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?
06/03/19, 0800	**Final effluent**	**5.0 °C**	**24 hours**	**0.00** mg/L	__Yes _x_No
06/05/19, 0800	**Final effluent**	**5.0 °C**	**24 hours**	**0.05** mg/L	__Yes _x_No
06/07/19, 0800	**Final effluent**	**5.0 °C**	**24 hours**	**0.01** mg/L	__Yes _x_No

TEST CONDITIONS

Date/Time of Test Initiation **06/04/19, 1515** Date/Time of Test Termination **06/11/19, 1415**
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: **24.7-26.1° 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: **06/08/19** Conductivity: **305** µmhos/cm
pH: **8.0** Total Res. Cl^-: **0** mg/L

CONTROL RESULTS

Pimephales promelas
Survival: **95 %**
Mean Dry Weight of Survivors (if applicable): **0.3670 mg**

REFERENCE TOXICITY TESTS

Date of most recent test: **06/04/19** 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 Pass**	Reproduction: **X Pass**		**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		06/21/19	**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: **100 %**	Test growth NOEC: **100%**
Test survival IC_{25}: **>100%**	Test growth IC_{25}: **>100%**
PMSD Su: 6.4% (No limits established; EPA833-R-02-013)	PMSD: **17.0%** Growth
TUa: **1.0** (Toxic Unit acute; 100%/LC_{50})	PMSD acceptable (Acceptable range 12%-30%; EPA833-R-02-013)
48 hour LC_{50}: **>100%**	
NOEC – No Observed Effect Concentration	PMSD – Percent Minimum Significant Difference

SURVIVAL / GROWTH DATA SUMMARY

Concentration	Ave. % Survival	Ave. Weight - mg	C.V. % Weight
Control	95	0.3670	9.127
24%	100	0.3293	6.107
48%	95	0.3718	4.503
72%	92.5	0.2973	16.307
96%	90	0.3423	12.300
100%	100	0.3348	13.662

Statistics	Normality	Is data normal?	Homogeneity	Is data homogeneous?	Analysis
Survival	Shapiro-Wilk's	No	Bartlett's	No	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	8.3	6.0	8.0	304	308
24%			7.9	8.1	5.9	8.1		
48%	Raw	Raw	7.7	8.0	5.8	8.5		
72%			7.7	8.0	5.8	8.8		
96%	Data	Data	7.6	7.9	5.5	9.0		
100%			7.6	7.9	5.8	9.9	1846	3740

REFERENCE TEST

Reference toxicant: Potassium chloride

Test Start: **06/04/19, 1515** Test terminated: **06/11/19, 1415**

Control survival: **100%**

Test NOEC: **250** ppm (Growth) Test #844 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 6/11/2019

Replicate No.	Control	TIWC
1	9	9
2	10	9
3	10	9
4	9	9
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	9.500	9.000
Std Dev.	0.577	0.000
# Replicates	4	4

T-Test Result	7.1179
Deg. of Freedom	3
Critical T Value	0.7649
Pass or Fail	PASS

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 6/11/2019

Replicate No.	Control	TIWC
1	0.33	0.305
2	0.409	0.368
3	0.354	0.388
4	0.375	0.308
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.367	0.342
Std Dev.	0.033	0.042
# Replicates	4	4

T-Test Result	2.7333
Deg. of Freedom	5
Critical T Value	0.7267
Pass or Fail	PASS

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: 4/4
Project Number: 01-03
Species: P. promelas

Beginning Date & Time: 6/4/19 1515
Ending Date & Time: 6/11/19 1415
Hatch Date: 6/4/19

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	9'	9	9	9	9
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	9'	9
24	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
48	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	10	10
	D	10	10	9	9	9	9	9	9
72	A	10	10	10	10	10	10	9	9
	B	10	10	10	10	9'	9	9	9
	C	10	9'	9	9	9	9	9	9
	D	10	10	10	10	10	10	10	10
96	A	10	10	10	10	10	10	10	9'
	B	10	10	10	10	9	9	9	9
	C	10	10	10	9'	9	9	9	9
	D	10	10	10	10	9'	9	9	9
100	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
	A								
	B								
	C								
	D								
Initials		JO	BR	JK	JK	JID	thd	MK	MK
Date		6/4	6/5	6/6	6/7	6/8	6/9	6/10	6/11

Observations:

CHFHLC.wk3

Client/Toxicant: 414
Project Number: 01-03
Species: P promelas

Beginning Date & Time: 6/4/19 1515
Ending Date & Time: 6/11/19 1415
Hatch Date: 6/4/19

Chronic Test

American Aquatic Testing, Inc.

Weight Data

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	0.00784	0.01114	3.30	9	0.367	0.330
	B	2	0.00798	0.01207	4.09	10	0.409	0.409
	C	3	0.00883	0.01237	3.54	10	0.354	0.354
	D	4	0.01006	0.01381	3.75	9	0.417	0.375
24	A	5	0.00894	0.01197	3.03	10		0.303
	B	6	0.00953	0.01280	3.27	10		0.327
	C	7	0.00906	0.01242	3.36	10		0.336
	D	8	0.00965	0.01316	3.51	10		0.351
48	A	9	0.00815	0.01193	3.78	10		0.378
	B	10	0.00831	0.01178	3.47	9		0.347
	C	11	0.00883	0.01261	3.78	10		0.378
	D	12	0.00988	0.01372	3.84	9		0.384
72	A	13	0.00886	0.01125	2.39	9		0.239
	B	14	0.00934	0.01249	3.15	9		0.315
	C	15	0.00879	0.01161	2.82	9		0.282
	D	16	0.00952	0.01305	3.53	10		0.353
96	A	17	0.00918	0.01223	3.05	9		0.305
	B	18	0.00911	0.01279	3.68	9		0.368
	C	19	0.00919	0.01307	3.88	9		0.388
	D	20	0.01058	0.01366	3.08	9		0.308
100	A	21	0.00948	0.01238	2.90	10		0.290
	B	22	0.00978	0.01281	3.03	10		0.303
	C	23	0.00982	0.01342	3.60	10		0.360
	D	23	0.01036	0.01422	3.86	10		0.386
	A							
	B							
	C							
	D							
	Initials		thd	thd	thd	MK	thd	thd
	Date		6/11/19	6/12/19	6/12/19	6/11	6/12/19	6/12/19

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

Observations:

Date/Time In: 6-11-19 1415
Temp: 105°

Date/Time Out: 6/12/19 6:00
Temp: 105°

CHPHWT.wk3

Job Number: 414-01-03
Species: P. promelas

Start Date & Time: 6/4/19 1515
End Date & Time: 6/11/19 1415

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	7.9	8.0	7.9	7.9	7.7	7.9	8.0	
	24%	8.1	8.0	8.1	8.0	7.8	8.0	8.0	
	48%	8.4	8.5	8.3	8.2	7.9	8.1	8.1	
	72%	8.7	8.8	8.6	8.6	8.1	8.4	8.2	
	96%	8.7	9.0	8.9	8.8	8.3	8.6	8.9	
	100%	9.5	9.9	9.8	9.8	8.5	8.9	9.1	
	—								
pH	Control	8.0	8.0	8.2	8.3	8.0	8.0	8.1	
	24%	7.9	8.0	8.0	8.0	8.0	8.0	8.0	
	48%	7.8	7.9	7.9	8.0	8.0	8.0	7.9	
	72%	7.7	7.9	7.9	7.9	8.0	7.9	7.8	
	96%	7.7	7.9	7.8	7.8	7.9	7.9	7.8	
	100%	7.7	7.8	7.8	7.8	7.8	7.9	7.8	
	—								
	Initials	JK	MF	BR	JO	MF	MF	MK	
	Date	6/4	6-5	6/6	6/7	6-8	6-9	6/10	

Conductivity (umhos/cm)		
Date	Control	100%
6/4	308	1846
6/6	304	3388
6-8	305	3740

Alkalinity (mg/L as CaCO3)		
Date	Control	100%
6/4	60	110
6/6	70	120
6-8	70	120

Hardness (mg/L as CaCO3)		
Date	Control	100%
6/4	90	150
6/6	90	210
6-8	90	250
Initials	JK	JK

Final Readings

Parameter	Concentration	Day 1	2	3	4	5	6	7	8
Dissolved Oxygen (mg/L)	Control	7.3	6.0	6.5	6.6	7.7	6.8	7.2	
	24%	6.9	5.9	6.6	6.7	7.7	7.0	7.2	
	48%	6.9	5.8	6.4	6.7	7.4	7.1	7.4	
	72%	7.0	5.8	6.5	6.8	7.4	6.9	7.4	
	96%	7.1	5.5	6.5	6.7	7.4	6.9	7.6	
	100%	7.2	5.8	6.6	6.8	7.5	6.8	7.4	
	—								
pH	Control	8.0	8.1	8.0	7.9	8.2	8.2	8.0	
	24%	7.9	8.0	7.9	7.9	8.1	8.0	7.9	
	48%	7.9	7.9	7.9	7.8	8.0	7.9	7.7	
	72%	7.9	7.9	7.9	7.8	7.9	7.9	7.7	
	96%	7.9	7.8	7.8	7.7	7.9	7.9	7.6	
	100%	7.9	7.8	7.7	7.7	7.9	7.9	7.6	
	—								
	Initials	MF	JO	JK	MF	MF	MK	MK	
	Date	6/5	6/6	6/7	6-8	6/9	6/10	6/11	

Chlorine (mg/L)		
Date	Control	100%
6/4	~~0.00~~ ②	0.00
6/6	0.00	0.05
6-8	0.00	0.01

NaSO4 added (mg/L)		
Date	Control	100%
~~6/4~~	~~0.00~~	
Initials	JO	MF

Observations:
① 8.3 - MF 6-5-19
② 0.00 BR 6/4

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	6/4/2019	Test ID:	4140103ppc	Sample ID:	Towamencin
End Date:	6/11/2019	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	0.9000	1.0000	1.0000	0.9000
24	1.0000	1.0000	1.0000	1.0000
48	1.0000	0.9000	1.0000	0.9000
72	0.9000	0.9000	0.9000	1.0000
96	0.9000	0.9000	0.9000	0.9000
100	1.0000	1.0000	1.0000	1.0000

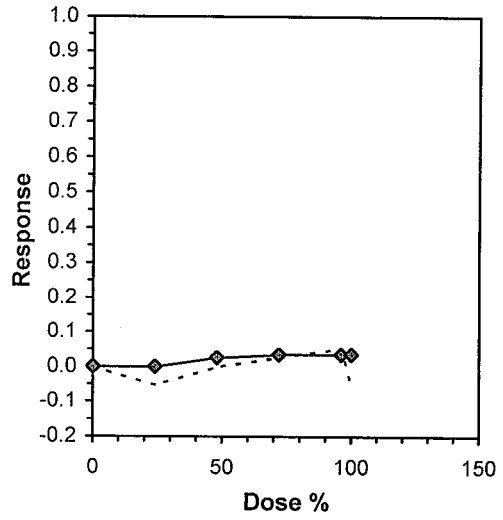
			Transform: Arcsin Square Root						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9500	1.0000	1.3305	1.2490	1.4120	7.072	4				0.9750	1.0000
24	1.0000	1.0526	1.4120	1.4120	1.4120	0.000	4	-1.809	2.410	0.1086	0.9750	1.0000
48	0.9500	1.0000	1.3305	1.2490	1.4120	7.072	4	0.000	2.410	0.1086	0.9500	0.9744
72	0.9250	0.9737	1.2898	1.2490	1.4120	6.318	4	0.905	2.410	0.1086	0.9417	0.9658
96	0.9000	0.9474	1.2490	1.2490	1.2490	0.000	4	1.809	2.410	0.1086	0.9417	0.9658
100	1.0000	1.0526	1.4120	1.4120	1.4120	0.000	4	-1.809	2.410	0.1086	0.9417	0.9658

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.86888	0.916	0.43021	-0.1642
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	0.06019	0.06381	0.01704	0.00406	0.0105	5, 18
Treatments vs Control										

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



ToxCalc v5.0.23

Reviewed by: EK

Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	6/4/2019	Test ID:	4140103ppc	Sample ID:	Towamencin
End Date:	6/11/2019	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	0.3300	0.4090	0.3540	0.3750
24	0.3030	0.3270	0.3360	0.3510
48	0.3780	0.3470	0.3780	0.3840
72	0.2390	0.3150	0.2820	0.3530
96	0.3050	0.3680	0.3880	0.3080
100	0.2900	0.3030	0.3600	0.3860

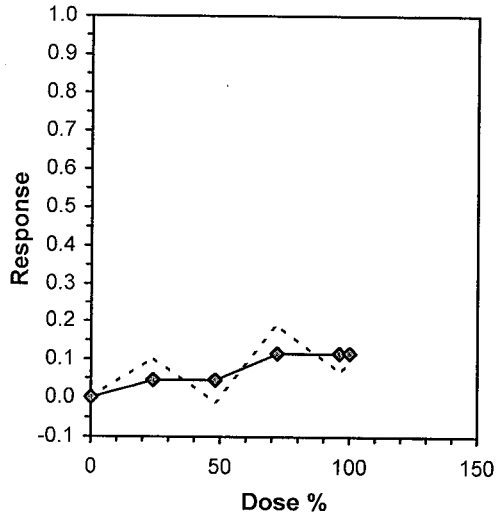
			Transform: Untransformed						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.3670	1.0000	0.3670	0.3300	0.4090	9.127	4				0.3670	1.0000
24	0.3293	0.8971	0.3293	0.3030	0.3510	6.107	4	1.460	2.410	0.0623	0.3505	0.9550
48	0.3718	1.0129	0.3718	0.3470	0.3840	4.503	4	-0.184	2.410	0.0623	0.3505	0.9550
*72	0.2973	0.8099	0.2973	0.2390	0.3530	16.307	4	2.698	2.410	0.0623	0.3248	0.8849
96	0.3423	0.9326	0.3423	0.3050	0.3880	12.300	4	0.957	2.410	0.0623	0.3248	0.8849
100	0.3348	0.9121	0.3348	0.2900	0.3860	13.662	4	1.247	2.410	0.0623	0.3248	0.8849

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96407	0.916	0.04086	-0.9634
Bartlett's Test indicates equal variances (p = 0.50)	4.35351	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	100	>100		1	0.0623	0.16976	0.00297	0.00134	0.09688	5, 18

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	49.724			
IC10	66.827			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



ToxCalc v5.0.23

Reviewed by: ER

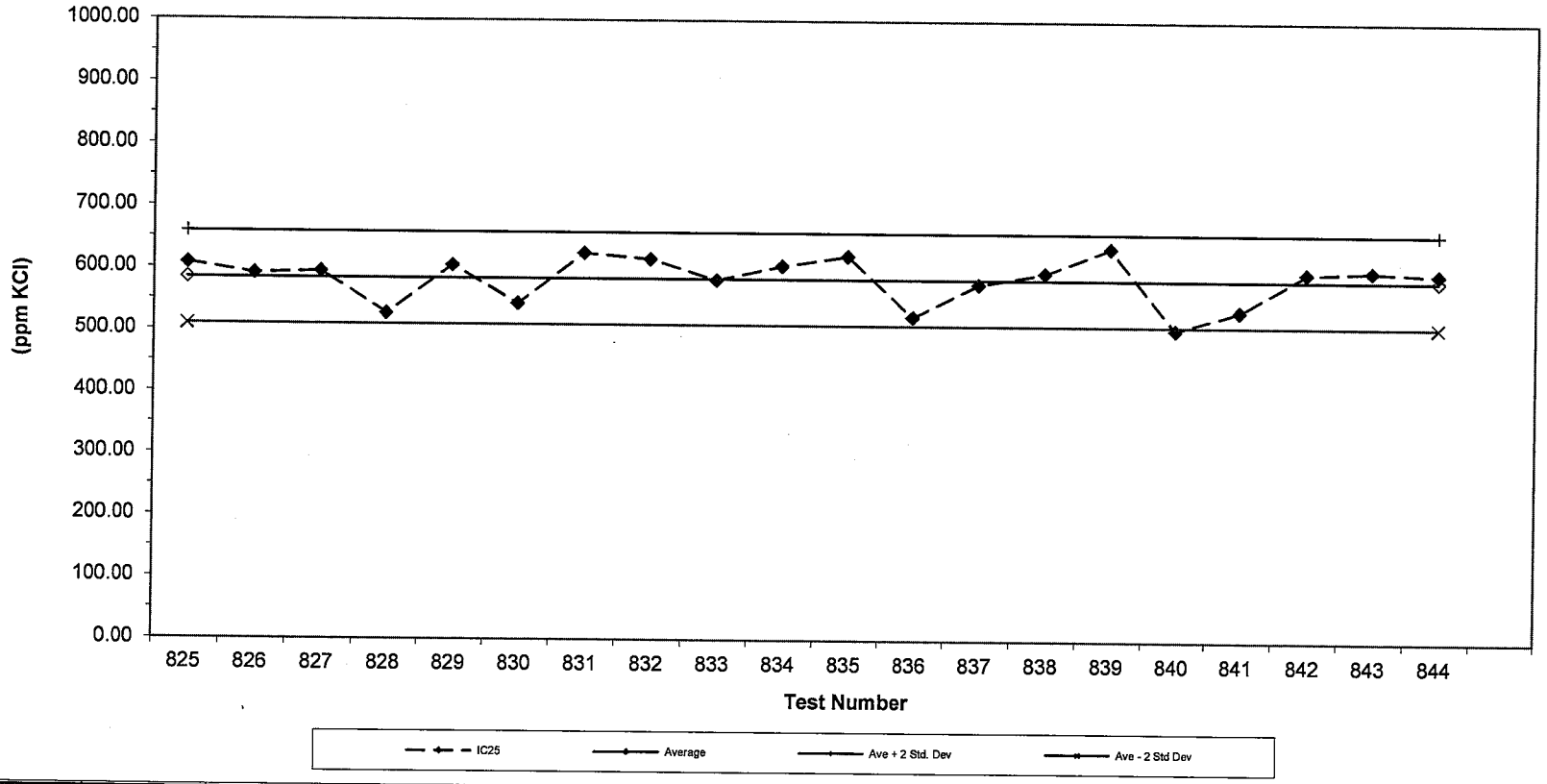
CHRONIC 1 06/04 to 11/19 +0.3 oC

Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)
6/4/19 12:22	25.44	6/6/19 4:22	25.06	6/7/19 20:22	25.56	6/9/19 12:22	25.89	6/11/19 4:22	25.06
6/4/19 12:52	25.5	6/6/19 4:52	25	6/7/19 20:52	25.56	6/9/19 12:52	25.89	6/11/19 4:52	25.06
6/4/19 13:22	25.44	6/6/19 5:22	25	6/7/19 21:22	25.56	6/9/19 13:22	25.89	6/11/19 5:22	25
6/4/19 13:52	25.39	6/6/19 5:52	25	6/7/19 21:52	25.56	6/9/19 13:52	25.83	6/11/19 5:52	25
6/4/19 14:22	25.33	6/6/19 6:22	25	6/7/19 22:22	25.56	6/9/19 14:22	25.78	6/11/19 6:22	25
6/4/19 14:52	25.39	6/6/19 6:52	25.06	6/7/19 22:52	25.5	6/9/19 14:52	25.78	6/11/19 6:52	25.06
6/4/19 15:22	25.39	6/6/19 7:22	25.06	6/7/19 23:22	25.44	6/9/19 15:22	25.83	6/11/19 7:22	25.11
6/4/19 15:52	25.39	6/6/19 7:52	25.11	6/7/19 23:52	25.33	6/9/19 15:52	25.72	6/11/19 7:52	25.17
6/4/19 16:22	25.39	6/6/19 8:22	25.17	6/8/19 0:22	25.28	6/9/19 16:22	25.67	6/11/19 8:22	25.17
6/4/19 16:52	25.44	6/6/19 8:52	25.22	6/8/19 0:52	25.17	6/9/19 16:52	25.56	6/11/19 8:52	25.22
6/4/19 17:22	25.44	6/6/19 9:22	25.22	6/8/19 1:22	25.11	6/9/19 17:22	25.44	6/11/19 9:22	25.22
6/4/19 17:52	25.33	6/6/19 9:52	25.28	6/8/19 1:52	25.06	6/9/19 17:52	25.44	6/11/19 9:52	25.28
6/4/19 18:22	25.28	6/6/19 10:22	25.44	6/8/19 2:22	25	6/9/19 18:22	25.39	6/11/19 10:22	25.33
6/4/19 18:52	25.22	6/6/19 10:52	25.56	6/8/19 2:52	24.94	6/9/19 18:52	25.33	6/11/19 10:52	25.39
6/4/19 19:22	25.11	6/6/19 11:22	25.72	6/8/19 3:22	24.94	6/9/19 19:22	25.33	6/11/19 11:22	25.5
6/4/19 19:52	25.06	6/6/19 11:52	25.83	6/8/19 3:52	24.94	6/9/19 19:52	25.28	6/11/19 11:52	25.61
6/4/19 20:22	25.06	6/6/19 12:22	25.83	6/8/19 4:22	24.89	6/9/19 20:22	25.28	6/11/19 12:22	25.78
6/4/19 20:52	25	6/6/19 12:52	25.83	6/8/19 4:52	24.89	6/9/19 20:52	25.28	6/11/19 12:52	25.83
6/4/19 21:22	25	6/6/19 13:22	25.78	6/8/19 5:22	24.83	6/9/19 21:22	25.28	6/11/19 13:22	25.89
6/4/19 21:52	24.94	6/6/19 13:52	25.78	6/8/19 5:52	24.89	6/9/19 21:52	25.22	6/11/19 13:52	25.89
6/4/19 22:22	25	6/6/19 14:22	25.83	6/8/19 6:22	24.89	6/9/19 22:22	25.28	6/11/19 14:22	25.94
6/4/19 22:52	24.94	6/6/19 14:52	25.89	6/8/19 6:52	24.89	6/9/19 22:52	25.22	6/11/19 14:52	26
6/4/19 23:22	24.89	6/6/19 15:22	25.83	6/8/19 7:22	24.94	6/9/19 23:22	25.17	6/11/19 15:22	26
6/4/19 23:52	24.89	6/6/19 15:52	25.78	6/8/19 7:52	25.06	6/9/19 23:52	25.11	6/11/19 15:52	26
6/5/19 0:22	24.83	6/6/19 16:22	25.78	6/8/19 8:22	25.06	6/10/19 0:22	25	6/11/19 16:22	26
6/5/19 0:52	24.83	6/6/19 16:52	25.72	6/8/19 8:52	25.22	6/10/19 0:52	24.89	6/11/19 16:52	26.06
6/5/19 1:22	24.78	6/6/19 17:22	25.67	6/8/19 9:22	25.33	6/10/19 1:22	24.83	6/11/19 17:22	26
6/5/19 1:52	24.78	6/6/19 17:52	25.61	6/8/19 9:52	25.44	6/10/19 1:52	24.78	6/11/19 17:52	25.89
6/5/19 2:22	24.72	6/6/19 18:22	25.61	6/8/19 10:22	25.61	6/10/19 2:22	24.72	6/11/19 18:22	25.83
6/5/19 2:52	24.67	6/6/19 18:52	25.61	6/8/19 10:52	25.78	6/10/19 2:52	24.72	6/11/19 18:52	25.78
6/5/19 3:22	24.67	6/6/19 19:22	25.61	6/8/19 11:22	26	6/10/19 3:22	24.67		
6/5/19 3:52	24.67	6/6/19 19:52	25.61	6/8/19 11:52	26.06	6/10/19 3:52	24.67		
6/5/19 4:22	24.67	6/6/19 20:22	25.56	6/8/19 12:22	26.11	6/10/19 4:22	24.67		
6/5/19 4:52	24.67	6/6/19 20:52	25.56	6/8/19 12:52	26.06	6/10/19 4:52	24.61		
6/5/19 5:22	24.67	6/6/19 21:22	25.61	6/8/19 13:22	25.94	6/10/19 5:22	24.61		
6/5/19 5:52	24.67	6/6/19 21:52	25.56	6/8/19 13:52	25.89	6/10/19 5:52	24.56		
6/5/19 6:22	24.67	6/6/19 22:22	25.5	6/8/19 14:22	25.94	6/10/19 6:22	24.56		
6/5/19 6:52	24.67	6/6/19 22:52	25.5	6/8/19 14:52	25.94	6/10/19 6:52	24.56		
6/5/19 7:22	24.72	6/6/19 23:22	25.44	6/8/19 15:22	25.94	6/10/19 7:22	24.61		
6/5/19 7:52	24.78	6/6/19 23:52	25.33	6/8/19 15:52	25.94	6/10/19 7:52	24.61		
6/5/19 8:22	24.83	6/7/19 0:22	25.28	6/8/19 16:22	25.94	6/10/19 8:22	24.67		
6/5/19 8:52	24.83	6/7/19 0:52	25.22	6/8/19 16:52	25.89	6/10/19 8:52	24.72		
6/5/19 9:22	24.94	6/7/19 1:22	25.17	6/8/19 17:22	25.83	6/10/19 9:22	24.72		
6/5/19 9:52	25.11	6/7/19 1:52	25.11	6/8/19 17:52	25.78	6/10/19 9:52	24.83		
6/5/19 10:22	25.33	6/7/19 2:22	25.06	6/8/19 18:22	25.72	6/10/19 10:22	25		
6/5/19 10:52	25.5	6/7/19 2:52	25	6/8/19 18:52	25.61	6/10/19 10:52	25.17		
6/5/19 11:22	25.56	6/7/19 3:22	25	6/8/19 19:22	25.56	6/10/19 11:22	25.22		
6/5/19 11:52	25.61	6/7/19 3:52	24.94	6/8/19 19:52	25.5	6/10/19 11:52	25.33		
6/5/19 12:22	25.67	6/7/19 4:22	24.94	6/8/19 20:22	25.5	6/10/19 12:22	25.06		
6/5/19 12:52	25.67	6/7/19 4:52	24.94	6/8/19 20:52	25.44	6/10/19 12:52	25.33		
6/5/19 13:22	25.61	6/7/19 5:22	24.94	6/8/19 21:22	25.39	6/10/19 13:22	25.39		
6/5/19 13:52	25.5	6/7/19 5:52	24.89	6/8/19 21:52	25.39	6/10/19 13:52	25.44		
6/5/19 14:22	25.44	6/7/19 6:22	24.89	6/8/19 22:22	25.33	6/10/19 14:22	25.5		
6/5/19 14:52	25.5	6/7/19 6:52	24.94	6/8/19 22:52	25.33	6/10/19 14:52	25.56		
6/5/19 15:22	25.5	6/7/19 7:22	25	6/8/19 23:22	25.22	6/10/19 15:22	25.72		
6/5/19 15:52	25.56	6/7/19 7:52	25.06	6/8/19 23:52	25.17	6/10/19 15:52	25.83		
6/5/19 16:22	25.61	6/7/19 8:22	25.06	6/9/19 0:22	25.11	6/10/19 16:22	25.89		
6/5/19 16:52	25.61	6/7/19 8:52	25.11	6/9/19 0:52	25.06	6/10/19 16:52	25.89		
6/5/19 17:22	25.56	6/7/19 9:22	25.11	6/9/19 1:22	25	6/10/19 17:22	25.89		
6/5/19 17:52	25.5	6/7/19 9:52	25.17	6/9/19 1:52	24.94	6/10/19 17:52	25.89		
6/5/19 18:22	25.44	6/7/19 10:22	25.33	6/9/19 2:22	24.89	6/10/19 18:22	25.89		
6/5/19 18:52	25.44	6/7/19 10:52	25.44	6/9/19 2:52	24.83	6/10/19 18:52	25.89		
6/5/19 19:22	25.44	6/7/19 11:22	25.56	6/9/19 3:22	24.78	6/10/19 19:22	25.83		
6/5/19 19:52	25.44	6/7/19 11:52	25.67	6/9/19 3:52	24.72	6/10/19 19:52	25.78		
6/5/19 20:22	25.44	6/7/19 12:22	25.72	6/9/19 4:22	24.72	6/10/19 20:22	25.72		
6/5/19 20:52	25.44	6/7/19 12:52	25.78	6/9/19 4:52	24.67	6/10/19 20:52	25.72		
6/5/19 21:22	25.5	6/7/19 13:22	25.78	6/9/19 5:22	24.67	6/10/19 21:22	25.72		
6/5/19 21:52	25.5	6/7/19 13:52	25.72	6/9/19 5:52	24.67	6/10/19 21:52	25.67		
6/5/19 22:22	25.44	6/7/19 14:22	25.78	6/9/19 6:22	24.67	6/10/19 22:22	25.67		
6/5/19 22:52	25.44	6/7/19 14:52	25.83	6/9/19 6:52	24.67	6/10/19 22:52	25.61		
6/5/19 23:22	25.39	6/7/19 15:22	25.89	6/9/19 7:22	24.83	6/10/19 23:22	25.56		
6/5/19 23:52	25.33	6/7/19 15:52	25.89	6/9/19 7:52	24.94	6/10/19 23:52	25.5		
6/6/19 0:22	25.28	6/7/19 16:22	25.94	6/9/19 8:22	25.11	6/11/19 0:22	25.44		
6/6/19 0:52	25.22	6/7/19 16:52	25.89	6/9/19 8:52	25.22	6/11/19 0:52	25.39		
6/6/19 1:22	25.17	6/7/19 17:22	25.83	6/9/19 9:22	25.39	6/11/19 1:22	25.28		
6/6/19 1:52	25.17	6/7/19 17:52	25.78	6/9/19 9:52	25.5	6/11/19 1:52	25.28		
6/6/19 2:22	25.11	6/7/19 18:22	25.72	6/9/19 10:22	25.61	6/11/19 2:22	25.22		
6/6/19 2:52	25.06	6/7/19 18:52	25.67	6/9/19 10:52	25.72	6/11/19 2:52	25.17		
6/6/19 3:22	25.06	6/7/19 19:22	25.61	6/9/19 11:22	25.72	6/11/19 3:22	25.11		
6/6/19 3:52	25.06	6/7/19 19:52	25.61	6/9/19 11:52	25.83	6/11/19 3:52	25.11		

Quality Control Chart *Pimephales promelas*

IC_{25}

American Aquatic Testing, Inc. - Chronic Toxicity
Chart date: 06/13/09 Chart: #821



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

CHAIN OF CUSTODY

Job# 414-01-03
Client Towamencin MUA
Address Landsdale, 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	5.0						Final	24hr comp	5 gal	6-2/3-19	0800-0800		✓	
02	5.0						Final	24 hr. comp	5 gal	6/45/19	0800-0800		✓	
03	5.0						Final	24 hr. comp	6 gals.	6/6-7/19	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	Michael Weber	[signature]	6-3-19	1115	[signature]	[signature]	6-3-19	1400	191203
02	Michael Weber	B E R	6/5/19	1115	B E R	[signature]	6/5/19	1345	191217
03	Michael Weber	B E R	6/7/19	1055	B E R	[signature]	6/7/19	1315	191233

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?
06/03/19, 0800	**Final effluent**	**5.0 °C**	**24 hours**	**0.00** mg/L	__Yes _x_No
06/05/19, 0800	**Final effluent**	**5.0 °C**	**24 hours**	**0.05** mg/L	__Yes _x_No
06/07/19, 0800	**Final effluent**	**5.0 °C**	**24 hours**	**0.01** mg/L	__Yes _x_No

TEST CONDITIONS

Date/Time of Test Initiation **06/04/19, 1515** Date/Time of Test Termination **06/11/19, 1415**
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: **24.7-26.1° 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: **06/08/19** Conductivity: **305** µmhos/cm
pH: **8.0** 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): **24.5**

REFERENCE TOXICITY TESTS

Date of most recent test: **05/22/19** 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 Pass**	Reproduction: **X Pass**		**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	Christopher Nally	06/21/19	**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: **100 %**	Test reproduction NOEC: **100%**
Test survival IC_{25}: **>100%**	Test reproduction IC_{25}: **>100%**
PMSD Su: N/A (No limits established; EPA833-R-02-013)	PMSD: **28.4%** Reproduction
TUa: **1.0** (Toxic Unit acute; 100%/LC_{50})	PMSD acceptable (Acceptable range 13%-47%; EPA833-R-02-013)
48 hour LC_{50}: **>100%**	
NOEC – No Observed Effect Concentration	PMSD – Percent Minimum Significant Difference

REPRODUCTION DATA SUMMARY

Concentration	Minimum	Average/Female	C.V. %
Control	21	24.5	10.406
24%	10	25.2	24.519
48%	0	20.8	39.826
72%	14	24.3	25.593
96%	4	21.9	30.853
100%	0	19.2	46.830

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	No	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	8.0	8.3	6.6	8.0	304	308
24%	Raw	Raw	7.9	8.2	6.7	8.1		
48%			7.8	8.1	6.5	8.4		
72%	Data	Data	7.7	8.1	6.5	8.8		
96%			7.7	8.1	6.4	9.0		
100%			7.7	8.1	6.5	9.9	1846	3740

REFERENCE TEST

Reference toxicant: Potassium chloride

Test Start: **05/22/19, 1310** Test terminated: **05/28/19, 1210**

Control survival: **100%**

Test NOEC: **250** ppm (Reproduction) Test #266 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: 6/10/2019

Replicate No.	Control	TIWC
1	1	1
2	1	1
3	1	1
4	1	0
5	1	1
6	1	1
7	1	1
8	1	1
9	1	1
10	1	1
11		
12		
13		
14		
15		
Mean	1.000	0.900
Std Dev.	0.000	0.316
# Replicates	10	10

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

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	Reproduction
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: 6/10/2019

Replicate No.	Control	TIWC
1	22	20
2	26	27
3	24	22
4	24	4
5	23	24
6	23	20
7	29	26
8	25	25
9	21	25
10	28	26
11		
12		
13		
14		
15		
Mean	24.500	21.900
Std Dev.	2.550	6.757
# Replicates	10	10

T-Test Result	1.5874
Deg. of Freedom	12
Critical T Value	0.8726
Pass or Fail	PASS

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	

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 # 414-01-03

Beginning Date/Time: 6-4-19 1530
Ending Date/Time: 6/10/19 1520

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		JK
2	N	B	0		0		0		0		0		0		0		0		0		0		JK
3	N	B	0		0		4	1	0		0		0		0		0		2	1	0		[illegible]
4	N	B	4	1	4	1	8	2	5	1	4	1	4	1	6	1	4	1	0		4	1	[illegible]
5	N	B	8	2	9	2	0		10	2	8	2	9	2	12	2	7	2	6	2	9	2	[illegible]
6	N	B	10	3	13	3	12	3	9	3	11	3	10	3	11	3	14	3	13	3	15	3	JK
7	N	B																					
8	N	B																					
	Tot N	Tot B	22	3	26	3	24	3	24	3	23	3	23	3	29	3	25	3	21	3	28	3	Tot A

Average Neonates / Female = 24.5 % 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		JK
2	N	B	0		0		0		0		0		0		0		0		0		0		JK
3	N	B	0		0		4	1	0		0		0		3	1	4	1	0		0		[illegible]
4	N	B	4	1	5	1	9	2	6	1	5	1	6	1	6	2	0		2	1	6	1	[illegible]
5	N	B	9	2	10	2	0		11	2	10	2	12	2	0		8	2	0		11	2	[illegible]
6	N	B	12	3	11	3	12	3	10	3	15	3	13	3	12	3	14	3	8	2	14	3	JK
7	N	B																					
8	N	B																					
	Tot N	Tot B	25	3	26	3	25	3	27	3	30	3	31	3	21	3	26	3	10	2	31	3	Tot A

Average Neonates / Female = 25.2 % 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		0		0		0		0		0		0		JK
2	N	B	0		0		0		0		0		0		0		0		0		0		JK
3	N	B	D	–	0		0		0		0		0		0		4	1	0		0		[illegible]
4	N	B	–	–	4	1	5	1	4	1	4	1	6	1	4	1	0		4	1	5	1	[illegible]
5	N	B	–	–	8	2	9	2	7	2	8	2	10	2	8	2	0		7	2	0		[illegible]
6	N	B	–	–	14	3	14	3	12	3	14	3	11	3	9	3	16	2	11	3	10	2	JK
7	N	B	–	–																			
8	N	B																					
	Tot N	Tot B	0	–	26	3	28	3	23	3	26	3	27	3	21	3	20	2	22	3	15	2	Tot A

Average Neonates / Female = 20.8 % Females with 3rd Brood = 70 | 9

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

Observations

Project # 414-01-03

Beginning Date/Time: 6-4-19 1530
Ending Date/Time: 6/10/19 1520

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	0		0		0		0		0		0		0		0		0		0		JK
2	N	B	0		0		0		0		0		0		0		0		0		0		JK
3	N	B	0		4	1	3	1	0		4	1	0		0		4	1	0		4	1	[illegible]
4	N	B	5	1	8	2	0		5	1	9	2	4	1	6	1	0		2	1	8	2	[illegible]
5	N	B	12	2	0		7	2	9	2	17	3	8	2	10	2	7	2	0		0		[illegible]
6	N	B	10	3	19	3	11	3	0		0		15	3	14	3	14	3	12	2	12	3	JK
7	N	B																					
8	N	B																					
	Tot N	Tot B	27	3	31	3	21	3	14	2	30	3	27	3	30	3	25	3	14	2	24	3	Tot A

Average Neonates / Female = 24.3 % Females with 3rd Brood = 80 10

Day	Conc. 96%		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		JK
2	N	B	0		0		0		0		0		0		0		0		0		0		JK
3	N	B	0		0		0		0		0		3	1	0		4	1	0		0		[illegible]
4	N	B	4	1	5	1	4	1	4	1	4	1	0		5	1	0		4	1	6	1	[illegible]
5	N	B	7	2	9	2	8	2	D	–	7	2	6	2	9	2	7	2	8	2	10	2	[illegible]
6	N	B	9	3	13	3	10	3	–	–	13	3	11	3	12	3	14	3	13	3	10	3	JK
7	N	B							–	–													
8	N	B							–	–													
	Tot N	Tot B	20	3	27	3	22	3	4	1	24	3	20	3	26	3	25	3	25	3	26	3	Tot A

Average Neonates / Female = 21.9 % Females with 3rd Brood = 90 9

Day	Conc. 100%		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		JK
2	N	B	0		0		0		0		0		0		0		0		0		0		JK
3	N	B	0		0		0		0		0		3	1	0		4	1	0		0		[illegible]
4	N	B	4	1	5	1	4	1	D	–	4	1	0		4	1	0		1	1	4	1	[illegible]
5	N	B	7	2	10	2	9	2	–	–	8	2	7	2	8	2	9	2	0		8	2	[illegible]
6	N	B	12	3	9	3	12	3	–	–	11	3	10	3	12	3	10	3	4	2	13	3	JK
7	N	B							–	–													
8	N	B																					
	Tot N	Tot B	23	3	24	3	25	3	0	–	23	3	20	3	24	3	23	3	5	2	25	3	Tot A

Ceria Survival Reproduction 2018 blankpage

Average Neonates / Female = 19.2 % Females with 3rd Brood = 80 9

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

Observations

Job Number: 414-01-03
Species: C. dubia

Start Date & Time: 6-4-19 1530
End Date & Time: 6/10/19 1520

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	7.9	8.0	7.9	7.9	7.7	7.9		
	24%	8.1	8.0	8.1	8.0	7.8	8.0		
	48%	8.4	8.5	8.3	8.2	7.9	8.1		
	72%	8.7	8.8	8.6	8.6	8.1	8.4		
	96%	8.7	9.0	8.9	8.8	8.3	8.6		
	100%	9.5	9.9	9.8	9.8	8.5	8.9		
	—								
pH	Control	8.0	8.3	8.2	8.3	8.0	8.0		
	24%	7.9	8.0	8.0	8.0	8.0	8.0		
	48%	7.8	7.9	7.9	8.0	8.0	8.0		
	72%	7.7	7.9	7.9	7.9	8.0	7.9		
	96%	7.7	7.9	7.8	7.8	7.9	7.9		
	100%	7.7	7.8	7.8	7.8	7.8	7.9		
	—								
	Initials	JK	MF	JO	JO	MF	MF		
	Date	6/4	6-5	6/6	6/7	6-8	6-9		

Conductivity (umhos/cm)		
Date	Control	100%
6/4	308	1846
6/6	304	3388
6-8	305	3740

Alkalinity (mg/L as CaCO3)		
Date	Control	100%
6/4	60	110
6/6	70	120
6-8	70	120

Hardness (mg/L as CaCO3)		
Date	Control	100%
6/4	90	150
6/6	90	210
6-8	80	250
Initials	JK	JK

Final Readings

Parameter	Concentration	Day 1	2	3	4	5	6	7	8
Dissolved Oxygen (mg/L)	Control	7.8	6.6	7.6	7.0	7.3	7.6		
	24%	7.6	6.7	7.4	6.9	7.2	7.6		
	48%	7.7	6.5	7.4	6.8	7.3	7.7		
	72%	7.5	6.5	7.2	6.7	7.3	7.7		
	96%	7.6	6.4	7.2	6.6	7.4	7.6		
	100%	7.6	6.5	7.4	6.6	7.4	7.5		
	—								
pH	Control	8.2	8.0	8.1	8.1	8.1	8.3		
	24%	8.1	7.9	8.0	8.1	8.1	8.2		
	48%	8.0	7.9	8.0	8.1	8.0	8.1		
	72%	8.0	7.9	8.0	8.1	8.0	8.1		
	96%	8.0	7.9	8.0	8.1	8.0	8.0		
	100%	8.0	7.9	8.0	8.1	8.0	8.1		
	—								
	Initials	JK	JK	JO	MF	MF	MK		
	Date	6/5	6/6	6/7	6-8	6-9	6/10		

Chlorine (mg/L)		
Date	Control	100%
6/4	0.00	0.00
6/6	0.00	0.05
6-8	0.00	0.01

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

Observations:

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	6/4/2019	Test ID:	4140103ppc	Sample ID:	Towamencin
End Date:	6/11/2019	Lab ID:	AAT, INC	Sample Type:	COMPOSITE
Sample Date:		Protocol:	EPAF 94-EPA/600/4-91/002	Test Species:	CD-Ceriodaphnia dubia
Comments:					

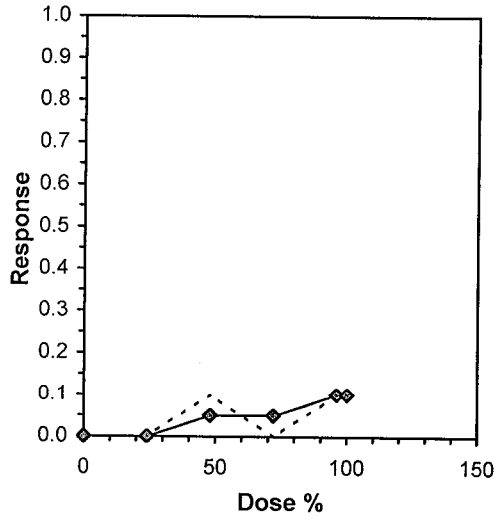
Conc-%	1	2	3	4	5	6	7	8	9	10
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
24	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
48	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
72	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000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

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	0.9000	0.9000	1	9	10	10	0.5000	0.0500	0.9500	0.9500
72	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0.9500	0.9500
96	0.9000	0.9000	1	9	10	10	0.5000	0.0500	0.9000	0.9000
100	0.9000	0.9000	1	9	10	10	0.5000	0.0500	0.9000	0.9000

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	100	>100		1
Treatments vs Control				

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL	Skew
IC05	72.000			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



ToxCalc v5.0.23

Reviewed by: ER

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	6/4/2019	Test ID:	4140103ppc	Sample ID:	Towamencin
End Date:	6/11/2019	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	22.000	26.000	24.000	24.000	23.000	23.000	29.000	25.000	21.000	28.000
24	25.000	26.000	25.000	27.000	30.000	31.000	21.000	26.000	10.000	31.000
48	0.000	26.000	28.000	23.000	26.000	27.000	21.000	20.000	22.000	15.000
72	27.000	31.000	21.000	14.000	30.000	27.000	30.000	25.000	14.000	24.000
96	20.000	27.000	22.000	4.000	24.000	20.000	26.000	25.000	25.000	26.000
100	23.000	24.000	25.000	0.000	23.000	20.000	24.000	23.000	5.000	25.000

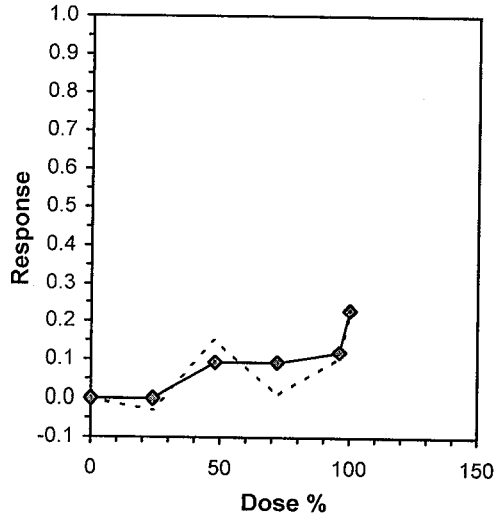
			Transform: Untransformed						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	24.500	1.0000	24.500	21.000	29.000	10.406	10				24.850	1.0000
24	25.200	1.0286	25.200	10.000	31.000	24.519	10	-0.230	2.287	6.967	24.850	1.0000
48	20.800	0.8490	20.800	0.000	28.000	39.826	10	1.214	2.287	6.967	22.550	0.9074
72	24.300	0.9918	24.300	14.000	31.000	25.593	10	0.066	2.287	6.967	22.550	0.9074
96	21.900	0.8939	21.900	4.000	27.000	30.853	10	0.853	2.287	6.967	21.900	0.8813
100	19.200	0.7837	19.200	0.000	25.000	46.830	10	1.740	2.287	6.967	19.200	0.7726

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.05)	1.46002	0.895	-1.734	2.6926
Bartlett's Test indicates equal variances (p = 0.03)	12.1979	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	6.96687	0.28436	57.07	46.413	0.30806	5, 54
Treatments vs Control										

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL		Skew
IC05	36.965	23.671	10.708	96.549	1.0174
IC10	78.831				
IC15	97.152				
IC20	98.993				
IC25	>100				
IC40	>100				
IC50	>100				



ToxCalc v5.0.23

Reviewed by: ER

CHRONIC 1 06/04 to 11/19 +0.3 oC

Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)
6/4/19 12:22	25.44	6/6/19 4:22	25.06	6/7/19 20:22	25.56	6/9/19 12:22	25.89	6/11/19 4:22	25.06
6/4/19 12:52	25.5	6/6/19 4:52	25	6/7/19 20:52	25.56	6/9/19 12:52	25.89	6/11/19 4:52	25.06
6/4/19 13:22	25.44	6/6/19 5:22	25	6/7/19 21:22	25.56	6/9/19 13:22	25.89	6/11/19 5:22	25
6/4/19 13:52	25.39	6/6/19 5:52	25	6/7/19 21:52	25.56	6/9/19 13:52	25.83	6/11/19 5:52	25
6/4/19 14:22	25.33	6/6/19 6:22	25	6/7/19 22:22	25.56	6/9/19 14:22	25.78	6/11/19 6:22	25
6/4/19 14:52	25.39	6/6/19 6:52	25.06	6/7/19 22:52	25.5	6/9/19 14:52	25.78	6/11/19 6:52	25.06
6/4/19 15:22	25.39	6/6/19 7:22	25.06	6/7/19 23:22	25.44	6/9/19 15:22	25.83	6/11/19 7:22	25.11
6/4/19 15:52	25.39	6/6/19 7:52	25.11	6/7/19 23:52	25.33	6/9/19 15:52	25.72	6/11/19 7:52	25.17
6/4/19 16:22	25.39	6/6/19 8:22	25.17	6/8/19 0:22	25.28	6/9/19 16:22	25.67	6/11/19 8:22	25.17
6/4/19 16:52	25.44	6/6/19 8:52	25.22	6/8/19 0:52	25.17	6/9/19 16:52	25.56	6/11/19 8:52	25.22
6/4/19 17:22	25.44	6/6/19 9:22	25.22	6/8/19 1:22	25.11	6/9/19 17:22	25.44	6/11/19 9:22	25.22
6/4/19 17:52	25.33	6/6/19 9:52	25.28	6/8/19 1:52	25.06	6/9/19 17:52	25.44	6/11/19 9:52	25.28
6/4/19 18:22	25.28	6/6/19 10:22	25.44	6/8/19 2:22	25	6/9/19 18:22	25.39	6/11/19 10:22	25.33
6/4/19 18:52	25.22	6/6/19 10:52	25.56	6/8/19 2:52	24.94	6/9/19 18:52	25.33	6/11/19 10:52	25.39
6/4/19 19:22	25.11	6/6/19 11:22	25.72	6/8/19 3:22	24.94	6/9/19 19:22	25.33	6/11/19 11:22	25.5
6/4/19 19:52	25.06	6/6/19 11:52	25.83	6/8/19 3:52	24.94	6/9/19 19:52	25.28	6/11/19 11:52	25.61
6/4/19 20:22	25.06	6/6/19 12:22	25.83	6/8/19 4:22	24.89	6/9/19 20:22	25.28	6/11/19 12:22	25.78
6/4/19 20:52	25	6/6/19 12:52	25.83	6/8/19 4:52	24.89	6/9/19 20:52	25.28	6/11/19 12:52	25.83
6/4/19 21:22	25	6/6/19 13:22	25.78	6/8/19 5:22	24.83	6/9/19 21:22	25.28	6/11/19 13:22	25.89
6/4/19 21:52	24.94	6/6/19 13:52	25.78	6/8/19 5:52	24.89	6/9/19 21:52	25.22	6/11/19 13:52	25.89
6/4/19 22:22	25	6/6/19 14:22	25.83	6/8/19 6:22	24.89	6/9/19 22:22	25.28	6/11/19 14:22	25.94
6/4/19 22:52	24.94	6/6/19 14:52	25.89	6/8/19 6:52	24.89	6/9/19 22:52	25.22	6/11/19 14:52	26
6/4/19 23:22	24.89	6/6/19 15:22	25.83	6/8/19 7:22	24.94	6/9/19 23:22	25.17	6/11/19 15:22	26
6/4/19 23:52	24.89	6/6/19 15:52	25.78	6/8/19 7:52	25.06	6/9/19 23:52	25.11	6/11/19 15:52	26
6/5/19 0:22	24.83	6/6/19 16:22	25.78	6/8/19 8:22	25.06	6/10/19 0:22	25	6/11/19 16:22	26
6/5/19 0:52	24.83	6/6/19 16:52	25.72	6/8/19 8:52	25.22	6/10/19 0:52	24.89	6/11/19 16:52	26.06
6/5/19 1:22	24.78	6/6/19 17:22	25.67	6/8/19 9:22	25.33	6/10/19 1:22	24.83	6/11/19 17:22	26
6/5/19 1:52	24.78	6/6/19 17:52	25.61	6/8/19 9:52	25.44	6/10/19 1:52	24.78	6/11/19 17:52	25.89
6/5/19 2:22	24.72	6/6/19 18:22	25.61	6/8/19 10:22	25.61	6/10/19 2:22	24.72	6/11/19 18:22	25.83
6/5/19 2:52	24.67	6/6/19 18:52	25.61	6/8/19 10:52	25.78	6/10/19 2:52	24.72	6/11/19 18:52	25.78
6/5/19 3:22	24.67	6/6/19 19:22	25.61	6/8/19 11:22	26	6/10/19 3:22	24.67		
6/5/19 3:52	24.67	6/6/19 19:52	25.61	6/8/19 11:52	26.06	6/10/19 3:52	24.67		
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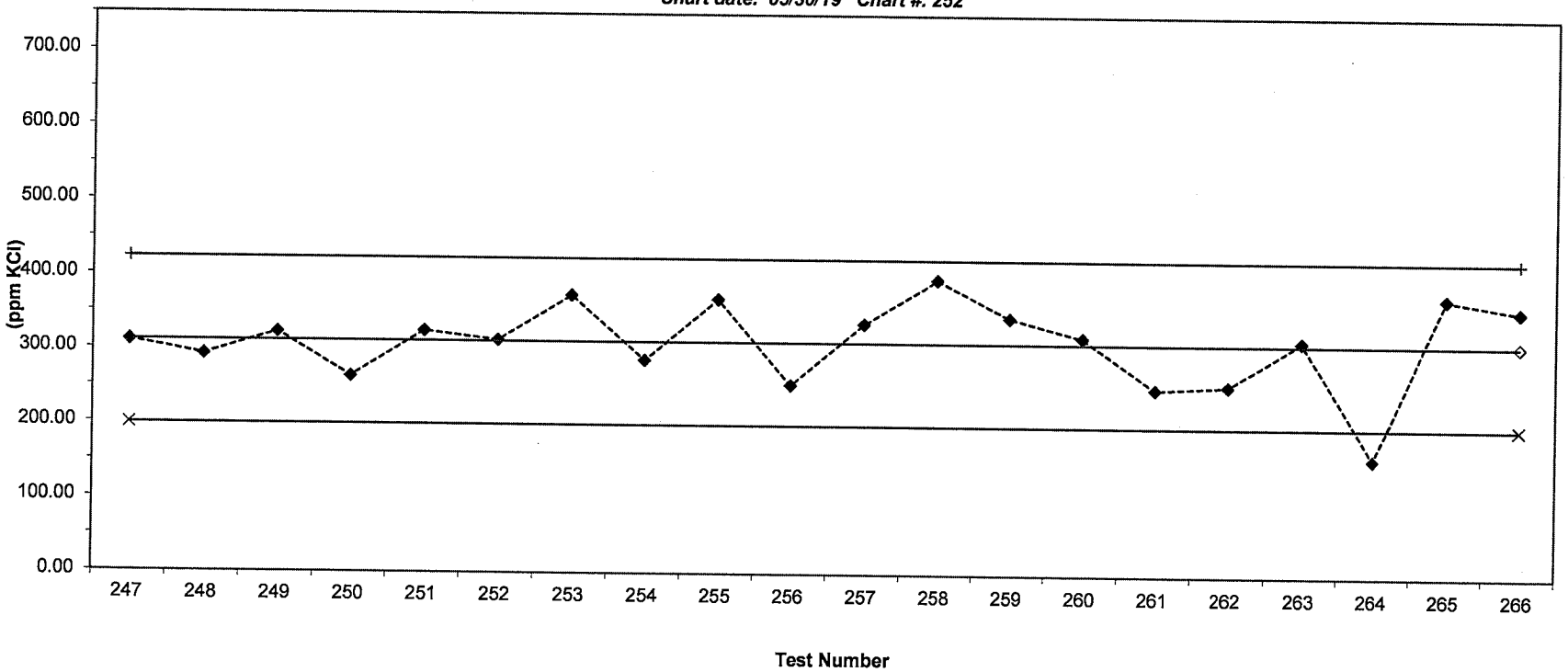
6/5/19 4:52	24.67	6/6/19 20:52	25.56	6/8/19 12:52	26.06	6/10/19 4:52	24.61		
6/5/19 5:22	24.67	6/6/19 21:22	25.61	6/8/19 13:22	25.94	6/10/19 5:22	24.61		
6/5/19 5:52	24.67	6/6/19 21:52	25.56	6/8/19 13:52	25.89	6/10/19 5:52	24.56		
6/5/19 6:22	24.67	6/6/19 22:22	25.5	6/8/19 14:22	25.94	6/10/19 6:22	24.56		
6/5/19 6:52	24.67	6/6/19 22:52	25.5	6/8/19 14:52	25.94	6/10/19 6:52	24.56		
6/5/19 7:22	24.72	6/6/19 23:22	25.44	6/8/19 15:22	25.94	6/10/19 7:22	24.61		
6/5/19 7:52	24.78	6/6/19 23:52	25.33	6/8/19 15:52	25.94	6/10/19 7:52	24.61		
6/5/19 8:22	24.83	6/7/19 0:22	25.28	6/8/19 16:22	25.94	6/10/19 8:22	24.67		
6/5/19 8:52	24.83	6/7/19 0:52	25.22	6/8/19 16:52	25.89	6/10/19 8:52	24.72		
6/5/19 9:22	24.94	6/7/19 1:22	25.17	6/8/19 17:22	25.83	6/10/19 9:22	24.72		
6/5/19 9:52	25.11	6/7/19 1:52	25.11	6/8/19 17:52	25.78	6/10/19 9:52	24.83		
6/5/19 10:22	25.33	6/7/19 2:22	25.06	6/8/19 18:22	25.72	6/10/19 10:22	25		
6/5/19 10:52	25.5	6/7/19 2:52	25	6/8/19 18:52	25.61	6/10/19 10:52	25.17		
6/5/19 11:22	25.56	6/7/19 3:22	25	6/8/19 19:22	25.56	6/10/19 11:22	25.22		
6/5/19 11:52	25.61	6/7/19 3:52	24.94	6/8/19 19:52	25.5	6/10/19 11:52	25.33		
6/5/19 12:22	25.67	6/7/19 4:22	24.94	6/8/19 20:22	25.5	6/10/19 12:22	25.06		
6/5/19 12:52	25.67	6/7/19 4:52	24.94	6/8/19 20:52	25.44	6/10/19 12:52	25.33		
6/5/19 13:22	25.61	6/7/19 5:22	24.94	6/8/19 21:22	25.39	6/10/19 13:22	25.39		
6/5/19 13:52	25.5	6/7/19 5:52	24.89	6/8/19 21:52	25.39	6/10/19 13:52	25.44		
6/5/19 14:22	25.44	6/7/19 6:22	24.89	6/8/19 22:22	25.33	6/10/19 14:22	25.5		
6/5/19 14:52	25.5	6/7/19 6:52	24.94	6/8/19 22:52	25.33	6/10/19 14:52	25.56		
6/5/19 15:22	25.5	6/7/19 7:22	25	6/8/19 23:22	25.22	6/10/19 15:22	25.72		
6/5/19 15:52	25.56	6/7/19 7:52	25.06	6/8/19 23:52	25.17	6/10/19 15:52	25.83		
6/5/19 16:22	25.61	6/7/19 8:22	25.06	6/9/19 0:22	25.11	6/10/19 16:22	25.89		
6/5/19 16:52	25.61	6/7/19 8:52	25.11	6/9/19 0:52	25.06	6/10/19 16:52	25.89		
6/5/19 17:22	25.56	6/7/19 9:22	25.11	6/9/19 1:22	25	6/10/19 17:22	25.89		
6/5/19 17:52	25.5	6/7/19 9:52	25.17	6/9/19 1:52	24.94	6/10/19 17:52	25.89		
6/5/19 18:22	25.44	6/7/19 10:22	25.33	6/9/19 2:22	24.89	6/10/19 18:22	25.89		
6/5/19 18:52	25.44	6/7/19 10:52	25.44	6/9/19 2:52	24.83	6/10/19 18:52	25.89		
6/5/19 19:22	25.44	6/7/19 11:22	25.56	6/9/19 3:22	24.78	6/10/19 19:22	25.83		
6/5/19 19:52	25.44	6/7/19 11:52	25.67	6/9/19 3:52	24.72	6/10/19 19:52	25.78		
6/5/19 20:22	25.44	6/7/19 12:22	25.72	6/9/19 4:22	24.72	6/10/19 20:22	25.72		
6/5/19 20:52	25.44	6/7/19 12:52	25.78	6/9/19 4:52	24.67	6/10/19 20:52	25.72		
6/5/19 21:22	25.5	6/7/19 13:22	25.78	6/9/19 5:22	24.67	6/10/19 21:22	25.72		
6/5/19 21:52	25.5	6/7/19 13:52	25.72	6/9/19 5:52	24.67	6/10/19 21:52	25.67		
6/5/19 22:22	25.44	6/7/19 14:22	25.78	6/9/19 6:22	24.67	6/10/19 22:22	25.67		
6/5/19 22:52	25.44	6/7/19 14:52	25.83	6/9/19 6:52	24.67	6/10/19 22:52	25.61		
6/5/19 23:22	25.39	6/7/19 15:22	25.89	6/9/19 7:22	24.83	6/10/19 23:22	25.56		
6/5/19 23:52	25.33	6/7/19 15:52	25.89	6/9/19 7:52	24.94	6/10/19 23:52	25.5		
6/6/19 0:22	25.28	6/7/19 16:22	25.94	6/9/19 8:22	25.11	6/11/19 0:22	25.44		
6/6/19 0:52	25.22	6/7/19 16:52	25.89	6/9/19 8:52	25.22	6/11/19 0:52	25.39		
6/6/19 1:22	25.17	6/7/19 17:22	25.83	6/9/19 9:22	25.39	6/11/19 1:22	25.28		
6/6/19 1:52	25.17	6/7/19 17:52	25.78	6/9/19 9:52	25.5	6/11/19 1:52	25.28		
6/6/19 2:22	25.11	6/7/19 18:22	25.72	6/9/19 10:22	25.61	6/11/19 2:22	25.22		
6/6/19 2:52	25.06	6/7/19 18:52	25.67	6/9/19 10:52	25.72	6/11/19 2:52	25.17		
6/6/19 3:22	25.06	6/7/19 19:22	25.61	6/9/19 11:22	25.72	6/11/19 3:22	25.11		
6/6/19 3:52	25.06	6/7/19 19:52	25.61	6/9/19 11:52	25.83	6/11/19 3:52	25.11		

Quality Control Chart *Ceriodaphnia dubia*

IC_{25}

American Aquatic Testing, Inc. - Chronic Toxicity
Chart date: 05/30/19 Chart #: 252