3800-FM-BPNP SM0485 Rev. 10/2013
Instructions

PA39-03724

WHOLE EFFLUENT TOXICITY (WET) TEST SUMMARY REPORT - COVER SHEET

NPDES Permit Number: **PA0039004** Facility Name: **Towamencin Municipal Authority**
Species Tested: *Ceriodaphnia dubia* _X ***Pimephales promelas*** Test Type: **X Chronic** __ Acute
Re-Test? ☐ Yes X No (If Yes, indicate the date of original test completion:)

SAMPLE INFORMATION

Date/Time	Sample Source	Temperature	Holding Time	Chlorine	Dechlorinated?
10/28/19, 0800	**Final effluent**	**3.5 °C**	**24 hours**	**0.04 mg/L**	__Yes _x_No
10/30/19, 0800	**Final effluent**	**4.0 °C**	**24 hours**	**0.02 mg/L**	__Yes _x_No
11/01/19, 0800	**Final effluent**	**3.0 °C**	**24 hours**	**0.01 mg/L**	__Yes _x_No

TEST CONDITIONS

Date/Time of Test Initiation **10/29/19, 1710** Date/Time of Test Termination **11/05/19, 1610**
X Renewal Test Non-Renewal Test Frequency of Renewals: **Daily**
Dilution Series: **24, 48, 72, 96, 100%** Target Instream Waste Concentration (TIWC): **96%**
Age of Organisms at Start of Test: **<30 hours**
Number of Replicates: **4** Number of Organisms per Replicate: **10**
Source of Organisms: **ABS, Inc.** Feeding Regimen: **Twice/day** *Artemia spp. nauplii*
Light Intensity: **50-100 foot-candles** Photoperiod: **16L-8D**
Temperature measurements made at least once per 24-hour period? **X Yes** Temperature Range: **24.7-25.7° C**
DO measured daily in at least one replicate of each concentration? **X Yes** (attach log sheet)
Were the chambers aerated? Yes **X** No Rate:
pH measured daily in at least one replicate of each concentration? **X Yes** (attach log sheet)
Were test acceptability criteria in the EPA method met? **X Yes** No
Were there any modifications to or deviations from EPA methods (if Yes, explain on separate sheet)? Yes **X No**

DILUTION / REAGENT WATER

USEPA moderately hard reconstituted water as per EPA-821-R-02-013 2002
Date of Last Test for Chemistry: **11/02/19** Conductivity: **295** µmhos/cm
pH: **8.1** Total Res. Cl⁻: **0** mg/L

CONTROL RESULTS

Pimephales promelas
Survival: **97.5 %**
Mean Dry Weight of Survivors (if applicable): **0.3928 mg**

REFERENCE TOXICITY TESTS

Date of most recent test: **10/29/19** Same conditions as test: **X Yes** No
Were test acceptability criteria in the EPA method met? **X Yes** No

TEST RESULTS

6. The permittee must report the results of each test endpoint that has a WET limit in Part A of this permit on the Discharge Monitoring Report (DMR). Test results shall be reported on the DMR in terms of acute or chronic Toxicity Units (TUa or TUc), where TUa is used for acute tests and TUc is used for chronic tests. If DEP's WET Analysis Spreadsheet indicates a passing result for an endpoint, report the value obtained from the expression "1/TIWC", which is equivalent to the permit limit. If the Spreadsheet indicates a failure, report the value obtained from the expression "> 1/TIWC". If a dilution higher than the TIWC dilution is used for the comparison with the control, report the value obtained from the expression "1/dilution". For example, an acute test endpoint failure at a TIWC dilution of 50% would be reported as "> 2.0 TUa" (1/0.5). Taken from PADEP SOP No. BPNPSM-PMT-031, page 11

Permit language varies, questions should be directed to the DEP's Bureau of Point and Non-Point Source Management at 717-787-2137 or your regional office.

Control compared to: **TIWC X**	Other:	Toxic Unit chronic (TUc): 100%/96%	**1.04 Survival**
Survival: **X Fail**	Reproduction: **X Fail**		**1.04 Growth**

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein; and based on my inquiry of the individuals personally responsible for obtaining the information, I believe the attached information is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine or imprisonment as provided by 18 Pa. C.S. §4904.

Christopher J. Nally	Christopher J. Nally	11/14/19	**39-03724**
Name of Laboratory Manager	Signature of Laboratory Manager	Date	DEP Lab ID No.

WHOLE EFFLUENT TOXICITY (WET) TEST SUMMARY REPORT

NPDES Permit Number: **PA0039004** Facility Name: **Towamencin Municipal Authority**
Species Tested: *Ceriodaphnia dubia* **X** ***Pimephales promelas*** Test Type: **X Chronic** __ Acute

TEST ENDPOINT SUMMARY

Test survival NOEC: **24 %**	Test growth NOEC: **24%**
Test survival IC_{25}: **36.4%**	Test growth IC_{25}: **39.0%**
PMSD Su: 9.9% (No limits established; EPA833-R-02-013)	PMSD: **14.7%** Growth
TUa: **4.2** (Toxic Unit acute; 100%/LC_{50})	PMSD acceptable (Acceptable range 12%-30%; EPA833-R-02-013)
48 hour LC_{50}: **46.1%**	
NOEC – No Observed Effect Concentration	PMSD – Percent Minimum Significant Difference

SURVIVAL / GROWTH DATA SUMMARY

Concentration	Ave. % Survival	Ave. Weight - mg	C.V. % Weight
Control	97.5	0.3928	9.354
24%	95	0.3608	11.012
48%	52.5	0.2550	14.092
72%	0.0	0.0000	0.000
96%	0.0	0.0000	0.000
100%	0.0	0.0000	0.000

Statistics	Normality	Is data normal?	Homogeneity	Is data homogeneous?	Analysis
Survival	Shapiro-Wilk's	No	Bartlett's	Yes	Dunnett's
Growth	Shapiro-Wilk's	Yes	Bartlett's	Yes	Dunnett's

PHYSICAL CHEMISTRY SUMMARY

	Temp.	°C	pH	Std. Units	D. O.	ppm	Cond.	µmhos
CONC.	Min	Max	Min	Max	Min	Max	Min	Max
Control	See	See	7.9	8.4	6.6	8.0	291	298
24%			7.7	8.2	6.4	8.4		
48%	Raw	Raw	7.7	8.1	6.9	8.9		
72%			7.6	8.1	7.8	9.0		
96%	Data	Data	7.6	8.0	7.9	9.1		
100%			7.5	8.2	7.8	9.2	2280	2946

REFERENCE TEST

Reference toxicant: Potassium chloride

Test Start: **10/29/19, 1710** Test terminated: **11/05/19, 1610**

Control survival: **97.5%**

Test NOEC: **500** ppm (Growth) Test #861 on attached chart

Random mortality: **0%**

Results within + /- 2standard deviations? **Yes**

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Pimephales
Endpoint	Survival
TIWC (decimal)	0.96
No. Per Replicate	10
TST b value	0.75
TST alpha value	0.25

Facility Name

Towamencin

Permit No.

PA0039004

Test Completion Date 11/5/2019

Replicate No.	Control	TIWC
1	10	0
2	10	0
3	9	0
4	10	0
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	9.750	0.000
Std Dev.	0.500	
# Replicates	4	

T-Test Result	#VALUE!
Deg. of Freedom	#VALUE!
Critical T Value	#VALUE!
Pass or Fail	0

Test Completion Date

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.000	0.000
Std Dev.		
# Replicates		

T-Test Result	
Deg. of Freedom	
Critical T Value	
Pass or Fail	

Test Completion Date

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.000	0.000
Std Dev.		
# Replicates		

T-Test Result	
Deg. of Freedom	
Critical T Value	
Pass or Fail	

Test Completion Date

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean		
Std Dev.		
# Replicates		

T-Test Result	
Deg. of Freedom	
Critical T Value	
Pass or Fail	

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Pimephales
Endpoint	Growth
TIWC (decimal)	0.96
No. Per Replicate	10
TST b value	0.75
TST alpha value	0.25

Facility Name

Towamencin

Permit No.

PA0039004

Test Completion Date 11/5/2019

Replicate No.	Control	TIWC
1	0.357	0
2	0.4	0
3	0.373	0
4	0.441	0
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.393	0.000
Std Dev.	0.037	
# Replicates	4	

T-Test Result	#VALUE!
Deg. of Freedom	#VALUE!
Critical T Value	#VALUE!
Pass or Fail	0

Test Completion Date

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.000	0.000
Std Dev.		
# Replicates		

T-Test Result	
Deg. of Freedom	
Critical T Value	
Pass or Fail	

Test Completion Date

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.000	0.000
Std Dev.		
# Replicates		

T-Test Result	
Deg. of Freedom	
Critical T Value	
Pass or Fail	

Test Completion Date

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean		
Std Dev.		
# Replicates		

T-Test Result	
Deg. of Freedom	
Critical T Value	
Pass or Fail	

Client/Toxicant: 414
Project Number: 01-04
Species: P. promelas

Beginning Date & Time: 10-29-19 1710
Ending Date & Time: 11-5-19 1610
Hatch Date: 10-28-19

Chronic Test
American Aquatic Testing, Inc.
Live Count

Conc.	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Control	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	9	9	9	9	9	9
	D	10	10	10	10	10	10	10	10
24%	A	10	10	10	10	10	10	10	10
	B	10	8[2]	8	8	8	8	8	8
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
48%	A	10	6[4]	6	6	6	6	6	6
	B	10	5[5]	5	4[1]	4	4	4	4
	C	10	7[3]	6[1]	6	6	6	6	6
	D	10	6[4]	5[1]	5	5	5	5	5
72%	A	10	0[10]	—	—	—	—	—	—
	B	10	0[10]	—	—	—	—	—	—
	C	10	0[10]	—	—	—	—	—	—
	D	10	0[10]	—	—	—	—	—	—
96%	A	10	0[10]	—	—	—	—	—	—
	B	10	0[10]	—	—	—	—	—	—
	C	10	0[10]	—	—	—	—	—	—
	D	10	0[10]	—	—	—	—	—	—
100%	A	10	0[10]	—	—	—	—	—	—
	B	10	0[10]	—	—	—	—	—	—
	C	10	0[10]	—	—	—	—	—	—
	D	10	0[10]	—	—	—	—	—	—
	A								
	B								
	C								
	D								
Initials		KB	KB	KR	KR	KB	KR	MK	MK
Date		10/29	10/30	10/31	11/1	11/2	11/3	11/4	11/5

Observations:

CHFHLC.wk3

Client/Toxicant: 414
Project Number: 01-04
Species: P. promelas

Beginning Date & Time: 10-29-19 1710
Ending Date & Time: 11-5-19 1610
Hatch Date: 10-28-19

Chronic Test

American Aquatic Testing, Inc.

Weight Data

QC
0.00756

% Conc.	Rep	Pan #	A weight of boat (g)	B weight of boat & fish (g)	(B – A)*1000 = C dry weight of fish (mg)	D # of surviving fish	C/D mean dry weight (mg)	C/E IC_{25} & NOEC calc. weight (mg)
Control	A	1	0.00714	0.01071	3.57	10	0.357	0.357
	B	2	0.00707	0.01107	4.00	10	0.400	0.400
	C	3	0.00654	0.01027	3.73	9	0.414	0.373
	D	4	0.00838	0.01279	4.41	10	0.441	0.441
24	A	5	0.00713	0.01057	3.44	10		0.344
	B	6	0.00789	0.01139	3.50	8		0.350
	C	7	0.00743	0.01162	4.19	10		0.419
	D	8	0.00758	0.01088	3.30	10		0.330
48	A	9	0.00800	0.01071	2.71	6		0.271
	B	10	0.00793	0.01007	2.14	4		0.214
	C	11	0.00733	0.00972	2.39	6		0.239
	D	12	0.00783	0.01079	2.96	5		0.296
72	A							
	B							
	C							
	D							
96	A							
	B							
	C							
	D							
100	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	Initials		thd	thd	thd	MK	thd	thd
	Date		11/1/19	11/7/19	11/7/19	11/5	11/7/19	11/7/19

QC
0.00756

E = Original number of organisms at test initiation, adjusted for losses.

Observations:

Date/Time In: 11-5-19 1610
Temp: 105°

Date/Time Out: 11/6/19 5:00
Temp: 105°

CHFHWT.wk3

Job Number: 414-01-04
Species: P. promelas

Start Date & Time: 10-29-19 1710
End Date & Time: 11-5-19 1610

Freshwater Chronic Test
American Aquatic Testing, Inc.
Phisical / Chemical Parameters

Initial Readings

Parameter	Concentration	Day 1	2	3	4	5	6	7	8
Dissolved Oxygen (mg/L)	Control	7.8	7.8	8.0	8.0	8.0	7.9	8.0	
	24%	8.0	8.2	8.3	8.4	8.1	8.2	8.1	
	48%	8.3	8.6	8.7	8.9	8.3	8.5	8.5	
	72%	9.0	—	—	—	—	—	—	—
	96%	9.1	—	—	—	—	—	—	—
	100%	9.2	—	—	—	—	—	—	—
	—								
pH	Control	7.9	8.4	8.2	8.2	8.1	8.2	8.1	
	24%	7.9	8.2	7.9	8.0	8.0	8.0	7.9	
	48%	7.7	8.0	7.8	7.8	7.8	7.8	7.8	
	72%	7.6	—	—	—	—	—	—	—
	96%	7.6	—	—	—	—	—	—	—
	100%	7.5	—	—	—	—	—	—	—
	—								
	Initials	KR	JK	KR	KR	KB	KR	KR	
	Date	10/29	10/30	10/31	11/1	11/2	11/3	11/4	

Conductivity (umhos/cm)		
Date	Control	100%
10/29	298	2280
10/31	291	2946
11/2	295	2842

Alkalinity (mg/L as CaCO3)		
Date	Control	100%
10/29	60	100
10/31	60	80
11/2	80	100

Hardness (mg/L as CaCO3)		
Date	Control	100%
10/29	100	160
10/31	96	190
11/2	100	180
Initials		

Final Readings

Parameter	Concentration	Day 1	2	3	4	5	6	7	8
Dissolved Oxygen (mg/L)	Control	7.5	7.2	6.6	7.7	7.7	7.2	7.2	
	24%	7.7	6.9	6.4	7.8	7.7	7.3	7.2	
	48%	7.8	7.0	6.9	7.9	7.8	7.5	7.4	
	72%	7.8	—	—	—	—	—	—	—
	96%	7.9	—	—	—	—	—	—	—
	100%	7.8	—	—	—	—	—	—	—
	—								
pH	Control	8.2	8.0	7.9	8.0	8.0	8.0	7.9	
	24%	8.1	7.9	7.7	7.9	8.0	7.9	7.8	
	48%	8.1	7.9	7.9	7.9	8.0	7.9	7.8	
	72%	8.1	—	—	—	—	—	—	—
	96%	8.0	—	—	—	—	—	—	—
	100%	8.2	—	—	—	—	—	—	—
	—								
	Initials	KR	MK	KR	JO	KR	MK	MK	
	Date	10/30	10/31	11/1	11/2	11/3	11/4	11/5	

Chlorine (mg/L)		
Date	Control	100%
10/29	0.00	0.04
10/31	0.00	0.02
11/2	0.00	0.01

NaSO4 added (mg/L)		
Date	Control	100%
Initials		

Observations:

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	10/29/2019	Test ID:	4140104ppc	Sample ID:	Towamencin
End Date:	11/5/2019	Lab ID:	AAT, INC.	Sample Type:	COMPOSITE
Sample Date:		Protocol:	EPAF 94-EPA/600/4-91/002	Test Species:	PP-Pimephales promelas
Comments:					

Conc-%	1	2	3	4
Control	1.0000	1.0000	0.9000	1.0000
24	1.0000	0.8000	1.0000	1.0000
48	0.6000	0.4000	0.6000	0.5000
72	0.0000	0.0000	0.0000	0.0000
96	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

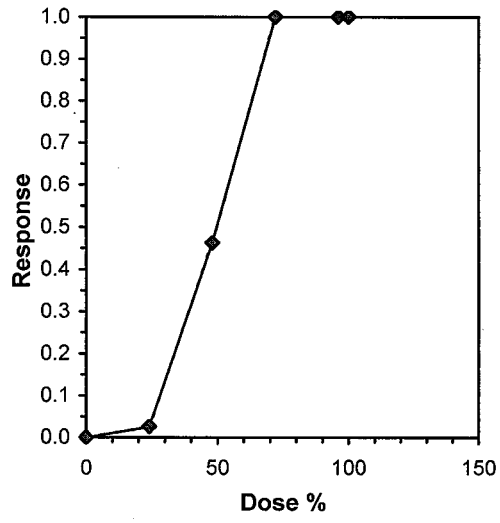
			Transform: Arcsin Square Root						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9750	1.0000	1.3713	1.2490	1.4120	5.942	4				0.9750	1.0000
24	0.9500	0.9744	1.3358	1.1071	1.4120	11.411	4	0.439	2.180	0.1761	0.9500	0.9744
*48	0.5250	0.5385	0.8106	0.6847	0.8861	11.892	4	6.940	2.180	0.1761	0.5250	0.5385
72	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	4				0.0000	0.0000
96	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	4				0.0000	0.0000
100	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	4				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.76518	0.859	-1.3238	0.63744
Bartlett's Test indicates equal variances (p = 0.56)	1.14916	9.21034		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	24	48	33.9411	4.16667	0.09532	0.09922	0.39434	0.01306	1.0E-04	2, 9

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	25.341	5.855	0.000	28.059	-1.2909
IC10	28.094	3.029	8.744	31.272	-2.0659
IC15	30.847	2.137	19.892	34.484	-0.9906
IC20	33.600	2.006	25.907	37.696	-0.6295
IC25	36.353	1.961	29.005	40.908	-0.2662
IC40	44.612	2.275	37.233	50.993	0.1597
IC50	49.714	1.995	42.698	54.171	-0.2749



ToxCalc v5.0.23

Reviewed by: CR

Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	10/29/2019	Test ID:	4140104ppc	Sample ID:	Towamencin
End Date:	11/5/2019	Lab ID:	AAT, INC.	Sample Type:	COMPOSITE
Sample Date:		Protocol:	EPAF 94-EPA/600/4-91/002	Test Species:	PP-Pimephales promelas
Comments:					

Conc-%	1	2	3	4
Control	0.3570	0.4000	0.3730	0.4410
24	0.3440	0.3500	0.4190	0.3300
48	0.2710	0.2140	0.2390	0.2960
72	0.0000	0.0000	0.0000	0.0000
96	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

			Transform: Untransformed						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.3928	1.0000	0.3928	0.3570	0.4410	9.354	4				0.3928	1.0000
24	0.3608	0.9185	0.3608	0.3300	0.4190	11.012	4	1.207	2.180	0.0578	0.3608	0.9185
*48	0.2550	0.6493	0.2550	0.2140	0.2960	14.092	4	5.195	2.180	0.0578	0.2550	0.6493
72	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	0.0000
96	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	0.0000

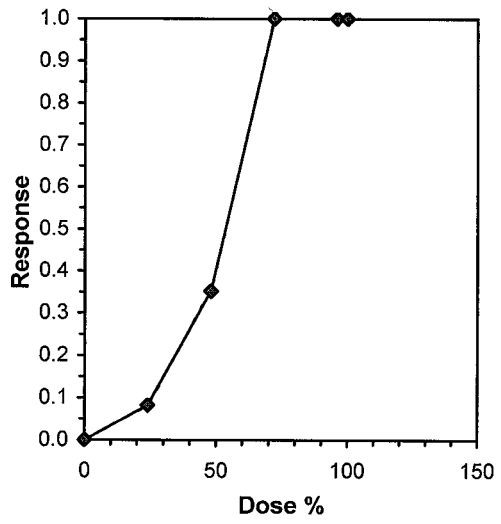
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.90708	0.859	0.6203	-0.9998
Bartlett's Test indicates equal variances (p = 0.99)	0.0295	9.21034		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	24	48	33.9411	4.16667	0.05781	0.14719	0.02079	0.00141	0.00143	2, 9
Treatments vs Control										

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05*	14.728	7.168	1.501	35.640	0.4134
IC10	25.651	5.628	5.285	35.865	-0.4063
IC15	30.108	4.479	12.949	41.315	-0.2941
IC20	34.565	4.118	20.291	46.282	0.1262
IC25	39.021	3.968	26.498	52.627	0.2409
IC40	49.821	2.047	41.575	54.399	-0.8638
IC50	53.518	1.442	48.354	57.333	-0.2400

* indicates IC estimate less than the lowest concentration



ToxCalc v5.0.23

Reviewed by: ER

Larval Fish Growth and Survival Test-48 Hr Survival

Start Date:	10/29/2019	Test ID:	4140104cdc	Sample ID:	Towamencin
End Date:	11/4/2019	Lab ID:	AAT, INC.	Sample Type:	COMPOSITE
Sample Date:		Protocol:	EPAF 94-EPA/600/4-91/002	Test Species:	PP-Pimephales promelas
Comments:					

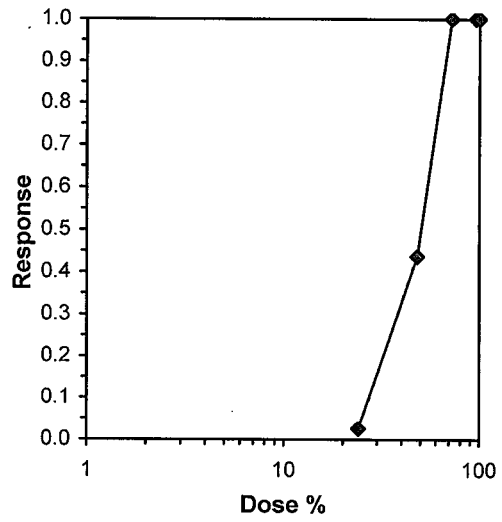
Conc-%	1	2	3	4
Control	1.0000	1.0000	0.9000	1.0000
24	1.0000	0.8000	1.0000	1.0000
48	0.6000	0.5000	0.6000	0.5000
72	0.0000	0.0000	0.0000	0.0000
96	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
Control	0.9750	1.0000	1	39	40	4			1	40
24	0.9500	0.9744	2	38	40	4	0.5000	0.0500	2	40
*48	0.5500	0.5641	18	22	40	4	0.0000	0.0500	18	40
72	0.0000	0.0000	40	0	40	4			40	40
96	0.0000	0.0000	40	0	40	4			40	40
100	0.0000	0.0000	40	0	40	4			40	40

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	24	48	33.9411	4.16667
Treatments vs Control				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%	46.384	42.090	51.117
10.0%	46.938	42.064	52.376
20.0%	48.051	41.211	56.026
Auto-2.6%	46.116	42.040	50.588



ToxCalc v5.0.23

Reviewed by: ER

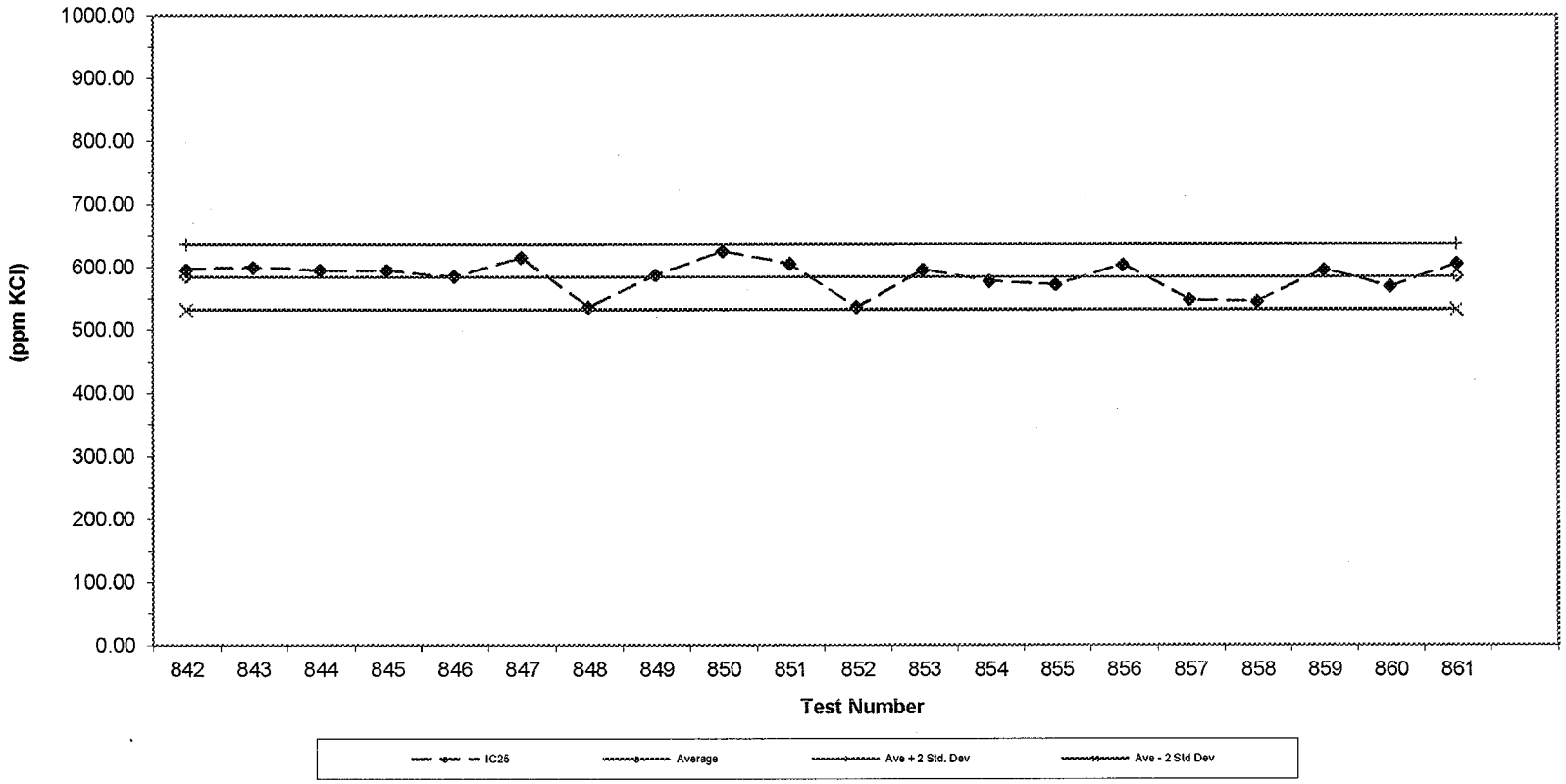
CHRONIC 2 10/29to11/05/19 +0.2 oC

Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)
10/29/19 15:55	24.78	10/31/19 7:55	25.06	11/1/19 23:55	25.17	11/3/19 14:55	25	11/5/19 6:55	25.06
10/29/19 16:25	24.83	10/31/19 8:25	25.06	11/2/19 0:25	25.17	11/3/19 15:25	25.06	11/5/19 7:25	25
10/29/19 16:55	24.83	10/31/19 8:55	25	11/2/19 0:55	25.17	11/3/19 15:55	25.06	11/5/19 7:55	25
10/29/19 17:25	24.89	10/31/19 9:25	25	11/2/19 1:25	25.17	11/3/19 16:25	25.06	11/5/19 8:25	25
10/29/19 17:55	24.94	10/31/19 9:55	25	11/2/19 1:55	25.17	11/3/19 16:55	25.06	11/5/19 8:55	24.94
10/29/19 18:25	24.94	10/31/19 10:25	24.94	11/2/19 2:25	25.17	11/3/19 17:25	25.06	11/5/19 9:25	24.94
10/29/19 18:55	25	10/31/19 10:55	24.94	11/2/19 2:55	25.17	11/3/19 17:55	25.06	11/5/19 9:55	24.94
10/29/19 19:25	25	10/31/19 11:25	24.94	11/2/19 3:25	25.17	11/3/19 18:25	25.11	11/5/19 10:25	24.94
10/29/19 19:55	24.89	10/31/19 11:55	24.94	11/2/19 3:55	25.17	11/3/19 18:55	25.11	11/5/19 10:55	24.89
10/29/19 20:25	24.78	10/31/19 12:25	24.94	11/2/19 4:25	25.17	11/3/19 19:25	25.11	11/5/19 11:25	24.89
10/29/19 20:55	24.83	10/31/19 12:55	24.94	11/2/19 4:55	25.11	11/3/19 19:55	25.06	11/5/19 11:55	24.89
10/29/19 21:25	24.94	10/31/19 13:25	24.89	11/2/19 5:25	25.11	11/3/19 20:25	25.06	11/5/19 12:25	24.89
10/29/19 21:55	24.83	10/31/19 13:55	24.94	11/2/19 5:55	25.11	11/3/19 20:55	25	11/5/19 12:55	24.89
10/29/19 22:25	24.78	10/31/19 14:25	24.94	11/2/19 6:25	25.06	11/3/19 21:25	25	11/5/19 13:25	24.94
10/29/19 22:55	24.78	10/31/19 14:55	24.94	11/2/19 6:55	25.06	11/3/19 21:55	25.06	11/5/19 13:55	24.94
10/29/19 23:25	24.78	10/31/19 15:25	24.94	11/2/19 7:25	25	11/3/19 22:25	25	11/5/19 14:25	24.83
10/29/19 23:55	24.83	10/31/19 15:55	24.89	11/2/19 7:55	25	11/3/19 22:55	25	11/5/19 14:55	24.78
10/30/19 0:25	24.89	10/31/19 16:25	24.94	11/2/19 8:25	24.94	11/3/19 23:25	25	11/5/19 15:25	24.72
10/30/19 0:55	24.94	10/31/19 16:55	24.94	11/2/19 8:55	24.94	11/3/19 23:55	25	11/5/19 15:55	24.67
10/30/19 1:25	24.94	10/31/19 17:25	24.94	11/2/19 9:25	24.94	11/4/19 0:25	25	11/5/19 16:25	24.72
10/30/19 1:55	24.94	10/31/19 17:55	24.94	11/2/19 9:55	24.94	11/4/19 0:55	25.06	11/5/19 16:55	24.72
10/30/19 2:25	24.94	10/31/19 18:25	25	11/2/19 10:25	24.94	11/4/19 1:25	25.06		
10/30/19 2:55	24.94	10/31/19 18:55	25	11/2/19 10:55	24.94	11/4/19 1:55	25.06		
10/30/19 3:25	24.94	10/31/19 19:25	25	11/2/19 11:25	24.94	11/4/19 2:25	25.06		
10/30/19 3:55	24.94	10/31/19 19:55	25	11/2/19 11:55	24.94	11/4/19 2:55	25.06		
10/30/19 4:25	24.94	10/31/19 20:25	25	11/2/19 12:25	24.89	11/4/19 3:25	25.06		
10/30/19 4:55	24.94	10/31/19 20:55	25.06	11/2/19 12:55	24.94	11/4/19 3:55	25.06		
10/30/19 5:25	24.94	10/31/19 21:25	25.06	11/2/19 13:25	24.94	11/4/19 4:25	25.06		
10/30/19 5:55	24.89	10/31/19 21:55	25.06	11/2/19 13:55	24.94	11/4/19 4:55	25.06		
10/30/19 6:25	24.89	10/31/19 22:25	24.94	11/2/19 14:25	24.94	11/4/19 5:25	25.06		
10/30/19 6:55	24.94	10/31/19 22:55	24.89	11/2/19 14:55	25	11/4/19 5:55	25.06		
10/30/19 7:25	24.94	10/31/19 23:25	24.83	11/2/19 15:25	25	11/4/19 6:25	25.06		
10/30/19 7:55	24.94	10/31/19 23:55	24.78	11/2/19 15:55	25.06	11/4/19 6:55	25.06		
10/30/19 8:25	24.94	11/1/19 0:25	24.78	11/2/19 16:25	25.06	11/4/19 7:25	25.06		
10/30/19 8:55	24.94	11/1/19 0:55	24.78	11/2/19 16:55	25.11	11/4/19 7:55	25.06		
10/30/19 9:25	24.89	11/1/19 1:25	24.89	11/2/19 17:25	25.11	11/4/19 8:25	25.06		
10/30/19 9:55	24.89	11/1/19 1:55	24.94	11/2/19 17:55	25.11	11/4/19 8:55	25.06		
10/30/19 10:25	24.83	11/1/19 2:25	24.94	11/2/19 18:25	25.11	11/4/19 9:25	25.06		
10/30/19 10:55	24.83	11/1/19 2:55	24.94	11/2/19 18:55	25.11	11/4/19 9:55	25.11		
10/30/19 11:25	24.78	11/1/19 3:25	25	11/2/19 19:25	25.11	11/4/19 10:25	25.06		
10/30/19 11:55	24.78	11/1/19 3:55	25	11/2/19 19:55	25.11	11/4/19 10:55	25.06		
10/30/19 12:25	24.78	11/1/19 4:25	25	11/2/19 20:25	25.06	11/4/19 11:25	25.06		
10/30/19 12:55	24.78	11/1/19 4:55	25	11/2/19 20:55	25.11	11/4/19 11:55	25.06		
10/30/19 13:25	24.78	11/1/19 5:25	24.94	11/2/19 21:25	25.11	11/4/19 12:25	25.06		
10/30/19 13:55	24.78	11/1/19 5:55	24.94	11/2/19 21:55	25.11	11/4/19 12:55	25.11		
10/30/19 14:25	24.78	11/1/19 6:25	24.94	11/2/19 22:25	25.11	11/4/19 13:25	25.11		
10/30/19 14:55	24.83	11/1/19 6:55	24.94	11/2/19 22:55	25.11	11/4/19 13:55	25.17		
10/30/19 15:25	24.89	11/1/19 7:25	24.89	11/2/19 23:25	25.11	11/4/19 14:25	25.17		
10/30/19 15:55	25	11/1/19 7:55	24.89	11/2/19 23:55	25.11	11/4/19 14:55	25.22		
10/30/19 16:25	25.06	11/1/19 8:25	24.89	11/3/19 0:25	25.11	11/4/19 15:25	25.22		
10/30/19 16:55	25.11	11/1/19 8:55	24.83	11/3/19 0:55	25.11	11/4/19 15:55	25.28		
10/30/19 17:25	25.11	11/1/19 9:25	24.83	11/3/19 1:25	25.11	11/4/19 16:25	25.28		
10/30/19 17:55	25.11	11/1/19 9:55	24.83	11/3/19 1:55	25.11	11/4/19 16:55	25.28		
10/30/19 18:25	25.17	11/1/19 10:25	24.83	11/3/19 1:25	25.11	11/4/19 17:25	25.33		
10/30/19 18:55	25.22	11/1/19 10:55	24.83	11/3/19 1:55	25.11	11/4/19 17:55	25.33		
10/30/19 19:25	25.17	11/1/19 11:25	24.78	11/3/19 2:25	25.11	11/4/19 18:25	25.28		
10/30/19 19:55	25.17	11/1/19 11:55	24.78	11/3/19 2:55	25.11	11/4/19 18:55	25.33		
10/30/19 20:25	25.22	11/1/19 12:25	24.78	11/3/19 3:25	25.11	11/4/19 19:25	25.39		
10/30/19 20:55	25.17	11/1/19 12:55	24.78	11/3/19 3:55	25.11	11/4/19 19:55	25.44		
10/30/19 21:25	25.17	11/1/19 13:25	24.78	11/3/19 4:25	25.11	11/4/19 20:25	25.5		
10/30/19 21:55	25.17	11/1/19 13:55	24.83	11/3/19 4:55	25.17	11/4/19 20:55	25.56		
10/30/19 22:25	25.17	11/1/19 14:25	24.83	11/3/19 5:25	25.17	11/4/19 21:25	25.61		
10/30/19 22:55	25.11	11/1/19 14:55	24.83	11/3/19 5:55	25.11	11/4/19 21:55	25.61		
10/30/19 23:25	25.11	11/1/19 15:25	24.89	11/3/19 6:25	25.11	11/4/19 22:25	25.67		
10/30/19 23:55	25.11	11/1/19 15:55	24.89	11/3/19 6:55	25.11	11/4/19 22:55	25.67		
10/31/19 0:25	25.11	11/1/19 16:25	24.89	11/3/19 7:25	25.06	11/4/19 23:25	25.5		
10/31/19 0:55	25.11	11/1/19 16:55	24.89	11/3/19 7:55	25.06	11/4/19 23:55	25.22		
10/31/19 1:25	25.11	11/1/19 17:25	24.89	11/3/19 8:25	25.06	11/5/19 0:25	25.11		
10/31/19 1:55	25.17	11/1/19 17:55	24.89	11/3/19 8:55	25	11/5/19 0:55	25.17		
10/31/19 2:25	25.17	11/1/19 18:25	24.94	11/3/19 9:25	25	11/5/19 1:25	25.17		
10/31/19 2:55	25.17	11/1/19 18:55	24.94	11/3/19 9:55	25	11/5/19 1:55	25.17		
10/31/19 3:25	25.17	11/1/19 19:25	24.94	11/3/19 10:25	24.94	11/5/19 2:25	25.17		
10/31/19 3:55	25.17	11/1/19 19:55	24.94	11/3/19 10:55	24.94	11/5/19 2:55	25.17		
10/31/19 4:25	25.17	11/1/19 20:25	24.94	11/3/19 11:25	24.94	11/5/19 3:25	25.17		
10/31/19 4:55	25.17	11/1/19 20:55	24.94	11/3/19 11:55	24.94	11/5/19 3:55	25.17		
10/31/19 5:25	25.17	11/1/19 21:25	24.94	11/3/19 12:25	24.89	11/5/19 4:25	25.17		
10/31/19 5:55	25.17	11/1/19 21:55	25	11/3/19 12:55	24.94	11/5/19 4:55	25.17		
10/31/19 6:25	25.17	11/1/19 22:25	25.06	11/3/19 13:25	24.94	11/5/19 5:25	25.11		
10/31/19 6:55	25.11	11/1/19 22:55	25.11	11/3/19 13:55	24.94	11/5/19 5:55	25.11		
10/31/19 7:25	25.06	11/1/19 23:25	25.11	11/3/19 14:25	25	11/5/19 6:25	25.06		

Quality Control Chart *Pimephales promelas*

IC_{25}

American Aquatic Testing, Inc. - Chronic Toxicity
Chart date: 11/08/19 Chart: #838



AMERICAN AQUATIC TESTING, INC.
890 North Graham St
Allentown, Pa 18109
610-434-9015

CHAIN OF CUSTODY

Job# 414-01-04
Client Towamencin Municipal
Address Lansdale, PA
Phone #

Contact
Sample Disposal — Return to Client ( ) — Lab disposal (X)

Sample #	Initial Chemistry Upon Arrival @ AAT: Temp °C	Dis O2 ppm	pH Std Unit	Alk. mg/L	Hard mg/L	Cl- mg/L	SAMPLE INFORMATION: Sample ID	Sample Type	Sample Volume	Sample Date	Sample Time	Tox Testing Req'd: Acute	Chronic	Sediment
01	3.5						FINAL	24HR COMP	3GAL	10/22-28/19	0800/0800		✓	
02	4.0						FINAL	24HR COMP	3GAL	10/29-30/19	0800/0800		✓	
03	3.0						FINAL	24HR COMP	3GAL	10/31-11/1/19	0800/0800		✓	

Sample collected by AAT personnel ( ) Client personnel (X)
Sample Rec'd on ice YES NO N/A
Sample rec'd w/in hold. Time? (YES) NO N/A
Sample container intact? (YES) NO N/A
Correct vol. for testing received? (YES) NO N/A

Sample #	Relinquished by:	Received by	Date	Time	Relinquished by:	Received by	Date	Time	Lab ISTN
01	[signature]	W. Mangan	10/28	1105	W. Mangan	[signature]	10/28	1500	192415
02	[signature]	W. Mangan	10/30	0940	W. Mangan	[signature]	10/30	1400	192452
03	[signature]	W. Mangan	11/1	1035	W. Mangan	T. Pelle	11/1	1730	192501

Special Instructions:

Dilution Water Collection Date(s): N/A

Will ammonia be analyzed on these samples? YES (NO)

Will additional parameters be analyzed on these samples? YES (NO)

3800-FM-BPNP SM0485 Rev. 10/2013
Instructions

PA39-03724

WHOLE EFFLUENT TOXICITY (WET) TEST SUMMARY REPORT - COVER SHEET

NPDES Permit Number: **PA0039004** Facility Name: **Towamencin Municipal Authority**
Species Tested: **X** ***Ceriodaphnia dubia*** _ *Pimephales promelas* Test Type: **X Chronic** __ Acute
Re-Test? ☐ Yes X No (If Yes, indicate the date of original test completion:)

SAMPLE INFORMATION

Date/Time	Sample Source	Temperature	Holding Time	Chlorine	Dechlorinated?
10/28/19, 0800	**Final effluent**	**3.5 °C**	**24 hours**	**0.04** mg/L	__Yes _x_No
10/30/19, 0800	**Final effluent**	**4.0 °C**	**24 hours**	**0.02** mg/L	__Yes _x_No
11/01/19, 0800	**Final effluent**	**3.0 °C**	**24 hours**	**0.01** mg/L	__Yes _x_No

TEST CONDITIONS

Date/Time of Test Initiation **10/29/19, 1635** Date/Time of Test Termination **11/04/19, 1710**
X Renewal Test Non-Renewal Test Frequency of Renewals: **Daily**
Dilution Series: **24, 48, 72, 96, 100%** Target Instream Waste Concentration (TIWC): **96%**
Age of Organisms at Start of Test: **<24 hours**
Number of Replicates: **10** Number of Organisms per Replicate: **1**
Source of Organisms: **In-house cultures** Feeding Regimen: **Once/day** *Selenastrum capricornutum* & YWT, at test exchange
Light Intensity: **50-100 foot-candles** Photoperiod: **16L-8D**
Temperature measurements made at least once per 24-hour period? **X Yes** Temperature Range: **24.7-25.7° C**
DO measured daily in at least one replicate of each concentration? **X Yes** (attach log sheet)
Were the chambers aerated? Yes **X** No Rate:
pH measured daily in at least one replicate of each concentration? **X Yes** (attach log sheet)
Were test acceptability criteria in the EPA method met? **X Yes** No
Were there any modifications to or deviations from EPA methods (if Yes, explain on separate sheet)? Yes **X No**

DILUTION / REAGENT WATER

USEPA moderately hard reconstituted water as per EPA-821-R-02-013 2002

Date of Last Test for Chemistry: **11/02/19** Conductivity: **295** µmhos/cm
pH: **8.1** Total Res. Cl⁻: **0** mg/L

CONTROL RESULTS

Ceriodaphnia dubia
Survival: **100 %**
Percent that produced 3 broods (if applicable): **100 %** Young per Surviving Female (if applicable): **30.2**

REFERENCE TOXICITY TESTS

Date of most recent test: **10/11/19** Same conditions as test: **X Yes** No
Were test acceptability criteria in the EPA method met? **X Yes** No

TEST RESULTS

6. The permittee must report the results of each test endpoint that has a WET limit in Part A of this permit on the Discharge Monitoring Report (DMR). Test results shall be reported on the DMR in terms of acute or chronic Toxicity Units (TUa or TUc), where TUa is used for acute tests and TUc is used for chronic tests. If DEP's WET Analysis Spreadsheet indicates a passing result for an endpoint, report the value obtained from the expression "1/TIWC", which is equivalent to the permit limit. If the Spreadsheet indicates a failure, report the value obtained from the expression "> 1/TIWC". If a dilution higher than the TIWC dilution is used for the comparison with the control, report the value obtained from the expression "1/dilution". For example, an acute test endpoint failure at a TIWC dilution of 50% would be reported as "> 2.0 TUa" (1/0.5). Taken from PADEP SOP No. BPNPSM-PMT-031, page 11

Permit language varies, questions should be directed to the DEP's Bureau of Point and Non-Point Source Management at 717-787-2137 or your regional office.

Control compared to: **TIWC X**	Other:	Toxic Unit chronic (TUc): 100%/96%	**1.04 Survival**
Survival: **X Fail**	Reproduction: **X Fail**		**1.04 Reproduction**

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein; and based on my inquiry of the individuals personally responsible for obtaining the information, I believe the attached information is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine or imprisonment as provided by 18 Pa. C.S. §4904.

Christopher J. Nally		11/14/19	**39-03724**
Name of Laboratory Manager	Signature of Laboratory Manager	Date	DEP Lab ID No.

WHOLE EFFLUENT TOXICITY (WET) TEST SUMMARY REPORT

NPDES Permit Number: **PA0039004** Facility Name: **Towamencin Municipal Authority**

Species Tested: **X** ***Ceriodaphnia dubia*** _ *Pimephales promelas* Test Type: **X Chronic** __ Acute

TEST ENDPOINT SUMMARY

Test survival NOEC: **48 %**	Test reproduction NOEC: **24%**
Test survival IC_{25}: **44.0%**	Test reproduction IC_{25}: **40.2%**
PMSD Su: N/A (No limits established; EPA833-R-02-013)	PMSD: **29.0%** Reproduction
TUa: **2.1** (Toxic Unit acute; 100%/LC_{50})	PMSD acceptable (Acceptable range 13%-47%; EPA833-R-02-013)
48 hour LC_{50}: **49.9%**	
NOEC – No Observed Effect Concentration	PMSD – Percent Minimum Significant Difference

REPRODUCTION DATA SUMMARY

Concentration	Minimum	Average/Female	C.V. %
Control	20	30.2	16.056
24%	20	29.4	17.869
48%	00	19.4	79.195
72%	00	0.0	0.000
96%	00	0.0	0.000
100%	00	0.0	0.000

Statistics	**Normality**	**Is data normal?**	**Homogeneity**	**Is data homogeneous?**	**Analysis**
Survival	Kolmogorov D	N/A	Bartlett's	N/A	Fisher's Exact
Reproduction	Kolmogorov D	Yes	Bartlett's	No	Dunnett's

PHYSICAL CHEMISTRY SUMMARY

	Temp.	**° C**	**pH**	**Std. Units**	**D. O.**	**ppm**	**Cond.**	**µmhos**
CONC.	Min	Max	Min	Max	Min	Max	Min	Max
Control	See	See	7.9	8.4	7.3	8.1	291	298
24%	Raw	Raw	7.9	8.2	7.3	8.4		
48%			7.7	8.3	6.8	8.7		
72%	Data	Data	7.6	8.2	7.3	9.0		
96%			7.6	8.1	7.0	9.1		
100%			7.5	8.1	6.9	9.2	2280	2946

REFERENCE TEST

Reference toxicant: Potassium chloride

Test Start: **10/11/19, 1400** Test terminated: **10/18/19, 1300**

Control survival: **100%**

Test NOEC: **125** ppm (Reproduction) Test #270 on attached chart

Random mortality: **0%**

Results within + /- 2standard deviations? **Yes**

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Ceriodaphnia
Endpoint	Survival
TIWC (decimal)	0.96
No. Per Replicate	1
TST b value	0.75
TST alpha value	0.2

Facility Name

Towamencin

Permit No.

PA0039004

Test Completion Date 11/4/2019

Replicate No.	Control	TIWC
1	1	0
2	1	0
3	1	0
4	1	0
5	1	0
6	1	0
7	1	0
8	1	0
9	1	0
10	1	0
11		
12		
13		
14		
15		
Mean	1.000	0.000
Std Dev.	0.000	
# Replicates	10	

T-Test Result
Deg. of Freedom
Critical T Value
Pass or Fail **FAIL**

Test Completion Date

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.000	0.000
Std Dev.		
# Replicates		

T-Test Result
Deg. of Freedom
Critical T Value
Pass or Fail

Test Completion Date

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.000	0.000
Std Dev.		
# Replicates		

T-Test Result
Deg. of Freedom
Critical T Value
Pass or Fail

Test Completion Date

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean		
Std Dev.		
# Replicates		

T-Test Result
Deg. of Freedom
Critical T Value
Pass or Fail

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Ceriodaphnia
Endpoint	Survival
TIWC (decimal)	0.96
No. Per Replicate	1
TST b value	0.75
TST alpha value	0.2

Facility Name: Towamencin

Permit No.: PA0039004

Test Completion Date: 11/4/2019

Replicate No.	Control	TIWC
1	1	0
2	1	0
3	1	0
4	1	0
5	1	0
6	1	0
7	1	0
8	1	0
9	1	0
10	1	0
11		
12		
13		
14		
15		
Mean	1.000	0.000
Std Dev.	0.000	
# Replicates	10	

T-Test Result
Deg. of Freedom
Critical T Value
Pass or Fail FAIL

Test Completion Date:

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.000	0.000
Std Dev.		
# Replicates		

T-Test Result
Deg. of Freedom
Critical T Value
Pass or Fail

Test Completion Date:

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.000	0.000
Std Dev.		
# Replicates		

T-Test Result
Deg. of Freedom
Critical T Value
Pass or Fail

Test Completion Date:

Replicate No.	Control	TIWC
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean		
Std Dev.		
# Replicates		

T-Test Result
Deg. of Freedom
Critical T Value
Pass or Fail

Project # 414-01-04

Beginning Date/Time: 10-29-19 1635
Ending Date/Time: 11/4/19 1710

Ceriodaphnia dubia Survival and Reproduction Test
American Aquatic Testing, Inc.
Survival/Reproduction Date

Day	Conc. Control		Replicate 1		2		3		4		5		6		7		8		9		10		Init
1	N	B	0		0		0		0		0		0		0		0		0		0		TAO
2	N	B	0		0		0		0		0		0		0		0		0		0		TAO
3	N	B	3	1	4	1	6	1	4	1	6	1	4	1	6	1	4	1	4	1	4	1	TAO
4	N	B	0		0		0		0		0		0		0		0		0		0		TAO
5	N	B	12	2	11	2	14	2	14	2	14	2	12	2	12	2	8	2	7	2	12	2	TAO
6	N	B	16	3	13	3	15	3	16	3	15	3	14	3	16	3	13	3	9	3	14	3	JK
7	N	B																					
8	N	B																					
	Tot N	Tot B	31	3	28	3	35	3	34	3	35	3	30	3	34	3	25	3	20	3	30	3	Tot A

Average Neonates / Female = 30.2 % Females with 3rd Brood = 100 | 10

Day	Conc. 24%		Replicate 1		2		3		4		5		6		7		8		9		10		Init
1	N	B	0		0		0		0		0		0		0		0		0		0		TAO
2	N	B	0		0		0		0		0		0		0		0		0		0		TAO
3	N	B	4	1	4	1	3	1	0		5	1	6	1	6	1	4	1	4	1	6	1	TAO
4	N	B	0		0		0		7	1	0		0		0		0		0		0		TAO
5	N	B	12	2	14	2	11	2	13	2	12	2	9	2	14	2	9	2	10	2	14	2	TAO
6	N	B	14	3	14	3	9	3	0		16	3	15	3	14	3	12	3	16	3	17	3	JK
7	N	B																					
8	N	B					(1)																
	Tot N	Tot B	30	3	32	3	~~24~~	3	20	2	33	3	30	3	34	3	25	3	30	3	37	3	Tot A

Average Neonates / Female = ~~29.5~~ (2) % Females with 3rd Brood = 90 | 10

Day	Conc. 48%		Replicate 1		2		3		4		5		6		7		8		9		10		Init
1	N	B	0		0		0		0		D	-	0		0		D	-	0		0		TAO
2	N	B	0		0		0		0		-	-	0		0		-	-	D	-	0		TAO
3	N	B	6	1	5	1	0		0		-	-	4	1	4	1	-	-	-	-	0		TAO
4	N	B	0		0		6	1	3	1	-	-	0		0		-	-	-	-	7	1	TAO
5	N	B	13	2	10	2	10	2	12	2	-	-	13	2	14	2	-	-	-	-	15	2	TAO
6	N	B	16	3	11	3	0		0		-	-	14	3	14	3	-	-	-	-	17	3	JK
7	N	B																					
8	N	B																					
	Tot N	Tot B	35	3	26	3	16	2	15	2	-	-	31	3	32	3	-	-	0	-	39	3	Tot A

Average Neonates / Female = 19.4 % Females with 3rd Brood = 50 | 7

(N= neonates, B=brood, A= Alive)

Observations (1) 23 3
(2) 29.4 3 tnd 11/11/19

Project # 414-01-04

Beginning Date/Time: 10-29-19 1635
Ending Date/Time: 11/4/19 1710

Ceriodaphnia dubia Survival and Reproduction Test
American Aquatic Testing, Inc.
Survival/Reproduction Date

Day	Conc. 72%		Replicate 1		2		3		4		5		6		7		8		9		10		Init
1	N	B	D	-	D	-	D	-	D	-	D	-	D	-	D	-	D	-	D	-	D	-	[illegible]
2	N	B																					
3	N	B																					
4	N	B																					
5	N	B																					
6	N	B																					
7	N	B																					
8	N	B																					
	Tot N	Tot B																					Tot A

Average Neonates / Female = _____ % Females with 3rd Brood = _____

Day	Conc. 96%		Replicate 1		2		3		4		5		6		7		8		9		10		Init
1	N	B	D	-	D	-	D	-	D	-	D	-	D	-	D	-	D	-	D	-	D	-	[illegible]
2	N	B																					
3	N	B																					
4	N	B																					
5	N	B																					
6	N	B																					
7	N	B																					
8	N	B																					
	Tot N	Tot B																					Tot A

Average Neonates / Female = _____ % Females with 3rd Brood = _____

Day	Conc. 100%		Replicate 1		2		3		4		5		6		7		8		9		10		Init
1	N	B	D	-	D	-	D	-	D	-	D	-	D	-	D	-	D	-	D	-	D	-	[illegible]
2	N	B																					
3	N	B																					
4	N	B																					
5	N	B																					
6	N	B																					
7	N	B																					
8	N	B																					
	Tot N	Tot B																					Tot A

Ceria Survival Reproduction 2018 blankpage

Average Neonates / Female = _____ % Females with 3rd Brood = _____

(N= neonates, B=brood, A= Alive)

Observations _____

Job Number: 414-01-04
Species: C. dubia

Start Date & Time: 10-29-19 1635
End Date & Time: 11/4/19 1710

Freshwater Chronic Test
American Aquatic Testing, Inc.
Phisical / Chemical Parameters

Initial Readings

Parameter	Concentration	Day 1	2	3	4	5	6	7	8
Dissolved Oxygen (mg/L)	Control	7.8	7.8	8.0	~~8.4~~ ①	8.0	7.9		
	24%	8.0	8.2	8.3	8.4	8.1	8.2		
	48%	8.3	8.6	8.7	8.9	8.3	8.5		
	72%	9.0	—	—	—	—	—	—	—
	96%	9.1	—	—	—	—	—	—	—
	100%	9.2	—	—	—	—	—	—	—
	—			—					
pH	Control	7.9	8.4	8.2	8.2	8.1	8.2		
	24%	7.9	8.2	7.9	8.0	8.0	8.0		
	48%	7.7	8.6	7.8	7.8	7.8	7.8		
	72%	7.6	—	—	—	—	—	—	—
	96%	7.6	—	—	—	—	—	—	—
	100%	7.5	—	—	—	—	—	—	—
	—								
	Initials	KR	JK	KR	KR	KB	KR		
	Date	10/29	10/30	10/31	11/1	11/2	11/3		

Conductivity (umhos/cm)		
Date	Control	100%
10/29	298	2280
10/31	291	2946
11-2	295	2842

Alkalinity (mg/L as CaCO3)		
Date	Control	100%
10/29	60	100
10/31	70	80
11-2	80	100

Hardness (mg/L as CaCO3)		
Date	Control	100%
10/29	100	160
10/31	90	190
11-2	100	180
Initials	KR	KR

Final Readings

Parameter	Concentration	Day 1	2	3	4	5	6	7	8
Dissolved Oxygen (mg/L)	Control	7.3	8.1	8.0	8.0	7.8	7.8		
	24%	7.3	8.0	8.1	7.9	7.8	8.1		
	48%	7.5	6.8	8.1	8.0	7.7	8.2		
	72%	7.3	—	—	—	—	—	—	—
	96%	7.0	—	—	—	—	—	—	—
	100%	6.9	—	—	—	—	—	—	—
	—								
pH	Control	8.1	8.2	8.1	8.1	8.2	8.1		
	24%	8.2	8.0	8.2	8.1	8.2	8.1		
	48%	8.3	7.9	8.1	8.1	8.2	8.1		
	72%	8.2	—	—	—	—	—	—	—
	96%	8.1	—	—	—	—	—	—	—
	100%	8.1	—	—	—	—	—	—	—
	—								
	Initials	KB	MK	KB	KB	KR	KR		
	Date	10/30	10/31	11/1	11/2	11/3	11/4		

Chlorine (mg/L)		
Date	Control	100%
10/29	0.00	0.04
10/31	0.00	0.02
11-2	0.00	0.01

NaSO4 added (mg/L)		
Date	Control	100%
Initials	MF	MF

Observations:
① 8.0 KR 10/1

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	10/29/2019	Test ID:	4140104cdc	Sample ID:	Towamencin
End Date:	11/4/2019	Lab ID:	AAT, INC.	Sample Type:	COMPOSITE
Sample Date:		Protocol:	EPAF 94-EPA/600/4-91/002	Test Species:	CD-Ceriodaphnia dubia
Comments:					

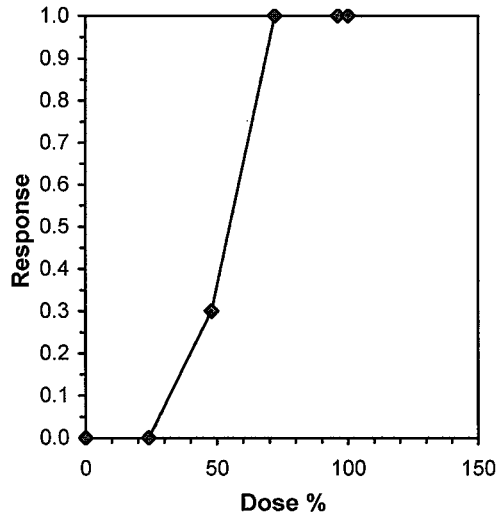
Conc-%	1	2	3	4	5	6	7	8	9	10
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
24	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
48	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	0.0000	0.0000	1.0000
72	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
96	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Isotonic Mean	Isotonic N-Mean
Control	1.0000	1.0000	0	10	10	10			1.0000	1.0000
24	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
48	0.7000	0.7000	3	7	10	10	0.1053	0.0500	0.7000	0.7000
72	0.0000	0.0000	10	0	10	10			0.0000	0.0000
96	0.0000	0.0000	10	0	10	10			0.0000	0.0000
100	0.0000	0.0000	10	0	10	10			0.0000	0.0000

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	48	72	58.7878	2.08333
Treatments vs Control				

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL		Skew
IC05	28.000	4.211	26.000	36.000	2.3769
IC10	32.000	6.691	28.000	48.000	1.1983
IC15	36.000	6.349	30.000	49.333	0.5948
IC20	40.000	6.414	32.000	50.667	0.0828
IC25	44.000	5.779	34.000	52.000	-0.2025
IC40	51.429	4.351	40.000	56.000	-0.9122
IC50	54.857	3.791	44.000	58.667	-1.1287



ToxCalc v5.0.23

Reviewed by: ER

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	10/29/2019	Test ID:	4140104cdc	Sample ID:	Towamencin
End Date:	11/4/2019	Lab ID:	AAT, INC.	Sample Type:	COMPOSITE
Sample Date:		Protocol:	EPAF 94-EPA/600/4-91/002	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-%	1	2	3	4	5	6	7	8	9	10
Control	31.000	28.000	35.000	34.000	35.000	30.000	34.000	25.000	20.000	30.000
24	30.000	32.000	23.000	20.000	33.000	30.000	34.000	25.000	30.000	37.000
48	35.000	26.000	16.000	15.000	0.000	31.000	32.000	0.000	0.000	39.000
72	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
96	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

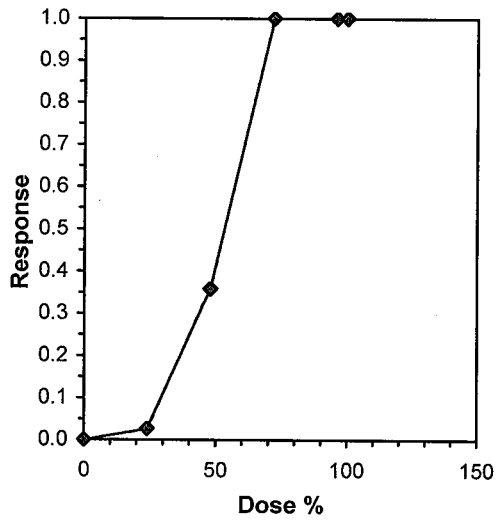
			Transform: Untransformed						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	30.200	1.0000	30.200	20.000	35.000	16.056	10				30.200	1.0000
24	29.400	0.9735	29.400	20.000	37.000	17.869	10	0.183	1.999	8.746	29.400	0.9735
*48	19.400	0.6424	19.400	0.000	39.000	79.195	10	2.468	1.999	8.746	19.400	0.6424
72	0.000	0.0000	0.000	0.000	0.000	0.000	10				0.000	0.0000
96	0.000	0.0000	0.000	0.000	0.000	0.000	10				0.000	0.0000
100	0.000	0.0000	0.000	0.000	0.000	0.000	10				0.000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9541	0.927	-0.365	0.42492
Bartlett's Test indicates unequal variances (p = 5.63E-04)	14.9653	9.21034		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	24	48	33.9411	4.16667	8.74584	0.2896	362.133	95.7185	0.03561	2, 27

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL		Skew
IC05	25.704	8.083	7.101	37.047	-0.2343
IC10	29.328	6.718	14.202	48.285	0.3741
IC15	32.952	6.685	21.303	49.603	0.7644
IC20	36.576	6.724	26.962	50.920	0.6741
IC25	40.200	6.504	30.302	52.238	0.3841
IC40	49.584	5.402	37.734	56.190	-0.3459
IC50	53.320	4.774	41.716	58.825	-0.6174



ToxCalc v5.0.23

Reviewed by: ER

Ceriodaphnia Survival and Reproduction Test-48 Hr Survival

Start Date:	10/29/2019	Test ID:	4140104cdc	Sample ID:	Towamencin
End Date:	11/4/2019	Lab ID:	AAT, INC.	Sample Type:	COMPOSITE
Sample Date:		Protocol:	EPAF 94-EPA/600/4-91/002	Test Species:	CD-Ceriodaphnia dubia
Comments:					

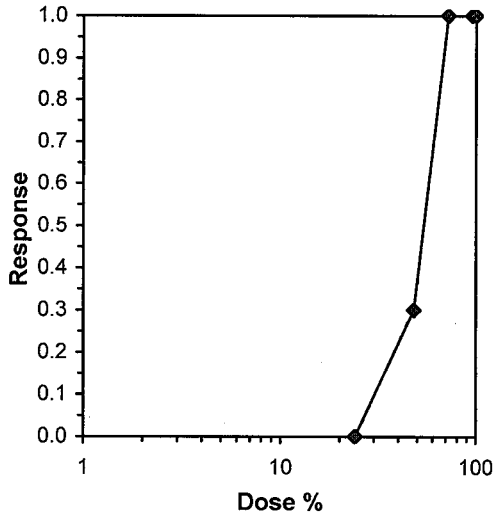
Conc-%	1	2	3	4	5	6	7	8	9	10
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
24	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
48	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	0.0000	0.0000	1.0000
72	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
96	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
Control	1.0000	1.0000	0	10	10	10			0	10
24	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0	10
48	0.7000	0.7000	3	7	10	10	0.1053	0.0500	3	10
72	0.0000	0.0000	10	0	10	10			10	10
96	0.0000	0.0000	10	0	10	10			10	10
100	0.0000	0.0000	10	0	10	10			10	10

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	48	72	58.7878	2.08333
Treatments vs Control				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	49.856	42.518	58.460
5.0%	50.751	42.405	60.740
10.0%	51.613	41.775	63.766
20.0%	53.124	38.125	74.023
Auto-0.0%	49.856	42.518	58.460



ToxCalc v5.0.23

Reviewed by: ER

CHRONIC 2 10/29to11/05/19 +0.2 oC

Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)
10/29/19 15:55	24.78	10/31/19 7:55	25.06	11/1/19 23:55	25.17	11/3/19 14:55	25	11/5/19 6:55	25.06
10/29/19 16:25	24.83	10/31/19 8:25	25.06	11/2/19 0:25	25.17	11/3/19 15:25	25.06	11/5/19 7:25	25
10/29/19 16:55	24.83	10/31/19 8:55	25	11/2/19 0:55	25.17	11/3/19 15:55	25.06	11/5/19 7:55	25
10/29/19 17:25	24.89	10/31/19 9:25	25	11/2/19 1:25	25.17	11/3/19 16:25	25.06	11/5/19 8:25	25
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10/29/19 20:25	24.78	10/31/19 12:25	24.94	11/2/19 4:25	25.17	11/3/19 19:25	25.11	11/5/19 11:25	24.89
10/29/19 20:55	24.83	10/31/19 12:55	24.94	11/2/19 4:55	25.11	11/3/19 19:55	25.06	11/5/19 11:55	24.89
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10/29/19 21:55	24.83	10/31/19 13:55	24.94	11/2/19 5:55	25.11	11/3/19 20:55	25	11/5/19 12:55	24.89
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10/29/19 22:55	24.78	10/31/19 14:55	24.94	11/2/19 6:55	25.06	11/3/19 21:55	25.06	11/5/19 13:55	24.94
10/29/19 23:25	24.78	10/31/19 15:25	24.94	11/2/19 7:25	25	11/3/19 22:25	25	11/5/19 14:25	24.83
10/29/19 23:55	24.83	10/31/19 15:55	24.89	11/2/19 7:55	25	11/3/19 22:55	25	11/5/19 14:55	24.78
10/30/19 0:25	24.89	10/31/19 16:25	24.94	11/2/19 8:25	24.94	11/3/19 23:25	25	11/5/19 15:25	24.72
10/30/19 0:55	24.94	10/31/19 16:55	24.94	11/2/19 8:55	24.94	11/3/19 23:55	25	11/5/19 15:55	24.67
10/30/19 1:25	24.94	10/31/19 17:25	24.94	11/2/19 9:25	24.94	11/4/19 0:25	25	11/5/19 16:25	24.72
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10/30/19 3:55	24.94	10/31/19 19:55	25	11/2/19 11:55	24.94	11/4/19 2:55	25.06		
10/30/19 4:25	24.94	10/31/19 20:25	25	11/2/19 12:25	24.89	11/4/19 3:25	25.06		
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10/30/19 6:55	24.94	10/31/19 22:55	24.89	11/2/19 14:55	25	11/4/19 5:55	25.06		
10/30/19 7:25	24.94	10/31/19 23:25	24.83	11/2/19 15:25	25	11/4/19 6:25	25.06		
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10/30/19 8:55	24.94	11/1/19 0:55	24.78	11/2/19 16:55	25.11	11/4/19 7:55	25.06		
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10/30/19 9:55	24.89	11/1/19 1:55	24.94	11/2/19 17:55	25.11	11/4/19 8:55	25.06		
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10/30/19 22:25	25.17	11/1/19 14:25	24.83	11/3/19 5:25	25.17	11/4/19 21:25	25.61		
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10/31/19 4:55	25.17	11/1/19 20:55	24.94	11/3/19 11:55	24.94	11/5/19 3:55	25.17		
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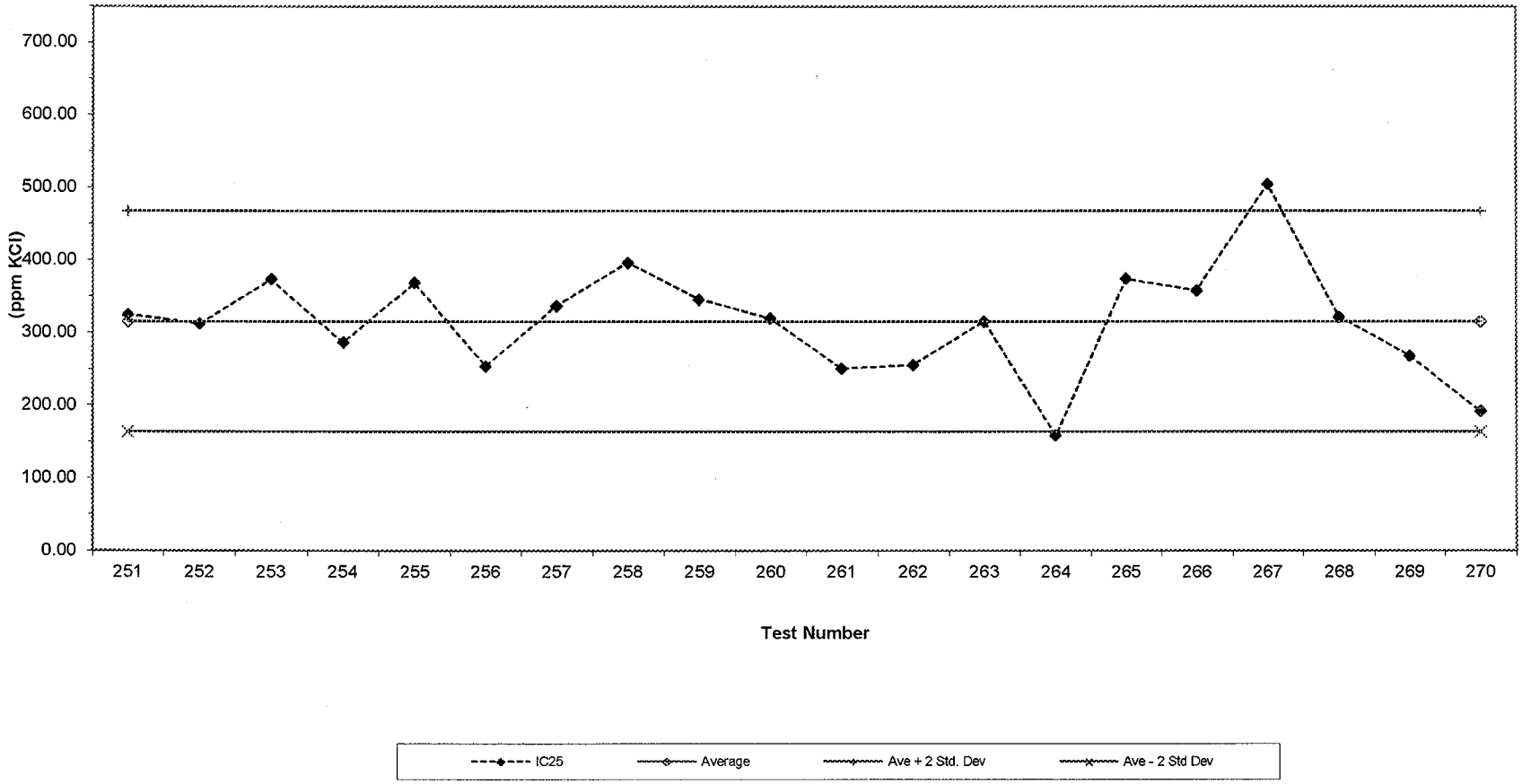
10/31/19 5:55	25.17	11/1/19 21:55	25	11/3/19 12:55	24.94	11/5/19 4:55	25.17		
10/31/19 6:25	25.17	11/1/19 22:25	25.06	11/3/19 13:25	24.94	11/5/19 5:25	25.11		
10/31/19 6:55	25.11	11/1/19 22:55	25.11	11/3/19 13:55	24.94	11/5/19 5:55	25.11		
10/31/19 7:25	25.06	11/1/19 23:25	25.11	11/3/19 14:25	25	11/5/19 6:25	25.06		

Quality Control Chart *Ceriodaphnia dubia*

IC25

American Aquatic Testing, Inc. - Chronic Toxicity
Chart date: 10/21/19 Chart #: 256