b> <u>Bluestreak</u>	<u>RS 12/3</u>
<b>Received By (Print Clearly &amp; Sign)</b> <u>[Signature]</u>	<b>Date</b>  	<b>Time</b>  	<b>Relinquished By (Print Clearly &amp; Sign)</b> <u>RS 12/3</u>	<b>Date</b>  
<b>Received By Lab (Print Clearly &amp; Sign)</b> <u>Rachel Salley</u> <u>[Signature]</u>	<b>Date</b> <u>12/3/14</u>	<b>Time</b> <u>900</u>	<b>Shipper's Tracking Number</b> <u>152-112116</u>	

See Provisions on back

**Job #:** TMP-PO-16222

**Laboratory Rejection/Acceptance Criteria**

- |  |   |
|--|---|
| 1) Sample Cooler Intact and Sealed ...                                 | 1) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |
| 2) Chain-of-Custody Seal Intact ...                                    | 2) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  |
| 3) Sample Bottles Sealed ...   | 3) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |
| 4) Sample Temperature Acceptable ...                                   | 4) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |
| 5) Sample Bottle Label(s) match<br>information on Chain-of-Custody ... | 5) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |
| 6) Sample Documentation complete                                       | 6) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |
| 7) Proper Sample Container Labeling                                    | 7) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |
| 8) Proper Sampling Containers (HDPE, PS, PP, Glass)                    | 8) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |
| 9) Sample Holding Time Acceptable                                      | 9) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  |
| 10) Adequate Sample Volume for Testing                                 | 10) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |

**Sample ID for samples that are a "no"**

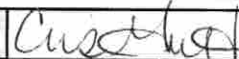
16222 A, 16222 B, 16222 C, 16222 D

**Client Rejection / Acceptance of Sample (if any of the above are "no")**

<b>Contact</b>	Peggy Penner
<b>Phone Number</b>	813-630-7490
<b>Client Response</b>	<input checked="" type="checkbox"/> the lab should <b>ACCEPT</b> the sample as is based on the above information <input type="checkbox"/> the lab should <b>REJECT</b> the sample as is based on the above information

**Addition Comments**

Client advised samples to be accepted via email CG 11/29  
All samples are "A" CG 12/18

**Form Completed by (signature):**

**Date:** 11/29/16

☒ Place form in Client Folder

<sup>1</sup> NELAC, Quality Systems, July 1, 2003, Section 5.11.2

## **Appendix B. Raw Data Sheets & Statistical Results**





Client: Tampa Electric Company - Polk Power Station

Code: TMP-PO Job #: 16222

Species: Ceriodaphnia dubia Code: CD

ID #: 8340 Age: <24-h

Note: Valid Control is  
≥80% survival @ 7d ... and ...  
≥15-neonates average /surviving female)

30-mL Plastic Cup

20-mLs per replicate

Initiation Date: 11-29-16 Termination Date: 12-6-16

Sample Description:

Control	R E P	Live Counts (Adults) Number of Neonates							1st-3rd brood total
		A	B	C	D	E	F	G	
		1	2	3	4	5	6	7	
0	A	0	0	0	05	01	0	015	31
	B	0	0	0	07	015	0	018	40
	C	0	0	0	06	011	0	016	33
	D	0	0	0	06	013	0	016	35
	E	0	0	0	07	013	0	018	38
Control	F	0	0	0	08	011	0	016	35
	G	0	0	0	06	010	0	013	29
	H	0	0	0	04	04	0	015	23
	I	0	0	0	06	010	0	016	32
	J	0	0	0	06	010	0	015	31
Live Count:		10	10	10	10	10	10	10	327

1st dilution	R E P	Live Counts							1st-3rd brood total
		1	2	3	4	5	6	7	
		1	2	3	4	5	6	7	
6.25	A	0	0	0	05	09	0	013	27
	B	0	0	0	07	014	0	015	36
	C	0	0	0	05	011	0	019	35
	D	0	0	0	07	015	0	017	39
	E	0	0	0	08	015	0	017	40
Effluent	F	0	0	0	06	017	0	0	23
	G	0	0	0	06	012	0	013	31
	H	0	0	0	07	012	0	019	38
	I	0	0	0	05	014	0	017	36
	J	0	0	0	05	013	0	017	35
Live Count:		10	10	10	10	10	10	10	340

2nd dilution	R E P	Live Counts							1st-3rd brood total
		1	2	3	4	5	6	7	
		1	2	3	4	5	6	7	
12.5	A	0	0	0	07	012	01	019	39
	B	0	0	0	06	011	0	016	33
	C	0	0	0	07	011	0	017	35
	D	0	0	0	06	013	0	017	33
	E	0	0	0	06	015	0	016	37
Effluent	F	0	0	0	0	09	018	0	27
	G	0	0	0	06	012	0	018	36
	H	0	0	0	07	09	012	02	30
	I	0	0	0	07	012	0	016	35
	J	0	0	0	06	014	015	0	35
Live Count:		10	10	10	10	10	10	10	310

3rd dilution	R E P	Live Counts							1st-3rd brood total
		1	2	3	4	5	6	7	
		1	2	3	4	5	6	7	
25	A	0	0	0	07	011	0	016	34
	B	0	0	0	06	015	09	013	33
	C	0	0	0	07	011	0	016	34
	D	0	0	0	06	013	0	015	34
	E	0	0	0	07	011	0	019	37
Effluent	F	0	0	0	06	012	0	016	34
	G	0	0	0	06	012	0	017	35
	H	0	0	0	08	013	0	016	37
	I	0	0	0	07	015	0	015	37
	J	0	0	0	04	07	0	011	22
Live Count:		10	10	10	10	10	10	10	337

4th dilution	R E P	Live Counts							1st-3rd brood total
		1	2	3	4	5	6	7	
		1	2	3	4	5	6	7	
50	A	0	0	0	06	013	0	019	37
	B	0	0	0	06	016	010	02	34
	C	0	0	0	07	010	01	019	37
	D	0	0	0	06	014	0	017	37
	E	0	0	0	05	015	01	018	39
Effluent	F	0	0	0	03	014	0	019	36
	G	0	0	0	04	011	0	018	33
	H	0	0	0	06	012	0	019	37
	I	0	0	0	06	012	0	020	38
	J	0	0	0	05	010	0	016	31
Live Count:		10	10	10	10	10	9	9	347

5th dilution	R E P	Live Counts							1st-3rd brood total
		1	2	3	4	5	6	7	
		1	2	3	4	5	6	7	
100	A	0	0	0	05	09	0	017	31
	B	0	0	0	04	010	0	018	32
	C	0	0	0	06	011	0	017	34
	D	0	0	0	07	09	0	015	31
	E	0	0	0	07	08	01	017	33
Effluent	F	0	0	0	06	013	01	014	34
	G	0	0	0	06	013	0	015	34
	H	0	0	0	07	012	0	016	35
	I	0	0	0	06	010	0	012	28
	J	0	0	0	06	08	0	011	25
Live Count:		10	10	10	10	10	10	10	317

0	1	2	3	4	5	6	7	Day
RS	EH	EH	EH	LS	KO	EH	KO	Initials
14:30	13:30	12:30	13:20	17:20	16:50	14:40	13:20	Time
182	182	182	182	182	182	182		F-CD #
419	419	419	419	419	419	419		F-SC #

Notes & Comments

1) one missing, EH 12/5 @ correction KO 12/6  
322 cwg 12/7/16

Normal Adult

Normal Adult near neonate release

Normal Adult with developing brood

Normal Adult w/ newly deposited brood

Normal Adult w/ embryos in oviducts

Abnormal Adult; reproductively inactive

Abnormal Adult; Dead

Abnormal Adult; Male

Randomization Template #

1

An "X" recorded for neonates means that dead or aborted neonates were present.

Photoperiod is 16-hours light and 8-hours dark, Illumination is ambient (50 to 100 fcd)

# CETIS Analytical Report

Report Date: 07 Dec-16 17:06 (p 1 of 1)

Test Code: ✓TMP-PO 16222CDC | 16-2749-0776

## Ceriodaphnia 7-d Survival and Reproduction Test ✓

Hydrosphere Research

Analysis ID: 19-5383-7377	Endpoint: Reproduction ✓	CETIS Version: CETISv1.9.2
Analyzed: 07 Dec-16 17:05	Analysis: Linear Interpolation (ICPIN) ✓	Official Results: Yes
Batch ID: 18-8000-8667	Test Type: Reproduction-Survival (7d)	Analyst:
Start Date: 29 Nov-16 14:30 ✓	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 06 Dec-16 13:20 ✓	Species: Ceriodaphnia dubia ✓	Brine:
Duration: 6d 23h	Source: In-House Culture	Age:
Sample ID: 19-0992-6908	Code: TMP-PO 16222CDC ✓	Client: Tampa Electric Polk Power Station ✓
Sample Date: 28 Nov-16 10:00 ✓	Material: Final Effluent	Project: WET Compliance Test
Receipt Date: 29 Nov-16 08:30	Source: TMP-PO (FL0043869) ✓	
Sample Age: 28h	Station: 001 ✓	

### Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1371104	200	Yes	Two-Point Interpolation

### Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC25	>100	n/a	n/a	<1	n/a	n/a

### Reproduction Summary

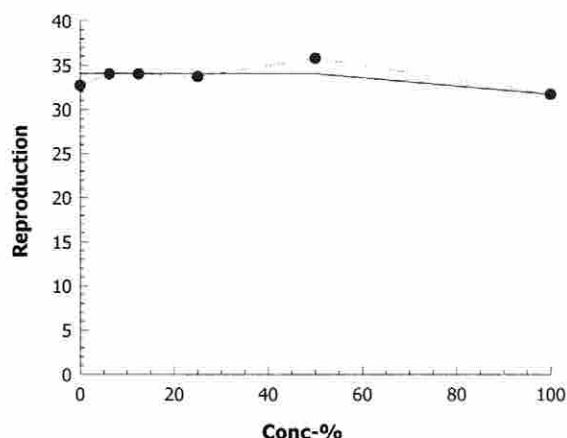
### Calculated Variate

Conc-%	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	10	32.7 ✓	23	40	1.513	4.785	14.63%	0.0%
6.25		10	34 ✓	23	40	1.719	5.437	15.99%	-3.98%
12.5		10	34 ✓	27	39	1.095	3.464	10.19%	-3.98%
25		10	33.7 ✓	22	37	1.383	4.373	12.98%	-3.06%
50		① ⑨	35.78 ✓	31	39	0.8625	2.587	7.23%	-9.41%
100		10	31.7 ✓	25	35	0.9894	3.129	9.87%	3.06%

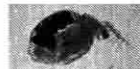
### Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	31	40	33	35	38	35	29	23	32	31
6.25		27	36	35	39	40	23	31	38	36	35
12.5		39	33	35	33	37	27	36	30	35	35
25		34	33	34	34	37	34	35	37	37	22
50		34	37	37	39	36	33	37	38	31	
100		31	32	34	31	33	34	34	35	28	25

### Graphics



$$\textcircled{1} \frac{322}{9} = 35.78$$



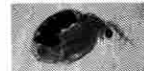
Client:	Tampa Electric Company - Polk Power Station	
Code:	TMP-PO	Job #: 16222
Species:	Ceriodaphnia dubia	
ID #:	8340	

Initiation Date:	11-29-16	Termination Date:	12-6-16
Sample Description:			

Sample Description	%	pH									
		(acceptable range for a valid test is 6 to 9)									
		new	old	new	old	new	old	new	old	new	old
Control	0	7.7	7.7	7.8	7.8	7.7	7.8	7.6	8.0	7.9	7.9
Effluent	6.25	7.7	7.8	7.7	7.9	7.6	7.8	7.6	8.0	7.9	7.8
	12.5	7.7	7.9	7.7	7.9	7.6	7.8	7.6	8.0	7.8	7.8
	25	7.6	7.9	7.7	7.9	7.6	7.8	7.6	8.0	7.8	7.8
	50	7.5	7.9	7.6	7.9	7.6	7.9	7.6	8.1	7.7	7.8
	100	7.3	7.8	7.6	7.9	7.5	7.9	7.5	8.1	7.6	7.8
Meter ID:		16	16	16	16	16	16	11	11	12	12
Day:		0	1	2	3	4	5	6	7		
Control ID:		4054	4054	4058	4058	4058	4058	4058	4058		
Diluent ID:		4054	4054	4058	4058	4058	4058	4058	4058		
Effluent ID:		A	A	B	B	C	C	C			
Initials:		EH	EH	EH	EH	EH	EH	RS	RS	KO	KO
Time:		1300	1355	1100	1210	1050	1330	1030	1405	1250	1340

Dissolved Oxygen (mg/L)									
(acceptable minimum for a valid test is 4.0-mg/L)									
new	old	new	old	new	old	new	old	new	old
0	1	2	3	4	5	6	7		
8.4	7.7	8.3	7.8	8.2	7.8	8.3	7.5	8.1	7.3
8.5	7.7	8.4	7.9	8.3	7.8	8.4	7.4	8.1	7.6
8.6	7.8	8.4	7.9	8.3	7.9	8.4	7.4	8.1	7.8
8.6	7.8	8.4	7.8	8.3	7.9	8.4	7.3	8.1	7.8
8.5	7.7	8.3	7.6	8.3	8.0	8.3	7.3	8.2	7.9
8.0	7.8	8.3	7.8	8.4	7.9	8.3	7.3	8.3	7.9
7	7	7	7	7	7	13	13	10	10
Notes & Comments									





Client:	Tampa Electric Company - Polk Power Station		
Code:	TMP-PO	Job #:	16222
Species:	Ceriodaphnia dubia		
ID #:	8340		

Initiation Date:	11-29-16	Termination Date:	12-6-16
Sample Description:			

Sample Description	%	Conductivity (µmho/cm)							
		Measured in each new sample and control							
		0	1	2	3	4	5	6	7
Control	0	300	299	283	288	268	272	291	
Effluent	6.25	338	344	333	329	313	322	330	
	12.5	380	381	371	368	342	365	370	
	25	460	443	443	439	411	430	444	
	50	603	600	592	603	546	560	584	
	100	899	896	899	908	826	918	914	
Meter ID:		17	17	17	17	15	18	17	
Day:		0	1	2	3	4	5	6	7
Control ID:		4054	4054	4058	4058	4058	4058	4058	
Diluent ID:		4054	4054	4058	4058	4058	4058	4058	
Effluent ID:		A	A	B	B	C	C	C	
Initials:		EH	EH	EH	EH	RS	KO	EH	KO
Time:		1305	1105	1055	1035	1250	1210	1105	1300

Temperature (°C)							
(acceptable range for a valid test is 23±1°C)							
Measured at the end of each 24-h exposure period							
0	1	2	3	4	5	6	7
24.4	24.9	24.7	24.9	24.8	24.8	24.9	
24.4	24.9	24.7	24.9	24.8	24.8	24.7	
24.4	24.9	24.7	24.9	24.8	24.8	24.9	
24.4	24.9	24.7	24.9	24.8	24.8	24.9	
24.4	24.9	24.7	24.9	24.8	24.8	24.9	
24.4	24.9	24.7	24.9	24.8	24.8	24.9	
57	57	57	57	57	57	57	57

Notes & Comments



Client: Tampa Electric Company - Polk Power Station

Code: TMP-PO Job #: 16222

Species: Ceriodaphnia dubia Code: CD

ID #: 8340 Age: <24-h

Note: Valid Control is  
≥80% survival @ 7d ... and ...  
≥15-neonates average /surviving female)

30-mL Plastic Cup

20-mLs per replicate

Initiation Date: 11-29-16 Termination Date: 12-6-16

Sample Description:  
UV treated effluent  
(see Laboratory Notes, Task Titled "UV Treatment of Samples")

W R F Sa Su M T										
Control	R	Live Counts (Adults <input type="radio"/> , Number of Neonates)							1st-3rd	
	E	T	W	R	F	Sa	Su	M	brood	
	P	1	2	3	4	5	6	7	total	
Effluent %	A	0	0	0	0	6	10	0	15	31
	B	0	0	0	0	0	11	0	17	34
	C	0	0	0	0	5	11	0	16	32
	D	0	0	0	0	6	12	0	18	33
	E	0	0	0	0	4	11	0	18	33
Sample Description	F	0	0	0	0	6	10	0	17	33
	G	0	0	0	0	6	10	0	16	32
	H	0	0	0	0	5	11	0	16	32
	I	0	0	0	0	5	11	0	14	30
	J	0	0	0	0	7	12	0	16	33
Live Count:		10	10	10	10	10	10	10	320	

1st dilution	R	Live Counts							1st-3rd brood total	
	E									
	P	1	2	3	4	5	6	7		
6.25	Effluent, %	A	✓	✓	✓	06	✓13	✓	✓13	32
		B	✓	✓	✓	06	✓8	✓	✓10	24
		C	✓	✓	✓	06	✓10	✓	✓14	30
		D	✓	✓	✓	06	✓11	✓1	✓14	32
		E	✓	✓	✓	06	✓14	✓	✓15	35
Effluent	Sample Description	F	✓	✓	✓	07	✓11	✓3	✓17	38
		G	✓	✓	✓	0	0	0	0	—
		H	✓	✓	✓	07	✓10	✓	✓14	31
		I	✓	✓	✓	07	✓11	✓	✓16	34
		J	✓	✓	✓	06	✓12	✓15	✓1	34
Live Count:		10	10	9	9	9	9	9	290	

2nd dilution	R	Live Counts							1st-3rd brood		
		1	2	3	4	5	6	7	total		
12.5	Effluent %	A	0	0	0	0	6	8	0	15	24
	B	0	0	0	0	6	12	0	18	34	
	C	0	0	0	0	5	10	0	15	28	
	D	0	0	0	0	6	14	0	20	35	
	E	0	0	0	0	6	12	0	18	31	
Effluent	Sample Description	F	0	0	0	0	6	13	0	19	34
	G	0	0	0	0	2	13	0	15	31	
	H	0	0	0	0	6	9	0	15	31	
	I	0	0	0	0	8	9	0	17	33	
	J	0	0	0	0	5	13	0	18	33	
Live Count:		10	10	10	10	10	10	10	320		

3rd dilution		R	Live Counts							1st-3rd
										brood
		P	1	2	3	4	5	6	7	total
25	Effluent, %	A	0	0	0	5	12	0	14	31
		B	0	0	0	7	13	0	10	30
		C	0	0	0	6	13	0	14	33
		D	0	0	0	7	14	0	14	37
		E	0	0	0	7	11	0	18	34
Effluent	Sample Description	F	0	0	0	6	12	0	12	30
		G	0	0	0	4	10	0	0	14
		H	0	0	0	6	13	0	0	19
		I	0	0	0	6	11	0	10	35
		J	0	0	0	6	11	0	20	37
Live Count:			10	10	10	10	10	10	10	300

4th dilution	R E P	Live Counts							1st-3rd brood total	
		1	2	3	4	5	6	7		
50	Effluent, %	A	0	0	0	04	011	0	011	26
		B	0	0	0	06	012	0	014	34
		C	0	0	0	06	011	01	016	34
		D	0	0	0	06	016	0	017	39
		E	0	0	0	06	015	0	018	39
Effluent	Sample description	F	0	0	0	06	011	0	017	34
		G	0	0	0	04	013	0	019	36
		H	0	0	0	0	0	0	01	—
		I	0	0	0	06	010	0	017	33
		J	0	0	0	07	012	0	018	37
Live Count:		10	10	10	10	10	9	9	312	

5th dilution		R	Live Counts							1st-3rd brood total
		E								
		P	1	2	3	4	5	6	7	
100	Effluent %	A	0	0	0	7	13	0	10	34
		B	0	0	0	8	14	0	14	36
		C	0	0	0	5	11	0	16	32
		D	0	0	0	7	13	0	16	36
		E	0	0	0	6	15	0	19	41
Effluent	Sample Description	F	0	0	0	6	14	0	18	38
		G	0	0	0	8	13	0	16	38
		H	0	0	0	6	15	0	19	40
		I	0	0	0	5	12	0	15	32
		J	0	0	0	7	12	0	0	319
Live Count:			10	10	10	10	10	9	9	249

0	1	2	3	4	5	6	7	Day
RS	EH	KO	EH	RS	KO	EH	EH	Initials
1615	1155	1100	1445	1735	1715	1405	1310	Time
182	182	182	182	182	182	182		F-CD #
419	419	419	419	419	419	419		F-SC #

Notes & Comments

① one missing EH 4/2 ② 9 KO 12/4

③ one missing EH 12/5, 324 CWJ 12/7/16

④ 29, 323 CWJ 12/7/16

☒ Normal Adult  
☐ Normal Adult w/ newly deposited brood  
☐ Abnormal Adult; reproductively inactive

☒ Normal Adult near neonate release  
☐ Normal Adult w/ embryos in oviducts  
☐ Abnormal Adult; Dead

☒ Normal Adult with developing brood  
☐ Abnormal Adult with Small Brood  
☐ Abnormal Adult; Male

Randomization Template #

2

# CETIS Analytical Report

Report Date: 07 Dec-16 16:50 (p 1 of 1)  
 Test Code: ✓TMP-PO 16222CDU | 03-0657-8066

## Ceriodaphnia 7-d Survival and Reproduction Test ✓

Hydrosphere Research

Analysis ID: 13-9200-8461	Endpoint: Reproduction ✓	CETIS Version: CETISv1.9.2
Analyzed: 07 Dec-16 16:46	Analysis: Linear Interpolation (ICPIN) ✓	Official Results: Yes
Batch ID: 18-8000-8667	Test Type: Reproduction-Survival (7d)	Analyst:
Start Date: 29 Nov-16 16:15 ✓	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 06 Dec-16 13:10 ✓	Species: Ceriodaphnia dubia ✓	Brine:
Duration: 6d 21h	Source: In-House Culture	Age:
Sample ID: 20-3186-2121	Code: TMP-PO 16222CDU ✓	Client: Tampa Electric Polk Power Station ✓
Sample Date: 28 Nov-16 10:00 ✓	Material: Final Effluent	Project: WET Compliance Test
Receipt Date: 29 Nov-16 08:30 ✓	Source: TMP-PO (FL0043869) ✓	
Sample Age: 30h ✓	Station: 001-UV ✓	

### Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
✓Linear	Linear	1995270	200	Yes	Two-Point Interpolation

### Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC25	>100	n/a	n/a	<1	n/a	n/a

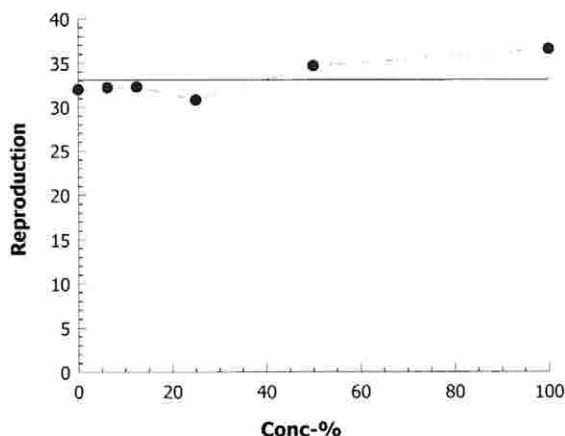
### Reproduction Summary

Conc-%	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	10	32 ✓	30	34	0.3944	1.247	3.90%	0.0%
6.25	①	⑨	32.22 ✓	24	38	1.299	3.898	12.10%	-0.69%
12.5		10	32.3 ✓	28	37	0.9315	2.946	9.12%	-0.94%
25		10	30.8 ✓	14	37	2.529	7.997	25.97%	3.75%
50	②	⑨	34.67 ✓	26	39	1.312	3.937	11.36%	-8.33%
100	③	⑨	36.56 ✓	32	41	1.042	3.127	8.55%	-14.24%

### Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	31	34	32	31	33	33	32	31	30	33
6.25		32	24	30	32	35	38	31	34	34	
12.5		29	34	28	35	37	34	31	29	33	33
25		31	36	33	37	36	30	14	19	35	37
50		26	34	34	39	39	34	36	33	37	
100		36	36	32	36	41	38	38	40	32	

### Graphics



$$\textcircled{1} \frac{290}{9} = 32.22$$

$$\textcircled{2} \frac{312}{9} = 34.67$$

$$\textcircled{3} \frac{329}{9} = 36.56$$



<b>Client:</b>	Tampa Electric Company - Polk Power Station	
<b>Code:</b>	TMP-PO	<b>Job #:</b> 16222
<b>Species:</b>	Ceriodaphnia dubia	
<b>ID #:</b>	8340	

<b>Initiation Date:</b>	11/29/16	<b>Termination Date:</b>	12/6/16
<b>Sample Description:</b>			
UV treated effluent (see Laboratory Notes: Task Titled "UV Treatment of Samples")			

Sample Description	%	pH (acceptable range for a valid test is 6 to 9)									
		new		old		new		old		new	
		0	1	2	3	4	5	6	7		
Control	0	7.7	7.7	7.8	7.8	7.8	7.7	8.0	7.9	7.9	7.7
Effluent	6.25	7.7	7.8	7.8	7.8	7.8	7.7	8.0	7.9	7.8	7.7
	12.5	7.7	7.8	7.8	7.8	7.8	7.7	8.1	7.9	7.8	7.7
	25	7.7	7.8	7.7	7.8	7.7	7.6	8.1	7.9	7.8	7.7
	50	7.6	7.8	7.7	7.8	7.7	7.7	8.1	7.8	7.8	7.7
	100	7.5	7.8	7.6	7.7	7.7	7.7	8.1	7.7	7.7	7.6
<b>Meter ID:</b>		16	16	16	16	16	16	11	11	12	12
<b>Day:</b>		0	1	2	3	4	5	6	7		
<b>Control ID:</b>		4054	4054	4058	4058	4058	4058	4058	4058		
<b>Diluent ID:</b>		4054	4054	4058	4058	4058	4058	4058	4058		
<b>Effluent ID:</b>		A	A	B	B	C	C	C	C		
<b>Initials:</b>		EH	EH	EH	EH	EH	EH	RS	RS	KO	KO
<b>Time:</b>		1135	1235	1030	1100	1125	1450	1115	1745	1300	1300

Dissolved Oxygen (mg/L) (acceptable minimum for a valid test is 4.0-mg/L)									
new		old		new		old		new	
0	1	2	3	4	5	6	7		
8.3	8.0	8.4	7.4	8.2	7.5	8.4	7.5	8.2	7.4
8.4	8.1	8.4	7.7	8.2	7.7	8.5	7.4	8.2	7.7
8.3	8.1	8.4	7.8	8.2	7.8	8.4	7.4	8.1	7.7
8.2	8.0	8.2	7.8	8.2	7.8	8.4	7.5	8.1	7.8
7.9	7.9	8.1	7.8	8.1	7.8	8.2	7.5	8.0	7.8
7.3	8.0	7.6	7.8	7.7	7.8	8.0	7.5	7.8	7.8
7	7	7	10	7	7	7	13	3	10

<b>Notes &amp; Comments</b>	





<b>Client:</b>	Tampa Electric Company - Polk Power Station		
<b>Code:</b>	TMP-PO	<b>Job #:</b>	16222
<b>Species:</b>	Ceriodaphnia dubia		
<b>ID #:</b>	8347		

<b>Initiation Date:</b>	11-29-16	<b>Termination Date:</b>	12/6/16
<b>Sample Description:</b>			
UV treated effluent (see Laboratory Notes, Task Titled "UV Treatment of Samples")			

Sample Description	%	Conductivity (µmho/cm)							
		(a Conductivity of 2,150 µmho/cm = a Salinity of 1‰ @ 25°C) Measured in each new sample and control							
	Effluent	0	1	2	3	4	5	6	7
Control	0	299	299	289	288	268	278	292	
Effluent	6.25	341	342	331	332	305	325	334	
	12.5	376	376	369	373	341	364	374	
	25	456	456	444	440	408	463	435	
	50	612	612	593	595	557	613	611	
	100	917	919	899	909	823	899	926	
Meter ID:		17	17	17	17	15	18	17	
Day:		0	1	2	3	4	5	6	7
Control ID:		4054	4054	4058	4058	4058	4058	4058	
Diluent ID:		4054	4054	4058	4058	4058	4058	4058	
Effluent ID:		A	A	B	B	C	C	C	
Initials:		EH	EH	EH	EH	RS	KO	EH	EH
Time:		1140	1035	1130	1120	1300	1215	1040	1315

	Temperature (°C)							
	(acceptable range for a valid test is 25±1°C) Measured at the end of each 24-h exposure period							
	0	1	2	3	4	5	6	7
	24.3	24.5	25.2	25.0	24.9	24.9	24.9	
	24.3	24.5	25.2	25.0	24.9	24.9	24.9	
	24.3	24.5	25.2	25.0	24.9	24.9	24.9	
	24.3	24.5	25.2	25.0	24.9	24.9	24.9	
	24.3	24.5	25.2	25.0	24.9	24.9	24.9	
	24.3	24.5	25.2	25.0	24.9	24.9	24.9	
	57	57	57	57	57	57	57	

Notes & Comments	



Client: Tampa Electric Company - Polk Power Station

Code: TMP-PO Job #: 16222

Species: *Pimephales promelas* Code: FM

ID #: 8339 Age: < 24-hours

Test Vessel: 1-L plastic cup

Test Volume: 250-mL / rep.

Initiation Date: 11-29-16 Termination Date: 12-6-16

Sample Description:

Sample Description	%	R E P	Live Counts (Valid Count is >80% survival @ 7d)							
			T	N	R	F	sa	su	M	T
Control	0	A	10	10	10	10	10	10	10	9'
		B	10	10	10	10	9'	9	9	9
		C	10	10	10	8 <sup>2</sup>	8	8	8	8
		D	10	10	10	10	9'	9	9	8'
Effluent	6.25	A	10	10	10	10	10	10	10	9'
		B	10	10	10	10	10	10	9'	8'
		C	10	10	9'	9	7 <sup>2</sup>	7	6 <sup>3</sup>	6
		D	10	10	9'	7 <sup>2</sup>	7	7	7	6'
	12.5	A	10	10	10	10	9'	8'	8	8
		B	10	10	10	10	9'	9	9	9
		C	10	10	10	10	10	9'	9	9
		D	10	10	10	10	9'	10	9 <sup>3</sup>	9
	25	A	10	10	10	10	10	8 <sup>2</sup>	7'	7
		B	10	10	10	10	10	9 <sup>2</sup>	9	9
		C	10	10	10	9'	9	9	8'	8
		D	10	10	10	9'	7 <sup>2</sup>	7	7	7
	50	A	10	10	10	10	10	10	10	10
		B	10	10	10	10	10	10	9'	9
		C	10	10	10	10	10	10	9'	9
		D	10	10	10	10	10	10	9'	9
	100	A	10	10	10	10	10	9'	9	9
		B	10	10	10	10	10	10	10	10
		C	10	10	10	9'	9	8'	8	8
		D	10	10	10	10	10	8 <sup>2</sup>	8	8

Pan #	Biomass (original number, final dry weight basis Valid Count is >80% survival @ 7d)			
	Tare Weight (0.00001-gms)	Total Weight (0.00001-gms)	Net Weight (0.00001-gms)	Wt / Fish (0.001-gms)
1	1.16058	1.16531	0.00473	0.473
2	1.13898	1.14410	0.00512	0.512
3	1.15637	1.16157	0.00520	0.520
4	1.15233	1.15702	0.00469	0.469
5	1.14051	1.14611	0.00560	0.560
6	1.14080	1.14676	0.00596	0.596
7	1.13454	1.13925	0.00471	0.523
8	1.16450	1.16963	0.00513	0.513
9	1.13995	1.14492	0.00497	0.497
10	1.14259	1.14839	0.00580	0.580
11	1.15628	1.16199	0.00571	0.571
12	1.14344	1.14955	0.00611	0.679
13	1.14541	1.15033	0.00492	0.492
14	1.15735	1.16304	0.00569	0.569
15	1.13205	1.13762	0.00557	0.557
16	1.14392	1.14951	0.00559	0.559
17	1.13631	1.14285	0.00654	0.654
18	1.14627	1.15277	0.00650	0.650
19	1.14880	1.15424	0.00544	0.544
20	1.14051	1.14660	0.00609	0.609
21	1.15003	1.15637	0.00634	0.634
22	1.13472	1.14122	0.00650	0.650
23	1.14103	1.14701	0.00598	0.598
24	1.14579	1.15136	0.00557	0.557

Initials: EH EH EH EH RS KD EH EH

Time: 1515 1400 1400 1400 1515 1620 1305 1115

Date Tare Weights: 11-57-2 Initials: CG

Date Final Dry Weights: 11-7-16 Initials: CG

Randomization Template # 1

Feeding Type: Artemia

Amount: 3-drops (0.15-mLs) of a concentrated slurry / 2x / day

Morning: 0925 0930 0930 1020 945 930

Evening: 1545 1455 1645 1610 1915 1815 1550

Other:

Notes & Comments

① 1 missing KD 12/4 ② 12/5/16 CG ③ 1 missing EH 12/5

④ 0.632 CG 12/7

Photoperiod is 16-hours light and 8-hours dark, illumination is ambient (50 to 100 ftd)

# CETIS Analytical Report

Report Date: 08 Dec-16 09:55 (p 1 of 1)

Test Code: TMP-PO 16222FMC | 20-1085-7342

## Fathead Minnow 7-d Larval Survival and Growth Test

Hydrosphere Research

Analysis ID: 00-8334-8206	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.9.2
Analyzed: 08 Dec-16 9:55	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 02-4045-3922	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 29 Nov-16 15:15	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 06 Dec-16 11:15	Species: Pimephales promelas	Brine:
Duration: 6d 20h	Source: In-House Culture	Age:
Sample ID: 09-5359-1903	Code: TMP-PO 16222FMC	Client: Tampa Electric Polk Power Station
Sample Date: 28 Nov-16 10:00	Material: Final Effluent	Project: WET Compliance Test
Receipt Date: 29 Nov-16 08:30	Source: TMP-PO (FL0043869)	
Sample Age: 29h	Station: 001	

### Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	607281	200	Yes	Two-Point Interpolation

### Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC25	>100	n/a	n/a	<1	n/a	n/a

### Mean Dry Biomass-mg Summary

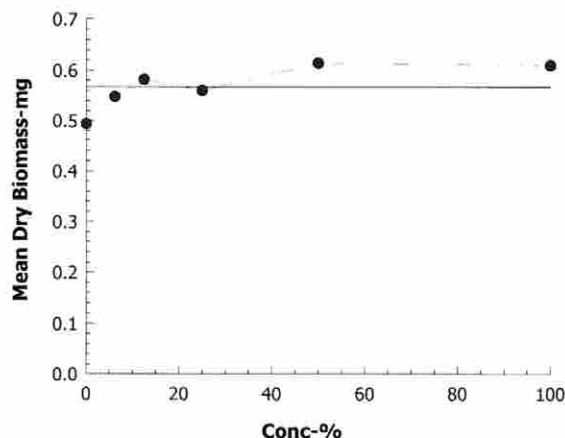
### Calculated Variate

Conc-%	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	4	0.4935	0.469	0.52	0.01312	0.02623	5.32%	0.0%
6.25		4	0.5481	0.513	0.596	0.01889	0.03777	6.89%	-11.06%
12.5		4	0.5817	0.497	0.6789	0.03735	0.07469	12.84%	-17.88%
25		4	0.5601	0.492	0.6322	0.02865	0.0573	10.23%	-13.49%
50		4	0.6143	0.544	0.654	0.02553	0.05106	8.31%	-24.47%
100		4	0.6098	0.557	0.65	0.02067	0.04135	6.78%	-23.56%

### Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	0.473	0.512	0.52	0.469
6.25		0.56	0.596	0.5233	0.513
12.5		0.497	0.58	0.571	0.6789
25		0.492	0.6322	0.557	0.559
50		0.654	0.65	0.544	0.609
100		0.634	0.65	0.598	0.557

### Graphics





Client:	Tampa Electric Company - Polk Power Station	
Code:	TMP-PO	Job #: 16222
Species:	Pimephales promelas	
ID#:	8339	

Initiation Date:	11-29-16	Termination Date:	12-6-16
Sample Description:			

Sample Description	%	pH (acceptable range for a valid test is 6 to 9)											
		new			old			new			old		
		0	1	2	3	4	5	6	7	8	9	10	11
Control	0	7.7	7.7	7.8	7.7	7.7	7.7	7.8	7.5	7.8	7.4	7.7	7.6
Effluent	6.25	7.7	7.7	7.8	7.7	7.7	7.7	7.9	7.5	7.8	7.5	7.7	7.5
	12.5	7.7	7.7	7.8	7.7	7.7	7.7	7.9	7.5	7.7	7.5	7.7	7.5
	25	7.6	7.7	7.7	7.7	7.7	7.8	7.9	7.5	7.7	7.5	7.7	7.5
	50	7.5	7.8	7.4	7.7	7.7	7.7	7.8	7.5	7.6	7.5	7.7	7.5
	100	7.4	7.8	7.4	7.7	7.6	7.7	7.6	7.6	7.5	7.5	7.4	7.5
Meter ID:		16	16	16	16	16	11	11	12	12	16	16	16
Day:		0	1	2	3	4	5	6	7				
Control ID:		4056	4056	4056	4056	4056	4056	4056	4056	4056	4056	4056	4056
Dilution ID:		4056	4056	4056	4056	4056	4056	4056	4056	4056	4056	4056	4056
Effluent ID:		A	A	B	B	C	C	C	C	C	C	C	C
Initials:		EH	EH	EH	EH	EH	EH	RS	RS	KO	KO	EH	EH
Time:		1325	1345	1115	1535	1100	1335	1045	1520	1245	1615	1200	1250

# Dissolved Oxygen (mg/L)

(acceptable minimum for a valid test is 4.0-mg/L)

new	old	new	old	new	old	new	old	new	old	new	old	new	old
0		1		2		3		4		5		6	
8.4		7.4	8.4	7.6	8.4	7.5	8.5	7.0	8.2	6.9	8.2	7.0	8.3
8.4		7.5	8.4	7.6	8.4	7.6	8.5	7.0	8.3	7.2	8.3	7.0	8.4
8.5		7.5	8.4	7.4	8.4	7.5	8.5	7.1	8.3	7.2	8.3	6.8	8.4
8.5		7.6	8.4	7.5	8.4	7.5	8.5	7.2	8.3	7.3	8.2	6.8	8.3
8.4		7.6	8.4	7.5	8.4	7.5	8.4	7.2	8.3	7.3	8.2	6.8	8.1
8.3		7.6	8.3	7.5	8.4	7.6	8.3	7.3	8.3	7.2	8.1	7.0	7.8
7		7	7	7	7	7	7	13	13	10	10	7	7

Notes & Comments





Client:	Tampa Electric Company - Polk Power Station		
Code:	TMP-PO	Job #:	16222
Species:	Pimephales promelas		
ID #:	8339		

Initiation Date:	11-29-16	Termination Date:	12-6-16
Sample Description:			

Sample Description	%	Conductivity (µmho/cm)							
		(a Conductivity of 2,150-µmho/cm = a Salinity of 1‰ @ 25°C)							
	Effluent	Measured in each new sample and control							
		0	1	2	3	4	5	6	7
Control	0	287	290	289	288	268	284	290	
Effluent	6.25	325	330	330	329	304	323	328	
	12.5	367	368	368	368	341	363	370	
	25	443	441	443	446	411	447	458	
	50	595	603	601	604	559	617	597	
	100	909	917	910	918	837	940	924	
Meter ID:		17	17	17	17	15	18	17	
Day:		0	1	2	3	4	5	6	7
Control ID:		4056	4056	4056	4056	4056	4056	4059	
Dilution ID:		4056	4056	4056	4056	4056	4056	4059	
Effluent ID:		A	A	B	B	C	C	C	
Initials:		EH	EH	EH	EH	RS	KO	EH	EH
Time:		1330	1120	1105	1050	1245	1155	1055	1035

Temperature (°C)							
(acceptable range for a valid test is 25±1°C)							
Measured at the end of each 24-h exposure period							
0	1	2	3	4	5	6	7
24.8	24.4	24.5	24.5	24.6	24.4	24.4	
24.8	24.4	24.5	24.5	24.6	24.4	24.4	
24.8	24.4	24.5	24.5	24.6	24.4	24.4	
24.8	24.4	24.5	24.5	24.6	24.4	24.4	
24.8	24.4	24.5	24.5	24.6	24.4	24.4	
24.8	24.4	24.5	24.5	24.6	24.4	24.4	
57	57	57	57	57	57	57	

Notes & Comments							



Client: Tampa Electric Company - Polk Power Station

Code: TMP-PO

Job: 16222

Sample Data

Sample Info				Dissolved Oxygen (D.O.)					Total Residual Chlorine ②			Ammonia			Conductivity			Salinity				Alkalinity/Hardness					
#	Date		Letter Code	Description	D.O. (mg/L)	D.O. (%)	Aeration ① (min)	Post Aeration D.O. (mg/L)	Meter #	Initials	TRC (mg/L)	Meter #	Initials	T-NH <sub>3</sub> (mg/L)	pH	Meter #	Initials	Conductivity (µmho/cm)	Meter #	Initials	Salinity (ppt)	Adjusted (ppt)	Meter #	Initials	Alkalinity (mgCaCO <sub>3</sub> /L)	Hardness (mgCaCO <sub>3</sub> /L)	Initials
	M/D/Y	Day																									
1	11/29/16	T	A	Eff-001	9.1	113	5	7.8	7	EH	1004	147	KC	X	7.3	16	EH	924	17	EH	X	X	X	EH	80	250	KC
2	11/30/16	W	A	Eff-001	9.9	122	5	8.3	7	EH	X	X	EH	X	7.3	16	EH	911	17	EH	X	X	X	EH	X	X	EH
3	12/01/16	R	B	Eff-001	10.2	123	5	8.4	7	EH	1004	147	RS	X	7.4	16	EH	902	17	EH	X	X	X	EH	80	250	RS
4	12/02/16	F	B	Eff-001	8.2	100	X	Y	7	EH	X	X	EH	X	7.5	16	EH	911	17	EH	X	X	X	EH	X	X	EH
5	12/03/16	Sa	C	Eff-001	10.0	116	5	8.1	13	RS	1004	147	RS	X	7.5	11	RS	822	15	RS	X	X	X	RS	040	250	RS
6	12/04/16	Su	C	"	9.4	123	5	8.1	10	KC	X	X	KC	X	7.3	12	KC	920	18	KC	X	X	X	KC	X	X	KC
7	12/05/16	M	C	"	10.0	123	5	7.8	7	EH	X	X	EH	X	7.3	16	EH	932	17	EH	X	X	X	EH	X	X	EH
8	/ /																										
9	/ /																										
10	/ /																										
11	/ /																										
12	/ /																										
13	/ /																										
14	/ /																										
15	/ /																										
16	/ /																										

Notes & Comments

① 926 EH 11/30

**Critical Note !!!**

Check COC.

Samples may need to be Composited in Lab.

For Jobs requiring routine and UV. On Saturday we will only receive 8 bottles. Label 4 new half-gallon bottles with the sample ID and mark at 1200 mL. Label two "Sun" and two "Mon". Warm the remaining bottles for use on Saturday and UV six 1,200 mL volumes (two each for Sat, Sun & Mon).

① Aeration rate is 500-mLs/min (EPA-821-R-02-012, Section 9.1.8, page 41).

② If sample is to be dechlorinated then use 1-mL Effluent Dechlorinator (8-g/L NaThio) per 1-L Effluent Sample per 1-ppm TRC (EPA-821-R-02-012, Section 9.1.6, pg 41)

Dilution Waters

Alkalinity/Hardness

Code	ID #	Alkalinity (mgCaCO <sub>3</sub> /L)	Hardness (mgCaCO <sub>3</sub> /L)	Initials
MHR	4054	60	90	cwf
MHR	4056	59	92	cwf
MHR	4058	60	88	cwf
MHR	4059	59	90	cwf

Job #: T M P · P O · 1 6 2 2 2

Task Title UV Treatment ① of Samples

Task Page 1 of

Initials	Date	Sample ID	Sample Clarity ② / UV duration (minutes)				
RS	11/29/16	16222A	<input type="checkbox"/> Clear / 2	<input type="checkbox"/> Cloudy / 3.5	<input type="checkbox"/> Opaque / 5	<input type="checkbox"/> Particles / 5	<input checked="" type="checkbox"/> Other (Note③)
RS	12/1	16222B	<input type="checkbox"/> Clear / 2	<input type="checkbox"/> Cloudy / 3.5	<input type="checkbox"/> Opaque / 5	<input type="checkbox"/> Particles / 5	<input checked="" type="checkbox"/> Other (Note③)
RS	12/3	16222C	<input type="checkbox"/> Clear / 2	<input type="checkbox"/> Cloudy / 3.5	<input type="checkbox"/> Opaque / 5	<input type="checkbox"/> Particles / 5	<input checked="" type="checkbox"/> Other (Note③)

## Notes &amp; Comments

③ Client requests that we UV treat sample for 5-minutes regardless of turbidity.

Dilution Series	Volume of Dilution		CD Only (200 mLs/dilution) Total volume of neat sample for # days		O R	FM Only (1,000 mLs/dilution) Total volume of neat sample for # days		O R	CD & FM (1,200 mLs/dilution) Total volume of neat sample for # days	
	1200	-mLs	2 days	3 days		2 days	3 days		2 days	3 days
0 %	0		775 mLs	1,163 mLs		3,875 mLs	5,813 mLs		4,650 mLs	6,975 mLs
6.25 %	75		1 bottles	1 bottles		3 bottles	4 bottles		3 bottles	4 bottles
12.5 %	150		# of DMs per UVed sample			# of bottled per UVed sample			# of bottled per UVed sample	
25 %	300		2 DMs	3 DMs		4 bottles	6 bottles		4 bottles	6 bottles
50 %	600		marked at	marked at		marked at	marked at		marked at	marked at
100 %	1200		388 mLs	388 mLs		969 mLs	969 mLs		1,163 mLs	1,163 mLs
	2325		container vol (max)	400 mLs		container vol (max)	1,800 mLs		container vol (max)	1,800 mLs

- 1) Mark up containers for the UV treated samples.
- 2) Treat 1.2-L at a time.
- 3) Pour effluent sample into sterilizer.
- 4) Close Valves\* and **PLUG IN STERILIZER**  
\* do not operate sterilizer without water in the chamber
- 5) **Set timer.**
- 6) Gently rock the chamber for the appropriate treatment time.
- 7) **UNPLUG** sterilizer.
- 8) Open valves and pour treated sample into marked container.
- 9) Clean the inside of the sterilizer by partially filling with a solution of Liquinox (~5-drops per liter), shaking vigorously, dumping, rinsing with copious amounts of warm tap water, rinsing with deionized water, then filling with deionized water and treating with UV for 2-minutes. Empty and store with valves closed.

① using a *Smart UV Lite Sterilizer*, Emperor Aquatics, Model Number 02240/40, 40-Watt, which emits UV light between 250 and 280 nm.

② Definitions based on sample in a half gallon bottle as viewed through the opening. Clear: bottom can be seen. Cloudy: bottom can be seen but is hazy. Opaque: bottom can not be seen. Particles: obvious settled material on bottom.

Labor Hours to perform tasks on this page:

Lab Notes Page of

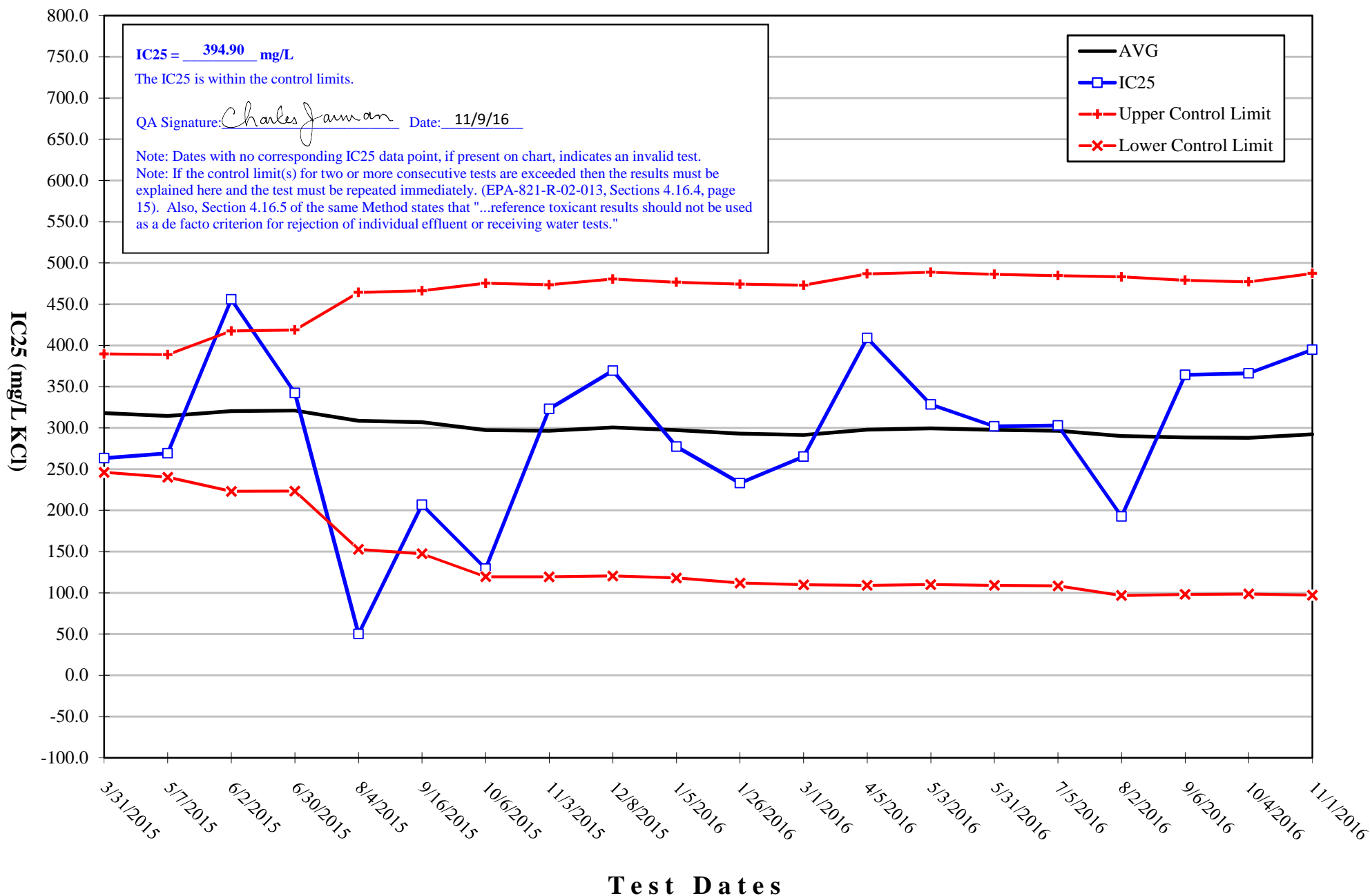
## Appendix C. Reference Toxicant Data



# Control Chart - I

## Control Limits for Standard Reference Toxicant Tests

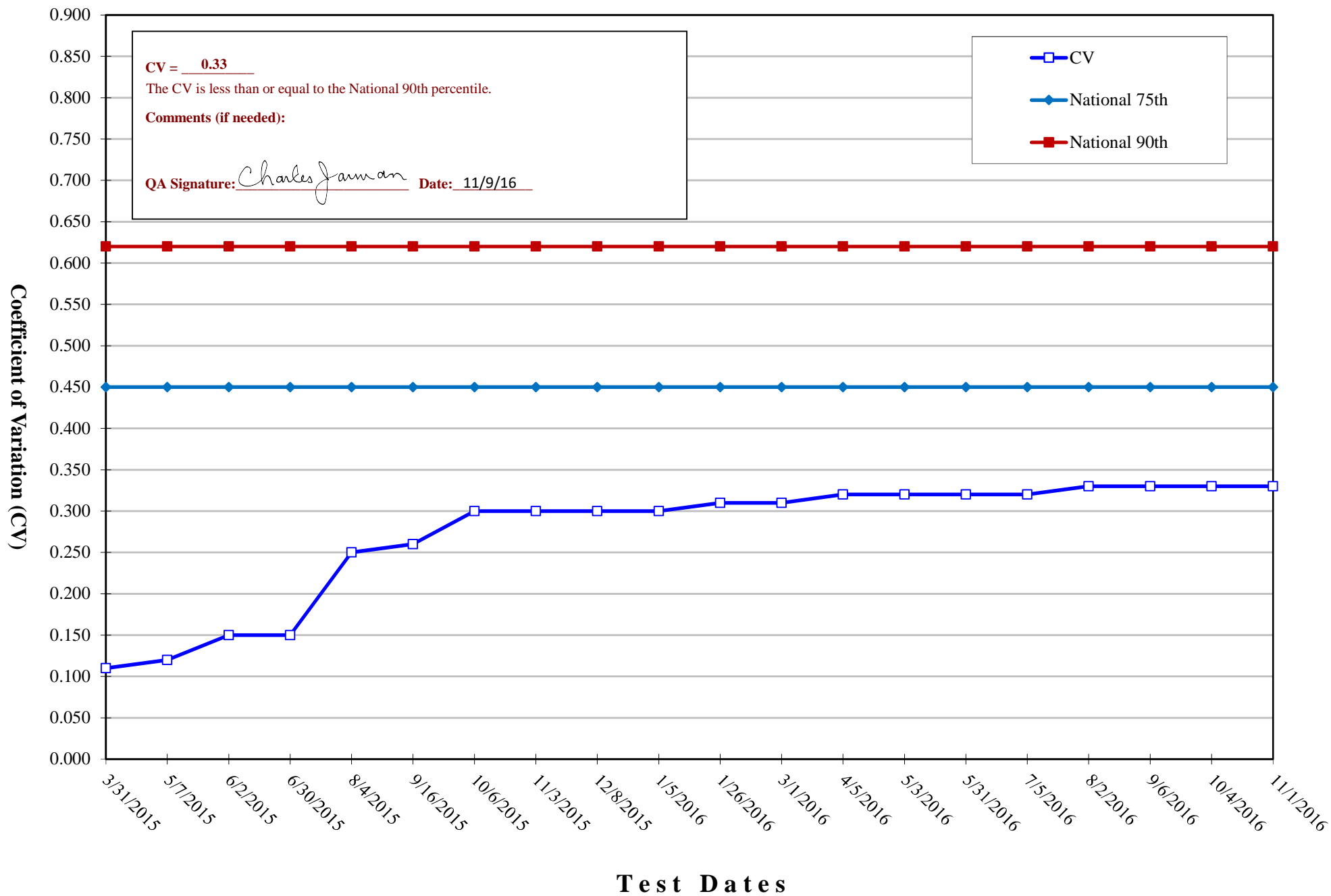
### CHRONIC ... *Ceriodaphnia dubia*





## Control Chart - II

Coefficient of Variation for Standard Reference Toxicant Tests  
CHRONIC ... *Ceriodaphnia dubia*



**REFERENCE TOXICANT LOG • Last 20**

**Test:** 7-day Chronic

**Species:** *Ceriodaphnia dubia*

**Toxicant:** Potassium chloride (mg KCl / liter)



N	DATE	IC25	AVG	S.D.	2S.D.	+2 SD	-2 SD	CV	National 75th %	National 90th %	Lower Control Limit	Upper Control Limit
129	3/31/2015	263.20	317.93	35.88	71.76	389.69	246.17	0.11	0.45	0.62	246.17	389.69
130	5/7/2015	269.20	314.49	37.13	74.25	388.74	240.23	0.12	0.45	0.62	240.23	388.74
131	6/2/2015	455.80	320.34	48.60	97.21	417.55	223.13	0.15	0.45	0.62	223.13	417.55
132	6/30/2015	342.30	321.06	48.83	97.66	418.71	223.40	0.15	0.45	0.62	223.40	418.71
133	8/4/2015	50.05	308.51	77.86	155.73	464.24	152.79	0.25	0.45	0.62	152.79	464.24
134	9/16/2015	206.80	306.85	79.73	159.46	466.32	147.39	0.26	0.45	0.62	147.39	466.32
135	10/6/2015	129.50	297.43	88.95	177.91	475.34	119.52	0.30	0.45	0.62	119.52	475.34
136	11/3/2015	323.00	296.44	88.53	177.06	473.51	119.38	0.30	0.45	0.62	119.38	473.51
137	12/8/2015	369.40	300.44	89.99	179.99	480.42	120.45	0.30	0.45	0.62	120.45	480.42
138	1/5/2016	277.30	297.30	89.63	179.26	476.56	118.04	0.30	0.45	0.62	118.04	476.56
139	1/26/2016	233.00	293.11	90.62	181.25	474.36	111.86	0.31	0.45	0.62	111.86	474.36
140	3/1/2016	265.30	291.35	90.81	181.63	472.98	109.72	0.31	0.45	0.62	109.72	472.98
141	4/5/2016	409.00	297.95	94.44	188.88	486.83	109.06	0.32	0.45	0.62	109.06	486.83
142	5/3/2016	328.40	299.39	94.69	189.37	488.76	110.01	0.32	0.45	0.62	110.01	488.76
143	5/31/2016	302.00	297.63	94.27	188.55	486.17	109.08	0.32	0.45	0.62	109.08	486.17
144	7/5/2016	303.00	296.53	94.07	188.13	484.66	108.40	0.32	0.45	0.62	108.40	484.66
145	8/2/2016	192.60	289.97	96.61	193.21	483.18	96.76	0.33	0.45	0.62	96.76	483.18
146	9/6/2016	364.30	288.57	95.23	190.46	479.03	98.10	0.33	0.45	0.62	98.10	479.03
147	10/4/2016	366.30	287.90	94.60	189.21	477.10	98.69	0.33	0.45	0.62	98.69	477.10
148	11/1/2016	394.90	292.27	97.53	195.06	487.33	97.21	0.33	0.45	0.62	97.21	487.33



SRT for the Month of (circle one):

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Species: Ceriodaphnia dubia Code: CD

ID #: 8317 Age: < 24-h

Note: Valid Control is  
≥80% survival @ 7d ... and ...  
≥15-neonates average /surviving female)

30-mL Plastic Cup

20-mLs per replicate

Initiation Date: 11/1/16 Termination Date: 11/8/16

Toxicant (desiccated): KCl

Stock Solution (Concentration): 100-gm KCl / Liter

Test Concentration (Units): mg KCl / Liter

Control	R	Live Counts (Adults ○, Number of Neonates)							1st-3rd brood total
		W	R	P	F	S	M	T	
		1	2	3	4	5	6	7	
0	A	✓	✓	✓	6	11	1	15	32
	B	✓	✓	✓	5	11	✓	16	32
	C	✓	✓	✓	6	14	✓	17	37
	D	✓	✓	✓	7	10	✓	19	36
	E	✓	✓	✓	4	11	19	✓	34
	F	✓	✓	✓	6	11	✓	19	36
	G	✓	✓	✓	6	12	✓	19	37
	H	✓	✓	✓	3	7	✓	13	23
	I	✓	✓	✓	4	11	15	✓	30
	J	✓	✓	✓	4	10	15	✓	29
Live Count:		10	10	10	10	10	10	10	326

1st dilution	R	Live Counts							1st-3rd brood total
		1	2	3	4	5	6	7	
		1	2	3	4	5	6	7	
3.125	A	✓	✓	✓	5	10	✓	14	29
	B	✓	✓	✓	6	11	✓	18	35
	C	✓	✓	✓	5	11	✓	16	32
	D	✓	✓	✓	6	13	✓	15	34
	E	✓	✓	✓	5	10	17	1	33
	F	✓	✓	✓	6	12	✓	19	37
	G	✓	✓	✓	7	10	✓	17	34
	H	✓	✓	✓	6	13	18	✓	37
	I	✓	✓	✓	3	16	18	✓	31
	J	✓	✓	✓	5	19	1	20	36
Live Count:		10	10	10	10	10	10	10	338

2nd dilution	R	Live Counts							1st-3rd brood total
		1	2	3	4	5	6	7	
		1	2	3	4	5	6	7	
62.5	A	✓	✓	✓	6	10	✓	14	30
	B	✓	✓	✓	5	12	✓	18	35
	C	✓	✓	✓	5	9	1	21	36
	D	✓	✓	✓	5	10	✓	18	33
	E	✓	✓	✓	7	11	✓	13	31
	F	✓	✓	✓	6	9	12	17	34
	G	✓	✓	✓	7	9	✓	18	34
	H	✓	✓	✓	5	8	✓	16	29
	I	✓	✓	✓	6	6	✓	10	22
	J	✓	✓	✓	6	10	13	✓	29
Live Count:		10	10	16	10	10	10	10	313

3rd dilution	R	Live Counts							1st-3rd brood total
		1	2	3	4	5	6	7	
		1	2	3	4	5	6	7	
125	A	✓	✓	✓	5	8	✓	12	30
	B	✓	✓	✓	6	12	✓	16	34
	C	✓	✓	✓	6	11	✓	19	36
	D	✓	✓	✓	4	11	✓	18	33
	E	✓	✓	✓	5	11	18	✓	34
	F	✓	✓	✓	5	10	✓	15	37
	G	✓	✓	✓	7	10	✓	20	37
	H	✓	✓	✓	4	6	✓	11	23
	I	✓	✓	✓	5	9	16	✓	30
	J	✓	✓	✓	3	8	15	✓	26
Live Count:		10	10	10	10	10	10	10	298

4th dilution	R	Live Counts							1st-3rd brood total
		1	2	3	4	5	6	7	
		1	2	3	4	5	6	7	
250	A	✓	✓	✓	5	11	✓	16	32
	B	✓	✓	✓	6	13	✓	18	37
	C	✓	✓	✓	5	9	✓	15	29
	D	✓	✓	✓	6	10	✓	19	35
	E	✓	✓	✓	5	12	16	1	34
	F	✓	✓	✓	5	10	✓	19	34
	G	✓	✓	✓	5	10	✓	18	33
	H	✓	✓	✓	6	5	✓	14	25
	I	✓	✓	✓	5	10	17	✓	32
	J	✓	✓	✓	5	9	19	13	33
Live Count:		10	10	10	10	10	10	10	324

5th dilution	R	Live Counts							1st-3rd brood total
		1	2	3	4	5	6	7	
		1	2	3	4	5	6	7	
500	A	✓	✓	✓	5	11	✓	10	26
	B	✓	✓	✓	4	9	✓	13	26
	C	✓	✓	✓	1*	6	✓	9	16
	D	✓	✓	✓	6	8	✓	13	27
	E	✓	✓	✓	✓	✓	✓	✓	✓
	F	✓	✓	✓	5	8	✓	13	26
	G	✓	✓	✓	5	6	✓	14	25
	H	✓	✓	✓	4	8	✓	10	20
	I	✓	✓	✓	1	2	10	14	26
	J	✓	✓	✓	3	2	✓	15	20
Live Count:		9	9	9	9	9	8	8	204

0	1	2	3	4	5	6	7	Day
SR	KO	KO	RS	SR	KO	KO	EH	Initials
15:20	15:05	15:45	14:10	14:20	11:55	12:30	12:45	Time
181	181	181	181	181	181	181		F-CD #
415	415	415	415	415	415	415		F-SC #

Notes & Comments
① correction KO 147 - 12
② 17 EH 11/8
③ 0 EH 11/8

○ Normal Adult	● ... Normal Adult near neonate release	⊗ ... Normal Adult with developing brood	Randomization Template #  3
○ ... Normal Adult w/ newly deposited brood	⊕ ... Normal Adult with Small Brood		
⊖ ... Abnormal Adult; reproductively inactive	⊖ Abnormal Adult: Dead ...	⊖ Abnormal Adult: Male ...	



# CETIS Analytical Report

Report Date: 09 Nov-16 15:23 (p 1 of 1)  
Test Code: NOV16CDC | 05-3000-3649

## Ceriodaphnia 7-d Survival and Reproduction Test

Hydrosphere Research

Analysis ID: 18-1001-1673	Endpoint: Reproduction	CETIS Version: CETISv1.9.2
Analyzed: 09 Nov-16 15:23	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 11-1451-4705	Test Type: Reproduction-Survival (7d)	Analyst:
Start Date: 01 Nov-16 15:30	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 08 Nov-16 12:45	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 21h	Source: In-House Culture	Age:
Sample ID: 05-6273-5793	Code: NOV16CDC	Client: Internal Lab
Sample Date: 01 Nov-16	Material: Potassium chloride	Project: Standard Reference Toxicant Test
Receipt Date: 01 Nov-16	Source: Reference Toxicant	
Sample Age: 16h	Station:	

### Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	2035753	200	Yes	Two-Point Interpolation

### Point Estimates

Level	mg/L	95% LCL	95% UCL
IC25	394.9	326.8	495.1

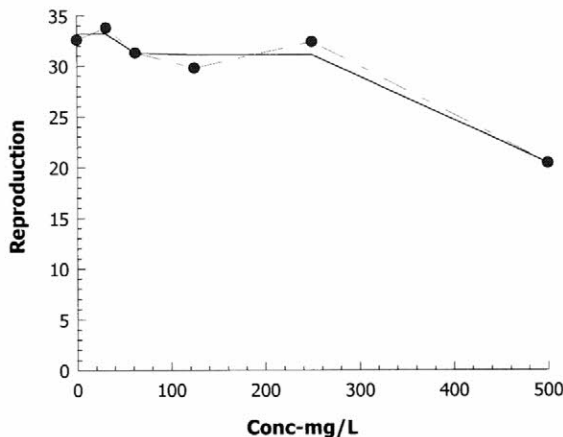
### Reproduction Summary

Conc-mg/L	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	10	32.6	23	37	1.4	4.427	13.58%	0.0%
31.25		10	33.8	29	37	0.8273	2.616	7.74%	-3.68%
62.5		10	31.3	22	36	1.3	4.111	13.13%	3.99%
125		10	29.8	15	37	2.149	6.795	22.80%	8.59%
250		10	32.4	25	37	1.056	3.34	10.31%	0.61%
500		10	20.4	0	27	2.782	8.796	43.12%	37.42%

### Reproduction Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	32	32	37	36	34	36	37	23	30	29
31.25		29	35	32	34	33	37	34	37	31	36
62.5		30	35	36	33	31	34	34	29	22	29
125		30	34	36	33	34	15	37	23	30	26
250		32	37	29	35	34	34	33	25	32	33
500		26	26	16	27	0	26	25	12	26	20

### Graphics



**SRT for the Month of (circle one):**

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

**Species:** Ceriodaphnia dubia

**ID #:** 8317

**Initiation Date:** 11/1/16 **Termination Date:** 11-8-16

**Toxicant (desiccated):** KCl

**Stock Solution (Concentration):** 100-gm KCl / L

**Test Concentration (Units):** mg KCl / L

µLs of Stock / 200-µLs	mg/L	pH (acceptable range for a valid test is 6 to 9)									
		new	old	new	old	new	old	new	old	new	old
		0	1	2	3	4	5	6	7		
Control	0	7.8	7.6	7.7	7.6	7.7	8.0	7.6	7.9	8.0	7.8
62.5-µL	31.25	7.8	7.6	7.8	7.6	7.7	8.1	7.7	7.9	8.0	7.8
125-µL	62.5	7.9	7.7	7.8	7.7	7.7	8.1	7.7	7.9	8.0	7.8
250-µL	125	7.9	7.7	7.8	7.7	7.7	8.1	7.7	7.9	8.0	7.8
0.5-mL	250	7.9	7.8	7.9	7.8	7.8	8.1	7.8	8.0	8.0	7.8
1-mL	500	7.9	7.8	7.9	7.8	7.9	8.1	7.8	8.0	8.0	7.8
Meter ID:		16	12	16	12	16	11	16	14	11	16
Day:		0	1	2	3	4	5	6	7		
Stock Solution ID (SLN):		16306	16306	16306	16306	16306	16306	16306	16306	16306	16306
Dilution ID:		4041	4041	4041	4041	4041	4046	4046	4046	4046	4046
Initials:		EH	KO	EH	KO	EH	RS	EH	PS	KO	EH
Time:		1210	1520	1020	1550	1040	1350	1110	1420	1110	1200

Dissolved Oxygen (mg/L) (acceptable minimum for a valid test is 24.0-mg/L)											
new	old	new	old	new	old	new	old	new	old	new	old
0	1	2	3	4	5	6	7				
8.2	7.4	8.1	7.7	8.3	7.2	8.2	8.1	7.7	7.6	8.4	7.1
8.3	7.5	8.2	7.7	8.4	7.2	8.3	8.1	7.8	7.7	8.4	7.3
8.3	7.5	8.2	7.7	8.4	7.2	8.3	8.1	7.8	7.9	8.4	7.3
8.3	7.5	8.2	7.7	8.4	7.1	8.3	8.0	7.7	7.8	8.4	7.3
8.3	7.4	8.2	7.8	8.4	7.1	8.4	8.0	7.8	7.7	8.5	7.3
8.3	7.5	8.3	7.7	8.4	7.1	8.3	7.9	7.8	7.8	8.5	7.3
7	10	7	10	7	13	7	7	13	10	7	13
Notes & Comments											
① 4046 cw 11/9											

<b>SRT for the Month of (circle one):</b>	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct <b>Nov</b> Dec	
<b>Species:</b>	Ceriodaphnia dubia
<b>ID #:</b>	8317

<b>Initiation Date:</b>	11/1/16	<b>Termination Date:</b>	11/8/16
<b>Toxicant (desiccated):</b>	KCl		
<b>Stock Solution (Concentration):</b>	100-gm KCl / L		
<b>Test Concentration (Units):</b>	mg KCl / L		

mLs of Stock / 200-mLs	mg/L	Conductivity (µmho/cm)							
		(a Conductivity of 2,150-µmho/cm = a Salinity of 1‰ @ 25°C)							
		Measured in each new sample and control							
		0	1	2	3	4	5	6	7
Control	0	289	290	288	295	286	295	295	
62.5-µL	31.25	354	352	354	355	342	348	351	
125-µL	62.5	592	425	426	427	415	424	421	
250-µL	125	536	532	537	538	520	528	537	
0.5-mL	250	744	746	749	756	729	731	742	
1-mL	500	1188	1192	1183	1197	1154	1178	1126	
<b>Meter ID:</b>		17	17	17	17	15	17	17	
<b>Day:</b>		0	1	2	3	4	5	6	7
<b>Stock Solution ID (SLN):</b>		16306	16306	16306	16306	16306	16306	16306	
<b>Dilution ID:</b>		4041	4041	4041	4041	4046	4046	4046	
<b>Initials:</b>		EH	EH	EH	EH	RS	EH	EH	EH
<b>Time:</b>		12:14	10:20	10:40	11:15	11:10	09:55	10:45	12:50

Temperature (°C)							
(acceptable range for a valid test is 25±1°C)							
Measured at the end of each 24-h exposure period							
0	1	2	3	4	5	6	7
25.1	25.1	24.4	25.1	24.6	24.4	25.0	
25.1	25.1	24.4	25.1	24.6	24.4	25.0	
25.1	25.1	24.4	25.0	24.6	24.4	25.0	
25.1	25.1	24.4	25.1	24.6	24.4	25.0	
25.1	25.1	24.4	25.0	24.6	24.4	24.9	
25.1	25.1	24.4	25.1	24.6	24.4	24.9	
57	57	57	57	57	57	57	57

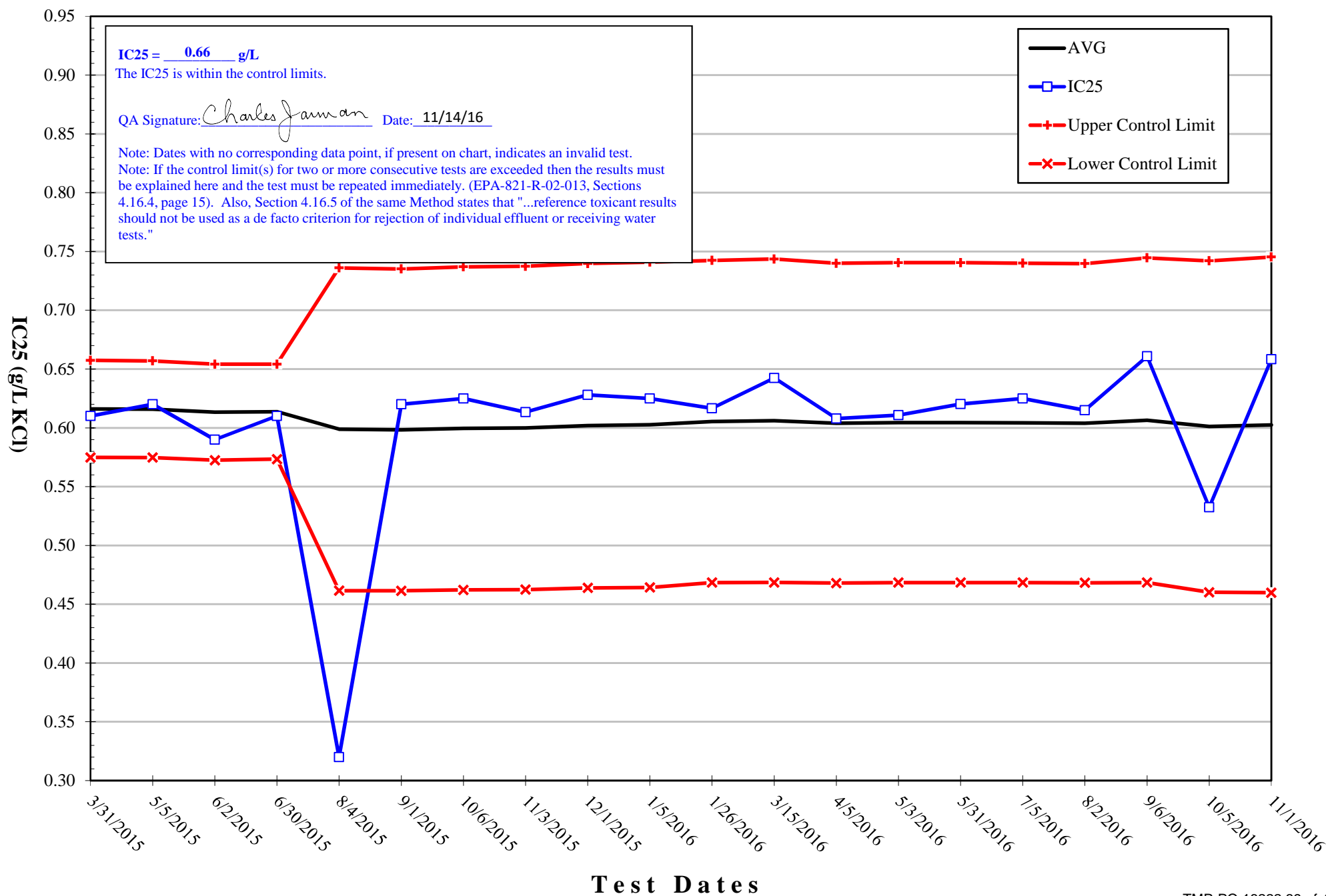
Notes & Comments
① 4046 CW 11/9



# Control Chart - I

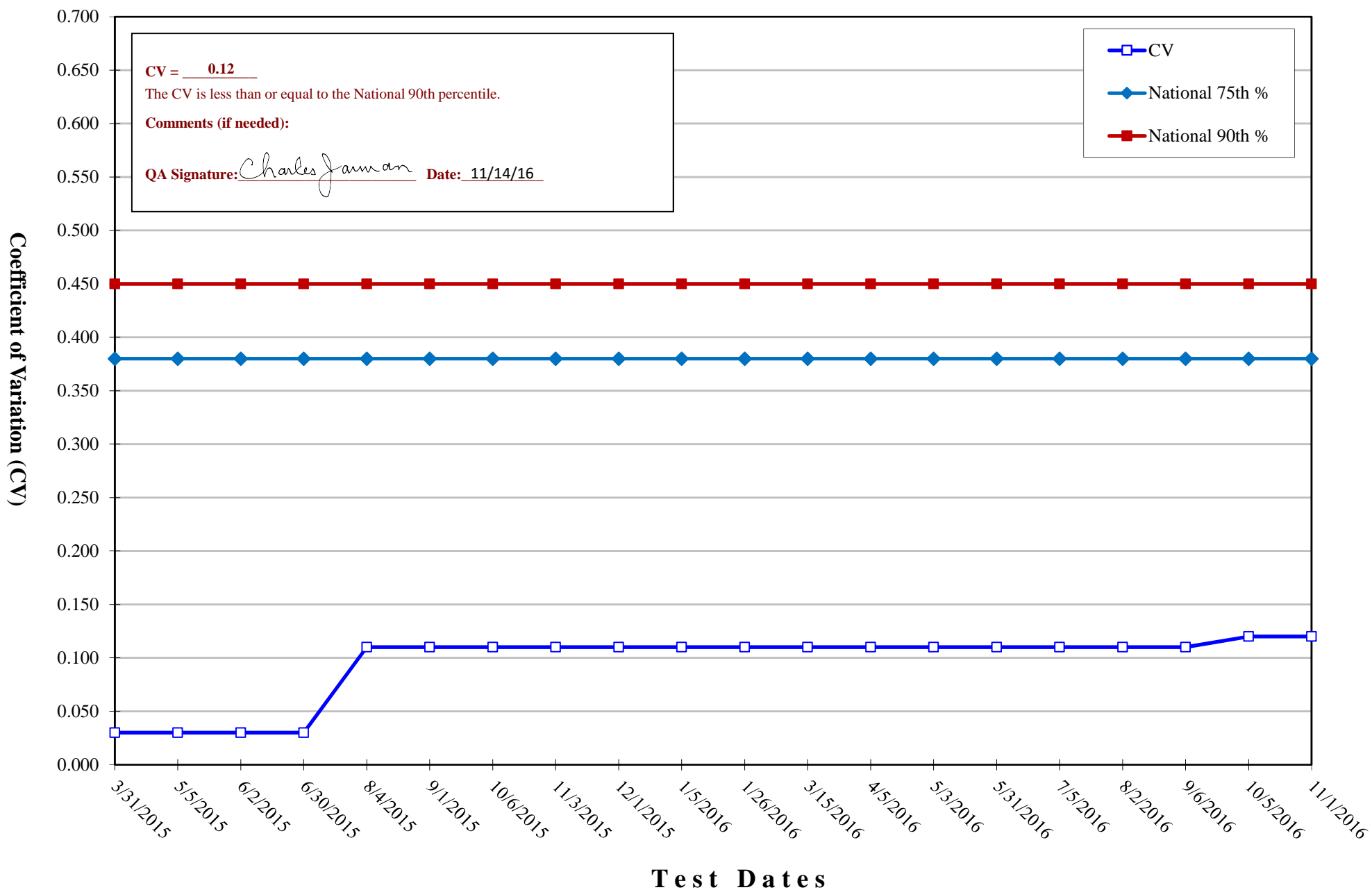
## Control Limits for Standard Reference Toxicant Tests

### CHRONIC ... *Pimephales promelas*



## Control Chart - II

Coefficient of Variation for Standard Reference Toxicant Tests  
CHRONIC ... *Pimephales promelas*



**REFERENCE TOXICANT LOG • Last 20**

**Test: 7-day Chronic**

**Species:** *Pimephales promelas*

**Toxicant:** Potassium chloride (gm KCl / liter)



N	DATE	IC25	AVG	S.D.	2S.D.	- 2S.D.	+2S.D.	CV	National 75th %	National 90th %	Lower Control Limit	Upper Control Limit
141	3/31/2015	0.61	0.62	0.02	0.04	0.57	0.66	0.03	0.38	0.45	0.57	0.66
142	5/5/2015	0.62	0.62	0.02	0.04	0.57	0.66	0.03	0.38	0.45	0.57	0.66
143	6/2/2015	0.59	0.61	0.02	0.04	0.57	0.65	0.03	0.38	0.45	0.57	0.65
144	6/30/2015	0.61	0.61	0.02	0.04	0.57	0.65	0.03	0.38	0.45	0.57	0.65
145	8/4/2015	0.32	0.60	0.07	0.14	0.46	0.74	0.11	0.38	0.45	0.46	0.74
146	9/1/2015	0.62	0.60	0.07	0.14	0.46	0.74	0.11	0.38	0.45	0.46	0.74
147	10/6/2015	0.63	0.60	0.07	0.14	0.46	0.74	0.11	0.38	0.45	0.46	0.74
148	11/3/2015	0.61	0.60	0.07	0.14	0.46	0.74	0.11	0.38	0.45	0.46	0.74
149	12/1/2015	0.63	0.60	0.07	0.14	0.46	0.74	0.11	0.38	0.45	0.46	0.74
150	1/5/2016	0.63	0.60	0.07	0.14	0.46	0.74	0.11	0.38	0.45	0.46	0.74
151	1/26/2016	0.62	0.61	0.07	0.14	0.47	0.74	0.11	0.38	0.45	0.47	0.74
152	3/15/2016	0.64	0.61	0.07	0.14	0.47	0.74	0.11	0.38	0.45	0.47	0.74
153	4/5/2016	0.61	0.60	0.07	0.14	0.47	0.74	0.11	0.38	0.45	0.47	0.74
154	5/3/2016	0.61	0.60	0.07	0.14	0.47	0.74	0.11	0.38	0.45	0.47	0.74
155	5/31/2016	0.62	0.60	0.07	0.14	0.47	0.74	0.11	0.38	0.45	0.47	0.74
156	7/5/2016	0.63	0.60	0.07	0.14	0.47	0.74	0.11	0.38	0.45	0.47	0.74
157	8/2/2016	0.62	0.60	0.07	0.14	0.47	0.74	0.11	0.38	0.45	0.47	0.74
158	9/6/2016	0.66	0.61	0.07	0.14	0.47	0.74	0.11	0.38	0.45	0.47	0.74
159	10/5/2016	0.53	0.60	0.07	0.14	0.46	0.74	0.12	0.38	0.45	0.46	0.74
160	11/1/2016	0.66	0.60	0.07	0.14	0.46	0.75	0.12	0.38	0.45	0.46	0.75





SRT for the Month of (circle one):

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Species: *Pimephales promelas*

Code: FM

ID #: 8316

Age: &lt; 24-hours

Treatment of Eggs/Larvae  $\oplus$   
☒ No, ☐ Yes, Note

Control Water: MHR

ID #: see "water quality"

Test Vessel: 1-L plastic cup

Test Volume: 250-mL / rep.

Initiation Date: 11.1.16

Termination Date: 11.8.16

Toxicant (desiccated): KCl

Stock Solution (Concentration): 100-gm KCl / Liter

Test Concentration (Units): gm KCl / Liter

	g/L	R E P	Live Counts (Valid Control is $\geq 80\%$ survival @ 7d)								Growth (original number, final dry weight basis. Valid Control is $\geq 0.25$ -mg surviving fish)					Notes & Comments
			T	W	R	F	SA	Ju	M	T	Pan #	Tare Weight (0.00001-gms)	Total Weight (0.00001-gms)	Net Weight (0.00001-gms)	Wt. / Fish (0.001-mgs)	
Control	0	A	10	10	10	10	10	10	10	10	25	1.14691	1.15145	0.00454	0.454	① 9' EH 11/03 ② 9' EH 11/03
		B	10	10	10	10	9'	9	9	9	26	1.14648	1.15078	0.00430	0.430	
		C	10	10	10	10	10	9'	9	9	27	1.16078	1.16520	0.00442	0.442	
		D	10	10	10	9	9	9	8'	7'	28	1.15685	1.16011	0.00326	0.326	
	0.25	A	10	10	10	10	10	10	10	10	29	1.15112	1.15585	0.00473	0.473	
		B	10	10	10	10	10	10	10	10	30	1.13580	1.14061	0.00481	0.481	
		C	10	10	10	10	10	10	10	8 <sup>2</sup>	31	1.14480	1.14816	0.00336	0.336	
		D	10	10	9	9	9	9	9	9	32	1.14733	1.15181	0.00448	0.448	
	0.5	A	10	10	9'	9	9	9	9	9	33	1.14893	1.15319	0.00426	0.426	
		B	10	10	10	10	10	10	10	10	34	1.14762	1.15227	0.00465	0.465	
		C	10	10	10	10	10	10	10	10	35	1.15780	1.16202	0.00422	0.422	
		D	10	10	10	10	10	10	10	10	36	1.15320	1.15751	0.00431	0.431	
	1	A	10	6 <sup>+</sup>	3 <sup>3</sup>	2'	2	2	2	2	37	1.13827	1.13961	0.00134	0.134	
		B	10	9'	8'	6 <sup>2</sup>	4 <sup>2</sup>	4	4	4	38	1.14774	1.15001	0.00227	0.227	
		C	10	7 <sup>3</sup>	1 <sup>6</sup>	1	0'									
		D	10	6 <sup>+</sup>	1 <sup>5</sup>	1	1	1	1	0'	39	1.16192				
	2	A	10	<del>10</del>												
		B	10	<del>10</del>												
		C	10	<del>10</del>												
		D	10	<del>10</del>												
	4	A	10	<del>10</del>												
		B	10	<del>10</del>												
		C	10	<del>10</del>												
		D	10	<del>10</del>												
Initials:			KO KO EH EH RS KO EH KO													
Time:			17:00 15:00 13:45 15:30 13:05 13:25 12:45 10:50													
Randomization Template #	Feeding Type:	Artemia														
	Amount:	3-drops (0.15-mLs) of a concentrated slurry / 2x / day														
	Artemia ID#:	16047	16047	16047	16047	16047	16047	16047	16047	16047	16047	16047	16047	16047	16047	(-CHM)
	Morning (time):	X	09:30	09:30	09:30	09:30	10:00	09:00	09:30							
	Evening (time):	17:40	16:00	16:50	17:00	16:30	16:20	17:00								
Weigh Pan and Dry Weight Determination Information																
Final	Oven ID#:	1	Date & Time IN:	11/8/11:05	Oven Temp:	60.8	Initials:	KO								
	Total Drying Time:	24:02	Date & Time OUT:	11/9/11:07	Oven Temp:	58.6	Initials:	CG								
Drying Times & Temperatures for Final Weights: 24-hours at 60 $\pm$ 1°C or $\geq$ 6-hours at 105 $\pm$ 1°C																

$\oplus$  Eggs may be treated with certain chemicals to control fungus. Typically methylene blue (MB) or Fungus Eliminator (FE) are used to control fungus. If used, note use under "Notes & Comments"

# CETIS Analytical Report

Report Date: 14 Nov-16 10:32 (p 1 of 1)  
Test Code: NOV16FMC | 07-6314-8983

## Fathead Minnow 7-d Larval Survival and Growth Test

Hydrosphere Research

Analysis ID: 00-6972-4371	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.9.2
Analyzed: 14 Nov-16 10:32	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 01-0984-3654	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 01 Nov-16 17:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 08 Nov-16 10:50	Species: Pimephales promelas	Brine:
Duration: 6d 18h	Source: In-House Culture	Age:
Sample ID: 00-6761-2887	Code: NOV16FMC	Client: Internal Lab
Sample Date: 01 Nov-16	Material: Potassium chloride	Project: Standard Reference Toxicant Test
Receipt Date: 01 Nov-16	Source: Reference Toxicant	
Sample Age: 17h	Station:	

### Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
✓ Linear	Linear	908261	200	Yes	Two-Point Interpolation

### Point Estimates

Level	gm/L	95% LCL	95% UCL
IC25	0.6584	0.5813	0.7444

### Mean Dry Biomass-mg Summary

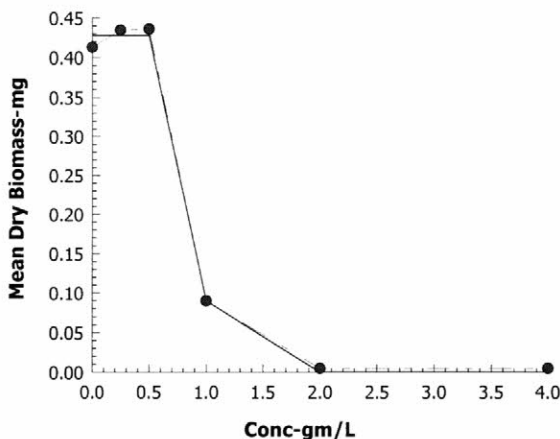
### Calculated Variate

Conc-gm/L	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	4	0.413	0.326	0.454	0.02941	0.05882	14.24%	0.0%
0.25		4	0.4345	0.336	0.481	0.03358	0.06715	15.46%	-5.21%
0.5		4	0.436	0.422	0.465	0.00984	0.01968	4.51%	-5.57%
1		4	0.09025	0	0.227	0.05546	0.1109	122.90%	78.15%
2		4	0	0	0	0	0		100.0%
4		4	0	0	0	0	0		100.0%

### Mean Dry Biomass-mg Detail

Conc-gm/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	0.454	0.43	0.442	0.326 ✓
0.25		0.473	0.481	0.336	0.448 ✓
0.5		0.426	0.465	0.422	0.431 ✓
1		0.134	0.227	0	0 ✓
2		0	0	0	0
4		0	0	0	0

### Graphics




**SRT for the Month of (circle one):**

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

**Species:** *Pimephales promelas*
**ID #:** 8316

**Initiation Date:** 11-1-16

**Termination Date:** 11-8-16

**Toxicant (desiccated):** KCl

**Stock Solution (Concentration):** 100-gm KCl / L

**Test Concentration (Units):** gm KCl / L

mLs of Stock / Liter	g/L	pH (acceptable range for a valid test is 6 to 9)													
		new	old	new	old	new	old	new	old	new	old	new	old		
		0	1	2	3	4	5	6	7						
Control	0	7.9	7.5	7.8	7.6	7.8	7.5	7.8	7.7	8.0	7.5	7.8	7.7	7.8	7.4
2.5-mls	0.25	8.0	7.6	7.9	7.6	7.8	7.6	7.9	7.7	8.1	7.6	8.0	7.7	7.9	7.7
5-mls	0.5	8.0	7.7	7.9	7.7	7.9	7.7	7.9	7.7	8.1	7.7	8.0	7.8	7.9	7.7
10-mls	1	8.1	7.8	8.0	7.8	7.9	7.7	8.0	7.8	8.2	7.8	8.0	7.8	8.0	7.8
20-mls	2	8.1	7.9	8.0											
40-mls	4	8.1	8.0	8.1											
Meter ID:		16	12	16	16	16	16	16	11	11	12	16	16	16	16
Day:		0	1	2	3	4	5	6	7						
Stock Solution ID (SLN):		16306	16306	16306	16306	16306	16306	16306	16306	16306	16306	16306	16306	16306	16306
Dilution ID:		4043	4043	4043	4043	4043	4043	4043	4043	4043	4043	4043	4043	4043	4043
Initials:		EH	KD	EH	EH	EH	EH	EH	EH	EH	EH	EH	EH	EH	EH
Time:		11:35	14:30	10:40	13:40	10:00	15:10	10:10	13:00	10:45	13:20	9:25	12:30	10:15	10:35

Dissolved Oxygen (mg/L) (acceptable minimum for a valid test is 4.0-mg/L)											
new	old	new	old	new	old	new	old	new	old	new	old
0	1	2	3	4	5	6	7				
8.4	7.3	8.3	7.4	8.5	7.3	8.4	6.7	7.9	7.2	8.6	7.2
8.5	7.4	8.4	7.5	8.5	7.2	8.4	6.6	7.9	7.2	8.6	7.2
8.5	7.5	8.4	7.5	8.5	7.3	8.4	6.6	7.9	7.1	8.6	7.2
8.5	7.5	8.4	7.6	8.5	7.4	8.5	6.8	8.0	7.2	8.6	7.4
8.5	7.5	8.4									
8.5	7.6	8.4									
7	10	7	7	7	7	7	13	13	10	7	7
<b>Notes &amp; Comments</b>											




**SRT for the Month of (circle one):**

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

**Species:** *Pimephales promelas*
**ID #:** 8316

**Initiation Date:** 11.1.16

**Termination Date:** 11.8.16

**Toxicant (desiccated):** KCl

**Stock Solution (Concentration):** 100-gm KCl / L

**Test Concentration (Units):** gm KCl / L

mLs of Stock / Liter	g/L	Conductivity (µmho/cm)							
		(a Conductivity of 2,150-µmho/cm = a Salinity of 1‰ @ 25°C)							
		Measured in each new sample and control							
		0	1	2	3	4	5	6	7
Control	0	289	286	289	290	286	295	292	
2.5-mls	0.25	718	745	744	730	715	736	743	
5-mls	0.5	1140	1155	1158	1166	1131	1169	1157	
10-mls	1	1980	1999	1987	1998	1946	2160	1964	
20-mls	2	3840	3830						
40-mls	4	6940	7080						
Meter ID:		17	17	17	17	15	17	17	
Day:		0	1	2	3	4	5	6	7
Stock Solution ID (SLN):		16306	16306	16306	16306	16306	16306	16306	
Dilution ID:		4043	4043	4043	4043	4045	4045	4045	
Initials:		EH	EH	EH	EH	RS	EH	EH	EH
Time:		11:30	10:45	10:00	10:15	10:45	09:25	10:10	10:30

Temperature (°C)							
(acceptable range for a valid test is 25±1°C)							
Measured at the end of each 24-h exposure period							
0	1	2	3	4	5	6	7
24.8	25.1	25.0	25.1	24.6	24.6	24.8	
24.8	25.1	25.0	25.1	24.6	24.6	24.8	
24.8	25.1	25.0	25.1	24.6	24.6	24.8	
24.8	25.1	25.0	25.1	24.6	24.6	24.8	
24.8							
24.8							
57	57	57	57	57	57	57	57

**Notes & Comments**

## Appendix D. Invalid Test



Client: Tampa Electric Company - Polk Power Station

Code: TMP-PO Job #: 16222

Species: *Pimephales promelas* Code: FM

ID #: 8339 Age: <24-hours

Test Vessel: 1-L plastic cup

Test Volume: 250-mL / rep.

Initiation Date: 11-29-16 Termination Date:

Sample Description: UV treated effluent  
(see Laboratory Notes, Task Titled "UV Treatment of Samples")

Sample Description	%	R E P	Live Counts (Valid Control is >80% survival @ 7d)							
	Effluent		T	W	R	F	Sa	Su	M	T
			0	1	2	3	4	5	6	7
Control	0	A	10	10	10	9'	9	9	9	8 <sup>+</sup>
		B	10	10	10	10	10	10	10	7 <sup>5</sup>
		C	10	10	10	10	10	10	10	7 <sup>5</sup>
		D	10	10	9'	9	9	9	9	8 <sup>+</sup>
Effluent	6.25	A	10	10	10	10	8 <sup>2</sup>	8	8	8
		B	10	10	9'	9	9	9	9	8'
		C	10	10	10	10	10	10	10	
		D	10	10	10	10	10	9'	9	
	12.5	A	10	10	10	10	8 <sup>2</sup>	10	10	
		B	10	10	9 <sup>+</sup>	10	10	8 <sup>2</sup>	8	
		C	10	10	10	10	8 <sup>2</sup>	7'	7	7
		D	10	9'	9	8'	8	8	6 <sup>2</sup>	
	25	A	10	10	10	10	8 <sup>2</sup>	8	8	
		B	10	10	10	8 <sup>2</sup>	7 <sup>3</sup>	7	7	
		C	10	10	10	9'	9	9	8'	
		D	10	10	10	8 <sup>2</sup>	8	8	6 <sup>2</sup>	
	50	A	10	10	10	10	7 <sup>3</sup>	6'	6	
		B	10	10	10	10	9'	9	8	
		C	10	10	10	8 <sup>2</sup>	10	10	10	
		D	10	10	10	10	10	10	10	
	100	A	10	10	10	10	10	9'	8'	
		B	10	10	10	10	8 <sup>2</sup>	8	8	
		C	10	10	10	8 <sup>2</sup>	8	7'	7	
		D	10	10	10	10	9'	8'	8	
Initials:			EH	EH	EH	EH	RS	KO	EH	KO
Time:			1455	1305	1630	1525	1540	1640	1235	1035

Randomization Template #

Feeding Type: Artemia

Amount: 3-drops (0.15-mLs) of a concentrated slurry / 2x / day

Morning: 0925 0930 0930 1020 945 930

Evening: 1545 1455 1645 1610 1915 1815 1550

Other:

Pan #	Tare Weight (0.00001-gms)	Total Weight (0.00001-gms)	Net Weight (0.00001-gms)	Wt / Fish (0.001-mgs)
25	1.14902			
26	1.14339			
27	1.15447			
28	1.14912			
29	1.15353			
30	1.13740			
31	1.15126			
32	1.15042			
33	1.15061			
34	1.15298			
35	1.14119			
36	1.14986			
37	1.15065			
38	1.14736			
39	1.14622			
40	1.16293			
41	1.14620			
42	1.14940			
43	1.14217			
44	1.15624			
45	1.14578			
46	1.15088			
47	1.15551			
48	1.15879			
Date Tare Weights: 12/5/16		Initials: CG		
Date Final Dry Weights:		Initials:		

Notes & Comments

① 10 EH 12/1 and 12/2 ② correction - RS 12/3

③ 1 missing - RS 12/3 ④ 1 missing KO 12/6

⑤ 1 dead, 2 missing KO 12/6

Photoperiod is 16-hours light and 8-hours dark, Illumination is ambient (50 to 100 fcd)

⑥ "missing" organisms were actually mortalities the remains were very decomposed & virtually unrecognizable FR 12/8/16

INVALID TEST DATA





Client:	Tampa Electric Company - Polk Power Station	
Code:	TMP-PO	Job #: 16222
Species:	Pimephales promelas	
ID #:	8339	

Initiation Date:	11-29-10	Termination Date:	
Sample Description:			
UV treated effluent (see Laboratory Notes, Task Titled "UV Treatment of Samples")			

Sample Description	%	pH (acceptable range for a valid test is 6 to 9)											
		new			old			new			old		
		0	1	2	3	4	5	6	7	8	9	10	11
Control	0	7.7	7.7	7.8	7.6	7.8	7.6	7.8	7.7	8.0	7.6	7.8	7.5
Effluent	6.25	7.7	7.7	7.8	7.6	7.8	7.6	7.8	7.7	8.0	7.6	7.8	7.4
	12.5	7.7	7.7	7.8	7.6	7.8	7.6	7.8	7.7	8.0	7.6	7.8	7.4
	25	7.7	7.7	7.8	7.6	7.8	7.6	7.8	7.7	7.9	7.6	7.8	7.4
	50	7.6	7.7	7.7	7.7	7.8	7.6	7.8	7.7	7.9	7.5	7.7	7.4
	100	7.5	7.7	7.6	7.7	7.7	7.6	7.7	7.7	7.7	7.5	7.6	7.4
Meter ID:		16	16	16	16	16	16	16	16	16	16	16	16
Day:		0	1	2	3	4	5	6	7				
Control ID:		4056	4056	4056	4056	4056	4056	4056	4056	4056	4056	4056	4056
Dilution ID:		4056	4056	4056	4056	4056	4056	4056	4056	4056	4056	4056	4056
Effluent ID:		A	A	B	B	C	C	C	C	C	C	C	C
Initials:		EH	EH	EH	EH	EH	EH	EH	EH	EH	EH	EH	EH
Time:		1155	1240	1045	1010	1140	1455	1135	1510	1300	1435	1205	1030

Dissolved Oxygen (mg/L) (acceptable minimum for a valid test is 4.0 mg/L)											
new			old			new			old		
0	1	2	3	4	5	6	7	8	9	10	11
8.4	7.4	8.4	7.4	8.4	7.3	8.5	6.9	8.2	7.0	8.2	6.9
8.4	7.4	8.4	7.3	8.4	7.2	8.5	6.8	8.3	7.2	8.3	6.9
8.4	7.3	8.4	7.3	8.4	7.3	8.5	6.8	8.3	7.3	8.3	6.9
8.3	7.4	8.3	7.4	8.3	7.3	8.4	6.8	8.2	7.3	8.3	6.9
8.0	7.4	8.1	7.3	8.1	7.3	8.3	6.8	8.1	7.3	8.5	6.9
7.4	7.4	7.5	7.3	7.8	7.3	8.1	6.7	7.8	6.9	7.8	6.8
7	7	7	7	7	7	7	7	7	7	7	7

Notes & Comments
INVALID TEST DATA



<b>Client:</b>	Tampa Electric Company - Polk Power Station		
<b>Code:</b>	TMP-PO	<b>Job #:</b>	16222
<b>Species:</b>	Pimephales promelas		
<b>ID #:</b>	8339		

<b>Initiation Date:</b>	11/24/16	<b>Termination Date:</b>	
<b>Sample Description:</b>			
UV treated effluent (see Laboratory Notes, Task Titled "UV Treatment of Samples")			

Sample Description	%	Conductivity (µmho/cm) (a Conductivity of 2,150-µmho/cm = a Salinity of 1‰ @ 25°C) Measured in each new sample and control						
		0	1	2	3	4	5	6
Control	0	288	289	289	287	268	285	290
Effluent	6.25	330	330	327	326	304	322	328
	12.5	368	369	365	369	340	359	371
	25	446	444	440	437	413	409	417
	50	594	611	603	601	552	612	612
	100	909	926	915	917	840	935	940
Meter ID:		17	17	17	17	15	18	17
Day:		0	1	2	3	4	5	6
Control ID:		4056	4056	4056	4056	4056	4056	4059
Dilution ID:		4056	4056	4056	4056	4056	4056	4059
Effluent ID:		A	A	B	B	C	C	C
Initials:		EH	EH	EH	EH	RS	KO	EH
Time:		1200	1100	1145	1140	1300	1210	1035

Temperature (°C) (acceptable range for a valid test is 25±1°C) Measured at the end of each 24-h exposure period						
0	1	2	3	4	5	6
24.9	24.7	24.4	24.5	24.6	25.0	24.9
24.9	24.7	24.4	24.5	24.6	25.0	24.9
24.9	24.7	24.4	24.5	24.6	25.0	24.9
24.9	24.7	24.4	24.5	24.6	25.0	24.9
24.9	24.7	24.4	24.5	24.6	25.0	24.9
24.9	24.7	24.4	24.5	24.6	25.0	24.9
57	57	57	57	57	57	57

<b>Notes &amp; Comments</b>
① 1050 EH 1/30
<b>INVALID TEST DATA</b>