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?
08/21/17, 0800	**Final effluent**	**3.0 °C**	**24 hours**	**0.02** mg/L	__Yes _x_No
08/23/17, 0800	**Final effluent**	**3.0 °C**	**24 hours**	**0.01** mg/L	__Yes _x_No
08/25/17, 0800	**Final effluent**	**4.0 °C**	**24 hours**	**0.00** mg/L	__Yes _x_No

TEST CONDITIONS

Date/Time of Test Initiation **08/22/17, 1610** Date/Time of Test Termination **08/29/17, 1510**
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: **24.0-25.7 °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: **08/26/17** Conductivity: **295** µmhos/cm
pH: **8.1** Total Res. Cl^-: **0** mg/L

CONTROL RESULTS

Pimephales promelas
Survival: **95 %**
Mean Dry Weight of Survivors (if applicable): **0.3170 mg**

REFERENCE TOXICITY TESTS

Date of most recent test: **08/22/17** 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** Fail	Reproduction: **X Pass** 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		09/12/17	**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: 12.8% (No limits established; EPA833-R-02-013)	PMSD: **18.9%** 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	0.3170	1.609
24%	87.5	0.3048	19.192
48%	90	0.3435	11.241
72%	95	0.3770	10.163
96%	100	0.3745	4.936
100%	100	0.3908	6.782

Statistics	Normality	Is data normal?	Homogeneity	Is data homogeneous?	Analysis
Survival	Shapiro-Wilk's	Yes	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	8.1	6.4	8.3	273	295
24%			7.8	8.0	6.6	8.4		
48%	Raw	Raw	7.7	8.0	6.2	8.7		
72%			7.6	8.0	6.8	9.1		
96%	Data	Data	7.6	8.0	6.7	9.6		
100%			7.5	8.1	6.7	10.2	2707	3005

REFERENCE TEST

Reference toxicant: Potassium chloride

Test Start: **08/22/17, 1610** Test terminated: **08/29/17, 1510**

Control survival: **95 %**

Test NOEC: **250** ppm (Growth) Test # 769 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: 8/29/2017

Replicate No.	Control	TIWC
1	10	10
2	10	10
3	9	10
4	9	10
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	9.500	10.000
Std Dev.	0.577	0.000
# Replicates	4	4

T-Test Result	11.7367
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: 8/29/2017

Replicate No.	Control	TIWC
1	0.319	0.362
2	0.322	0.382
3	0.31	0.397
4	0.317	0.357
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.317	0.375
Std Dev.	0.005	0.018
# Replicates	4	4

T-Test Result	14.4895
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	

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

Beginning Date & Time: 8-22-17 1610
Ending Date & Time: 8-29-17 1510
Hatch Date: 8-21-17

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	10	10	9	9	9	9
	D	10	10	10	10	10	9'	9	9
24%	A	10	10	10	10	8²	8	8	8
	B	10	10	9'	9	9	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	9'	8²	8	8	8
48%	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	9'	9	8'	7'
	C	10	10	9'	9	9	9	9	9
	D	10	10	10	10	10	10	10	10
72%	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	9'	9	9
96%	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
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		JK	EKH	JO	JK	MTC	MTC	EKH	MTC
Date		8/22	8/23	8/24	8/25	8-26	8-27	8/28	8-29

Observations:

CHFHLC.wk3

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

Beginning Date & Time: 8-22-17 1610
Ending Date & Time: 8-29-17 1510
Hatch Date: 8-21-17

Chronic Test

American Aquatic Testing, Inc.

Weight Data

QC 0.00917

% 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	0.00817	0.01136	3.19	10	0.319	0.319
	B	2	0.00864	0.01186	3.22	10	0.322	0.322
	C	3	0.00800	0.01110	3.10	9	0.344	0.310
	D	4	0.00867	0.01184	3.17	9	0.352	0.317
24	A	5	0.00682	0.00906	2.24	8		0.224
	B	6	0.00632	0.00948	3.16	9		0.316
	C	7	0.00573	0.00937	3.64	10		0.364
	D	8	0.00667	0.00982	3.15	8		0.315
48	A	9	0.00856	0.01157	3.01	10		0.301
	B	10	0.00721	0.01045	3.24	7		0.324
	C	11	0.00773	0.01134	3.61	9		0.361
	D	12	0.00702	0.01090	3.88	10		0.388
72	A	13	0.00828	0.01148	3.20	9		0.320
	B	14	0.00773	0.01163	3.90	10		0.390
	C	15	0.00687	0.01083	3.96	10		0.396
	D	16	0.00746	0.01148	4.02	9		0.402
96	A	17	0.00845	0.01207	3.62	10		0.362
	B	18	0.00660	0.01042	3.82	10		0.382
	C	19	0.00765	0.01162	3.97	10		0.397
	D	20	0.00727	0.01084	3.57	10		0.357
100	A	21	0.00808	0.01180	3.72	10		0.372
	B	22	0.00771	0.01135	3.64	10		0.364
	C	23	0.00781	0.01196	4.15	10		0.415
	D	24	0.00798	0.01210	4.12	10		0.412
	A							
	B							
	C							
	D							
	Initials		thd	thd	thd	MK	thd	thd
	Date		8/28/17	8/30/17	8/30/17	8/29	8/30/17	8/30/17

QC 0.00917

QC 0.00920

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

Observations:

Date/Time In: 8/29/17 1510
Temp: 105°

Date/Time Out ~~8/30/17 1510~~ 5:00
Temp: 105°

(1)

CHFHWT.wk3

8/30/17

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

Start Date & Time: 8-22-17 1610
End Date & Time: 8-29-17 1510

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	8.1	8.0	8.2	8.2	8.0	7.9	8.3	
	24%	8.3	8.3	8.2	8.2	8.3	8.1	8.4	
	48%	8.7	8.4	8.2	8.3	8.4	8.4	8.7	
	72%	9.1	8.8	8.6	8.4	9.1	8.4	8.9	
	96%	9.6	9.2	8.9	8.6	9.4	8.8	9.3	
	100%	10.2	9.9	9.3	8.9	9.9	8.9	9.9	
	—								
pH	Control	7.9	7.9	8.0	8.0	8.1	8.1	7.9	
	24%	7.9	7.9	7.9	7.9	8.0	7.9	7.9	
	48%	7.8	7.9	7.8	7.9	7.9	7.8	7.7	
	72%	7.8	7.8	7.8	7.9	7.7	7.8	7.6	
	96%	7.8	7.8	7.8	7.9	7.6	7.7	7.6	
	100%	7.8	7.8	7.7	7.9	7.6	7.6	7.5	
	—								
	Initials	JO	EKH	JK	EKH	MF	MP	EKH	
	Date	8/22	8/23	8/24	8/25	8/26	8/27	8/28	

Conductivity (umhos/cm)		
Date	Control	100%
8/22	273	2989
8/24	295	3005
8/26	295	2707

Alkalinity (mg/L as CaCO3)		
Date	Control	100%
8/22	50	120
8/24	70	130
8/26	70	110

Hardness (mg/L as CaCO3)		
Date	Control	100%
8/22	100	180
8/24	100	190
8/26	100	230
Initials	JK	EKH

Final Readings

Parameter	Concentration	Day 1	2	3	4	5	6	7	8
Dissolved Oxygen (mg/L)	Control	7.0	7.4	7.0	7.3	7.1	7.2	6.4	
	24%	6.9	7.1	7.2	7.6	7.4	7.5	6.6	
	48%	7.0	6.7	7.1	7.6	7.5	7.6	6.8	
	72%	7.3	6.9	7.2	7.6	7.5	7.7	6.8	
	96%	7.5	6.9	7.1	7.6	7.6	7.7	6.7	
	100%	7.6	6.8	7.3	7.7	7.5	7.7	6.7	
	—								
pH	Control	8.0	8.0	8.0	7.9	8.0	7.9	7.9	
	24%	8.0	8.0	7.9	7.9	8.0	7.9	7.8	
	48%	8.0	7.9	7.8	7.9	8.0	7.8	7.7	
	72%	7.9	7.9	7.9	7.9	8.0	7.8	7.7	
	96%	8.0	8.0	7.9	7.9	8.0	7.8	7.7	
	100%	8.1	8.0	7.9	8.0	8.0	7.9	7.7	
	—								
	Initials	EKH	JO	EKH	MF	MF	EKH	MP	
	Date	8/23	8/24	8/25	8/26	8/27	8/28	8/29	

Chlorine (mg/L)		
Date	Control	100%
8/22	0.00	0.02
8/24	0.00	0.01
8/26	0.00	0.00

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

Observations: ① 8.1 EKH 8/25

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	8/22/2017	Test ID:	4140101ppc	Sample ID:	Towamencin
End Date:	8/29/2017	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	0.9000
24	0.8000	0.9000	1.0000	0.8000
48	1.0000	0.7000	0.9000	1.0000
72	0.9000	1.0000	1.0000	0.9000
96	1.0000	1.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000	1.0000

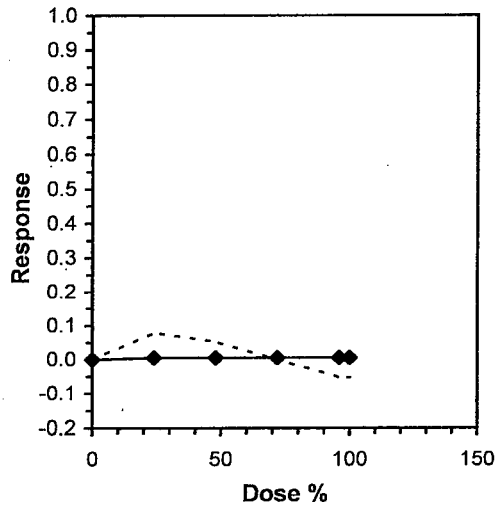
			Transform: Arcsin Square Root						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9500	1.0000	1.3305	1.2490	1.4120	7.072	4				0.9500	1.0000
24	0.8750	0.9211	1.2188	1.1071	1.4120	11.906	4	1.383	2.410	0.1946	0.9450	0.9947
48	0.9000	0.9474	1.2661	0.9912	1.4120	15.696	4	0.798	2.410	0.1946	0.9450	0.9947
72	0.9500	1.0000	1.3305	1.2490	1.4120	7.072	4	0.000	2.410	0.1946	0.9450	0.9947
96	1.0000	1.0526	1.4120	1.4120	1.4120	0.000	4	-1.009	2.410	0.1946	0.9450	0.9947
100	1.0000	1.0526	1.4120	1.4120	1.4120	0.000	4	-1.009	2.410	0.1946	0.9450	0.9947

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.94084	0.884	-0.465	1.26705
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	0.12087	0.12813	0.02391	0.01304	0.15704	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: ER

Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	8/22/2017	Test ID:	4140101ppc	Sample ID:	Towamencin
End Date:	8/29/2017	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	0.3190	0.3220	0.3100	0.3170
24	0.2240	0.3160	0.3640	0.3150
48	0.3010	0.3240	0.3610	0.3880
72	0.3200	0.3900	0.3960	0.4020
96	0.3620	0.3820	0.3970	0.3570
100	0.3720	0.3640	0.4150	0.4120

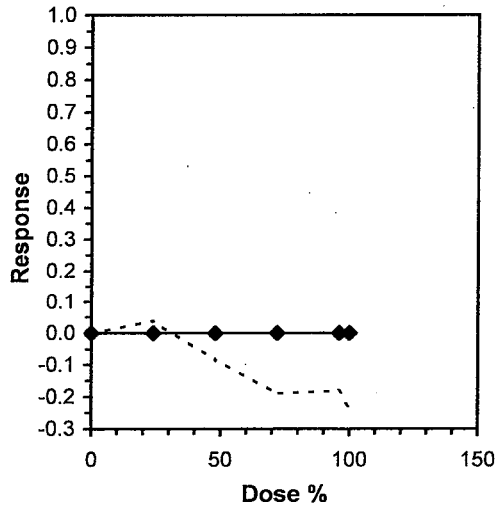
			Transform: Untransformed						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.3170	1.0000	0.3170	0.3100	0.3220	1.609	4				0.3513	1.0000
24	0.3048	0.9614	0.3048	0.2240	0.3640	19.192	4	0.492	2.410	0.0600	0.3513	1.0000
48	0.3435	1.0836	0.3435	0.3010	0.3880	11.241	4	-1.064	2.410	0.0600	0.3513	1.0000
72	0.3770	1.1893	0.3770	0.3200	0.4020	10.163	4	-2.408	2.410	0.0600	0.3513	1.0000
96	0.3745	1.1814	0.3745	0.3570	0.3970	4.936	4	-2.308	2.410	0.0600	0.3513	1.0000
100	0.3908	1.2326	0.3908	0.3640	0.4150	6.782	4	-2.960	2.410	0.0600	0.3513	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.95538	0.884	-0.7279	1.04771
Bartlett's Test indicates equal variances (p = 0.04)	11.5853	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	0.06005	0.18943	0.00493	0.00124	0.01333	5, 18

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

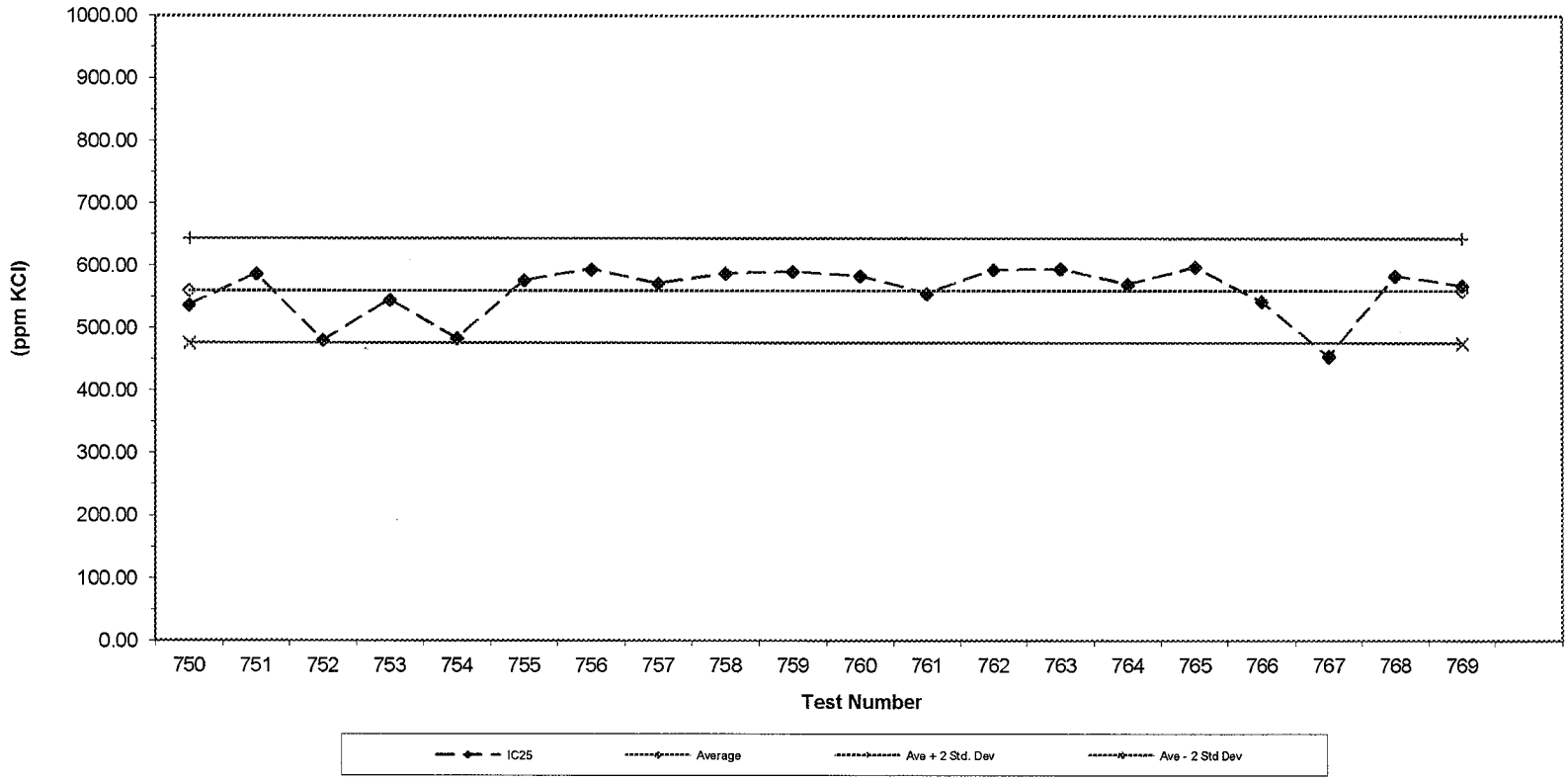
Reviewed by: EK

Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)
8/22/17 10:19	25.33	8/24/17 1:19	24.89	8/25/17 16:19	25.39	8/27/17 7:19	24.06	8/28/17 22:19	25.28
8/22/17 10:49	25.39	8/24/17 1:49	24.89	8/25/17 16:49	25.33	8/27/17 7:49	24.06	8/28/17 22:49	25.22
8/22/17 11:19	25.44	8/24/17 2:19	24.83	8/25/17 17:19	25.28	8/27/17 8:19	24.11	8/28/17 23:19	25.17
8/22/17 11:49	25.5	8/24/17 2:49	24.78	8/25/17 17:49	25.28	8/27/17 8:49	24.22	8/28/17 23:49	25.06
8/22/17 12:19	25.56	8/24/17 3:19	24.78	8/25/17 18:19	25.22	8/27/17 9:19	24.39	8/29/17 0:19	24.94
8/22/17 12:49	25.61	8/24/17 3:49	24.72	8/25/17 18:49	25.17	8/27/17 9:49	24.5	8/29/17 0:49	24.89
8/22/17 13:19	25.67	8/24/17 4:19	24.67	8/25/17 19:19	25.17	8/27/17 10:19	24.61	8/29/17 1:19	24.78
8/22/17 13:49	25.67	8/24/17 4:49	24.61	8/25/17 19:49	25.11	8/27/17 10:49	24.72	8/29/17 1:49	24.67
8/22/17 14:19	25.72	8/24/17 5:19	24.56	8/25/17 20:19	25.11	8/27/17 11:19	24.83	8/29/17 2:19	24.61
8/22/17 14:49	25.78	8/24/17 5:49	24.56	8/25/17 20:49	25.06	8/27/17 11:49	24.89	8/29/17 2:49	24.5
8/22/17 15:19	25.83	8/24/17 6:19	24.5	8/25/17 21:19	25.06	8/27/17 12:19	25.06	8/29/17 3:19	24.44
8/22/17 15:49	25.89	8/24/17 6:49	24.5	8/25/17 21:49	25.06	8/27/17 12:49	25.17	8/29/17 3:49	24.33
8/22/17 16:19	25.89	8/24/17 7:19	24.5	8/25/17 22:19	25.06	8/27/17 13:19	25.28	8/29/17 4:19	24.28
8/22/17 16:49	25.89	8/24/17 7:49	24.56	8/25/17 22:49	25	8/27/17 13:49	25.33	8/29/17 4:49	24.17
8/22/17 17:19	25.89	8/24/17 8:19	24.56	8/25/17 23:19	24.94	8/27/17 14:19	25.44	8/29/17 5:19	24.11
8/22/17 17:49	25.89	8/24/17 8:49	24.61	8/25/17 23:49	24.89	8/27/17 14:49	25.5	8/29/17 5:49	24.06
8/22/17 18:19	25.89	8/24/17 9:19	24.61	8/26/17 0:19	24.83	8/27/17 15:19	25.56	8/29/17 6:19	24.06
8/22/17 18:49	25.83	8/24/17 9:49	24.67	8/26/17 0:49	24.78	8/27/17 15:49	25.61	8/29/17 6:49	24
8/22/17 19:19	25.78	8/24/17 10:19	24.78	8/26/17 1:19	24.72	8/27/17 16:19	25.61	8/29/17 7:19	24
8/22/17 19:49	25.72	8/24/17 10:49	24.94	8/26/17 1:49	24.61	8/27/17 16:49	25.56	8/29/17 7:49	24.06
8/22/17 20:19	25.72	8/24/17 11:19	25.11	8/26/17 2:19	24.56	8/27/17 17:19	25.56	8/29/17 8:19	24.06
8/22/17 20:49	25.67	8/24/17 11:49	25.28	8/26/17 2:49	24.5	8/27/17 17:49	25.5	8/29/17 8:49	24.11
8/22/17 21:19	25.61	8/24/17 12:19	25.44	8/26/17 3:19	24.44	8/27/17 18:19	25.44	8/29/17 9:19	24.17
8/22/17 21:49	25.56	8/24/17 12:49	25.5	8/26/17 3:49	24.39	8/27/17 18:49	25.39	8/29/17 9:49	24.22
8/22/17 22:19	25.5	8/24/17 13:19	25.56	8/26/17 4:19	24.28	8/27/17 19:19	25.33	8/29/17 10:19	24.33
8/22/17 22:49	25.44	8/24/17 13:49	25.56	8/26/17 4:49	24.22	8/27/17 19:49	25.33	8/29/17 10:49	24.44
8/22/17 23:19	25.44	8/24/17 14:19	25.56	8/26/17 5:19	24.17	8/27/17 20:19	25.28	8/29/17 11:19	24.5
8/22/17 23:49	25.39	8/24/17 14:49	25.56	8/26/17 5:49	24.11	8/27/17 20:49	25.22	8/29/17 11:49	24.61
8/23/17 0:19	25.33	8/24/17 15:19	25.56	8/26/17 6:19	24.06	8/27/17 21:19	25.22	8/29/17 12:19	24.78
8/23/17 0:49	25.33	8/24/17 15:49	25.56	8/26/17 6:49	24.06	8/27/17 21:49	25.17	8/29/17 12:49	24.94
8/23/17 1:19	25.28	8/24/17 16:19	25.5	8/26/17 7:19	24.06	8/27/17 22:19	25.17	8/29/17 13:19	25.06
8/23/17 1:49	25.22	8/24/17 16:49	25.5	8/26/17 7:49	24.06	8/27/17 22:49	25.17	8/29/17 13:49	25.11
8/23/17 2:19	25.22	8/24/17 17:19	25.44	8/26/17 8:19	24.11	8/27/17 23:19	25.11	8/29/17 14:19	25.22
8/23/17 2:49	25.17	8/24/17 17:49	25.39	8/26/17 8:49	24.11	8/27/17 23:49	25.06	8/29/17 14:49	25.33
8/23/17 3:19	25.17	8/24/17 18:19	25.39	8/26/17 9:19	24.22	8/28/17 0:19	24.94	8/29/17 15:19	25.44
8/23/17 3:49	25.11	8/24/17 18:49	25.33	8/26/17 9:49	24.39	8/28/17 0:49	24.89	8/29/17 15:49	25.56
8/23/17 4:19	25.11	8/24/17 19:19	25.28	8/26/17 10:19	24.5	8/28/17 1:19	24.78	8/29/17 16:19	25.67
8/23/17 4:49	25.06	8/24/17 19:49	25.28	8/26/17 10:49	24.61	8/28/17 1:49	24.72		
8/23/17 5:19	25.06	8/24/17 20:19	25.22	8/26/17 11:19	24.72	8/28/17 2:19	24.67		
8/23/17 5:49	25	8/24/17 20:49	25.17	8/26/17 11:49	24.83	8/28/17 2:49	24.61		
8/23/17 6:19	25	8/24/17 21:19	25.17	8/26/17 12:19	24.94	8/28/17 3:19	24.56		
8/23/17 6:49	25	8/24/17 21:49	25.17	8/26/17 12:49	25.06	8/28/17 3:49	24.44		
8/23/17 7:19	25.06	8/24/17 22:19	25.17	8/26/17 13:19	25.17	8/28/17 4:19	24.39		
8/23/17 7:49	25.11	8/24/17 22:49	25.11	8/26/17 13:49	25.28	8/28/17 4:49	24.33		
8/23/17 8:19	25.22	8/24/17 23:19	25.11	8/26/17 14:19	25.39	8/28/17 5:19	24.28		
8/23/17 8:49	25.28	8/24/17 23:49	25.06	8/26/17 14:49	25.56	8/28/17 5:49	24.28		
8/23/17 9:19	25.28	8/25/17 0:19	25	8/26/17 15:19	25.67	8/28/17 6:19	24.28		
8/23/17 9:49	25.33	8/25/17 0:49	24.94	8/26/17 15:49	25.78	8/28/17 6:49	24.33		
8/23/17 10:19	25.39	8/25/17 1:19	24.89	8/26/17 16:19	25.72	8/28/17 7:19	24.33		
8/23/17 10:49	25.44	8/25/17 1:49	24.83	8/26/17 16:49	25.72	8/28/17 7:49	24.39		
8/23/17 11:19	25.5	8/25/17 2:19	24.78	8/26/17 17:19	25.72	8/28/17 8:19	24.39		
8/23/17 11:49	25.44	8/25/17 2:49	24.72	8/26/17 17:49	25.67	8/28/17 8:49	24.44		
8/23/17 12:19	25.44	8/25/17 3:19	24.67	8/26/17 18:19	25.61	8/28/17 9:19	24.44		
8/23/17 12:49	25.5	8/25/17 3:49	24.61	8/26/17 18:49	25.61	8/28/17 9:49	24.5		
8/23/17 13:19	25.56	8/25/17 4:19	24.56	8/26/17 19:19	25.56	8/28/17 10:19	24.61		
8/23/17 13:49	25.56	8/25/17 4:49	24.5	8/26/17 19:49	25.5	8/28/17 10:49	24.72		
8/23/17 14:19	25.61	8/25/17 5:19	24.44	8/26/17 20:19	25.44	8/28/17 11:19	24.78		
8/23/17 14:49	25.61	8/25/17 5:49	24.39	8/26/17 20:49	25.39	8/28/17 11:49	24.89		
8/23/17 15:19	25.61	8/25/17 6:19	24.33	8/26/17 21:19	25.33	8/28/17 12:19	25		
8/23/17 15:49	25.67	8/25/17 6:49	24.33	8/26/17 21:49	25.28	8/28/17 12:49	25.17		
8/23/17 16:19	25.61	8/25/17 7:19	24.33	8/26/17 22:19	25.22	8/28/17 13:19	25.22		
8/23/17 16:49	25.56	8/25/17 7:49	24.39	8/26/17 22:49	25.22	8/28/17 13:49	25.28		
8/23/17 17:19	25.56	8/25/17 8:19	24.44	8/26/17 23:19	25.17	8/28/17 14:19	25.33		
8/23/17 17:49	25.5	8/25/17 8:49	24.83	8/26/17 23:49	25.06	8/28/17 14:49	25.33		
8/23/17 18:19	25.44	8/25/17 9:19	25	8/27/17 0:19	24.94	8/28/17 15:19	25.39		
8/23/17 18:49	25.39	8/25/17 9:49	25.06	8/27/17 0:49	24.89	8/28/17 15:49	25.44		
8/23/17 19:19	25.33	8/25/17 10:19	25.11	8/27/17 1:19	24.78	8/28/17 16:19	25.56		
8/23/17 19:49	25.28	8/25/17 10:49	25.22	8/27/17 1:49	24.72	8/28/17 16:49	25.56		
8/23/17 20:19	25.22	8/25/17 11:19	25.28	8/27/17 2:19	24.61	8/28/17 17:19	25.61		
8/23/17 20:49	25.17	8/25/17 11:49	25.33	8/27/17 2:49	24.56	8/28/17 17:49	25.61		
8/23/17 21:19	25.17	8/25/17 12:19	25.39	8/27/17 3:19	24.5	8/28/17 18:19	25.67		
8/23/17 21:49	25.11	8/25/17 12:49	25.39	8/27/17 3:49	24.44	8/28/17 18:49	25.61		
8/23/17 22:19	25.11	8/25/17 13:19	25.44	8/27/17 4:19	24.33	8/28/17 19:19	25.56		
8/23/17 22:49	25.11	8/25/17 13:49	25.44	8/27/17 4:49	24.28	8/28/17 19:49	25.5		
8/23/17 23:19	25.06	8/25/17 14:19	25.39	8/27/17 5:19	24.22	8/28/17 20:19	25.44		
8/23/17 23:49	25.06	8/25/17 14:49	25.39	8/27/17 5:49	24.17	8/28/17 20:49	25.39		
8/24/17 0:19	25	8/25/17 15:19	25.39	8/27/17 6:19	24.11	8/28/17 21:19	25.33		
8/24/17 0:49	24.94	8/25/17 15:49	25.39	8/27/17 6:49	24.06	8/28/17 21:49	25.33		

Quality Control Chart *Pimephales promelas*

IC_{25}

American Aquatic Testing, Inc. - Chronic Toxicity
Chart date: 8/31/17 Chart: #746



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

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

CHAIN OF CUSTODY

Contact Henry Stepnowski
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	Toxicity Testing Req'd.: Acute	Chronic	Sediment	Other
01	3.0						Final	24hr. Comp	4gal	8/20-21/17	0800-0800		✓		
02	3.0						Final	24hr. Comp	3gal	8/22-23/17	0800-0800		✓		
03	4.0						Final	24hr. Comp	5gal	8/24-25/17	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]	T. Pallop	8/21/17	1337	T. Pallop	[signature]	8/21/17	1435	171706
02	[signature]	T. Pallop	8/23/17	1315	T. Pallop	[signature]	8/23/17	1440	171723
03	[signature]	T. Pallop	8/25/17	1135	T. Pallop	[signature]	8/25/17	1350	171743

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?
08/21/17, 0800	**Final effluent**	**3.0 °C**	**24 hours**	**0.02** mg/L	__Yes _x_No
08/23/17, 0800	**Final effluent**	**3.0 °C**	**24 hours**	**0.01** mg/L	__Yes _x_No
08/25/17, 0800	**Final effluent**	**4.0 °C**	**24 hours**	**0.00** mg/L	__Yes _x_No

TEST CONDITIONS

Date/Time of Test Initiation **08/22/17, 1510** Date/Time of Test Termination **08/29/17, 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: **<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: **24.0-25.7 °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: **08/26/17** 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): **90 %** Young per Surviving Female (if applicable): **29.2**

REFERENCE TOXICITY TESTS

Date of most recent test: **07/20/17** 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** Fail	Reproduction: **X Pass** 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		09/12/17	**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: **19.7%** 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	18	29.2	17.447
24%	5	30.4	31.975
48%	24	30.9	12.056
72%	24	28.3	10.409
96%	14	26.5	22.236
100%	24	27.2	12.474

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	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	7.7	8.1	7.3	8.3	273	295
24%	Raw	Raw	7.7	8.0	7.4	8.4		
48%			7.7	7.9	7.3	8.7		
72%	Data	Data	7.6	8.0	7.3	9.1		
96%			7.6	8.0	7.2	9.6		
100%			7.5	8.2	7.2	10.2	2707	3005

REFERENCE TEST

Reference toxicant: Potassium chloride

Test Start: **07/20/17, 1500** Test terminated: **07/26/17, 1800**

Control survival: **100 %**

Test NOEC: **250** ppm (Reproduction) Test # 246 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: 8/29/2017

Replicate No.	Control	TIWC
1	1	1
2	1	1
3	1	1
4	1	1
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	1.000
Std Dev.	0.000	0.000
# 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: 8/29/2017

Replicate No.	Control	TIWC
1	32	29
2	31	22
3	18	32
4	27	32
5	31	14
6	24	30
7	29	29
8	32	28
9	36	20
10	32	29
11		
12		
13		
14		
15		
Mean	29.200	26.500
Std Dev.	5.095	5.893
# Replicates	10	10

T-Test Result	2.0713
Deg. of Freedom	16
Critical T Value	0.8647
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 Number: 414-01-01

Beginning Date & Time: 8-22-17 1510
Ending Date & Time: 8-29-17 1610

Ceriodaphnia dubia, Survival and Reproduction Test

American Aquatic Testing, Inc.,

Survival / Reproduction Data

Day	Conc. Control		Replicate 1	2	3	4	5	6	7	8	9	10	Initals
1	N	B	0	0	0	0	0	0	0	0	0	0	MP
2	N	B	0	0	0	0	0	0	0	0	0	0	JO
3	N	B	0	0	0	0	0	0	0	0	0	0	JK
4	N	B	6 1	7 1	6 1	4 1	4 1	4 1	5 1	6 1	4 1	2 1	TAP
5	N	B	12 2	9 2	0	10 2	12 2	10 2	12 2	10 2	12 2	15 2	MP
6	N	B	14 3	15 3	0	13 3	15 3	0	12 3	0	0	0	TAP
7	N	B	0	0	12 2	0	0	10 3	0	16 3	20 3	15 3	TAP
8	N	B											
	Tot N	Tot B	32 3	31 3	18 2	27 3	31 3	24 3	29 3	32 3	36 3	32 3	Tot A 10

Average Neonates per Female = 29.2 % Females with 3rd Brood = 90

Day	Conc. 24%		Replicate 1	2	3	4	5	6	7	8	9	10	Initals
1	N	B	0	0	0	0	0	0	0	0	0	0	MP
2	N	B	0	0	0	0	0	0	0	0	0	0	JO
3	N	B	0	0	0	0	0	0	0	0	0	0	JK
4	N	B	6 1	6 1	6 1	5 1	6 1	6 1	4 1	6 1	6 1	6 1	TAP
5	N	B	12 2	15 2	14 2	D -	12 2	12 2	8 2	13 2	12 2	12 2	MP
6	N	B	16 3	0	18 3	- -	0	0	0	0	0	0	TAP
7	N	B	0	17 3	0	- -	12 3	14 3	13 3	14 3	18 3	15 3	TAP
8	N	B											
	Tot N	Tot B	34 3	38 3	38 3	5 1	30 3	32 3	25 3	33 3	36 3	33 3	Tot A 9

Average Neonates per Female = 30.4 % Females with 3rd Brood = 90

Day	Conc. 48%		Replicate 1	2	3	4	5	6	7	8	9	10	Initals
1	N	B	0	0	0	0	0	0	0	0	0	0	MP
2	N	B	0	0	0	0	0	0	0	0	0	0	JO
3	N	B	0	0	0	0	0	0	0	0	0	0	JK
4	N	B	4 1	5 1	5 1	6 1	4 1	6 1	7 1	7 1	6 1	8 1	TAP
5	N	B	12 2	13 2	11 2	12 2	10 2	8 2	13 2	11 2	6 2	10 2	MP
6	N	B	16 3	0	16 3	14 3	0	0	0	0	0	0	TAP
7	N	B	0	12 3	0	0	20 3	10 3	17 3	12 3	14 3	14 3	TAP
8	N	B											
	Tot N	Tot B	32 3	30 3	32 3	32 3	34 3	24 3	37 3	30 3	26 3	32 3	Tot A 10

Average Neonates per Female = 30.9 % Females with 3rd Brood = 100

(N=Neonates, B=Broods, A=Alive)

Observations:

CHCDLCRP.wk3

Project Number: 414-01-01

Beginning Date & Time: 8-22-17 1510
Ending Date & Time: 8-29-07 1610

Ceriodaphnia dubia, Survival and Reproduction Test

American Aquatic Testing, Inc.,

Survival / Reproduction Data

Day	Conc. 72%		Replicate 1	2	3	4	5	6	7	8	9	10	Initals
1	N	B	0	0	0	0	0	0	0	0	0	0	MO
2	N	B	0	0	0	0	0	0	0	0	0	0	JO
3	N	B	0	0	0	0	0	0	0	0	0	0	JK
4	N	B	4 1	6 1	5 1	4 1	6 1	4 1	6 1	6 1	6 1	5 1	TAP
5	N	B	10 2	10 2	11 2	10 2	10 2	8 2	10 2	8 2	10 2	7 2	MO
6	N	B	16 3	0	0	0	0	0	0	0	0	0	TAP
7	N	B	0	12 3	14 3	13 3	9 3	12 3	18 3	16 3	10 3	17 3	TAP
8	N	B											
	Tot N	Tot B	30 3	28 3	30 3	27 3	25 3	24 3	34 3	30 3	26 3	29 3	Tot A
													10

Average Neonates per Female = 28.3 % Females with 3rd Brood = 100

Day	Conc. 96%		Replicate 1	2	3	4	5	6	7	8	9	10	Initals
1	N	B	0	0	0	0	0	0	0	0	0	0	MO
2	N	B	0	0	0	0	0	0	0	0	0	0	JO
3	N	B	0	0	0	0	0	0	0	0	0	0	JK
4	N	B	4 1	4 1	5 1	6 1	2 1	4 1	3 1	5 1	4 1	4 1	TAP
5	N	B	8 2	10 2	11 2	10 2	0	8 2	8 2	9 2	8 2	10 2	MO
6	N	B	17 3	0	0	16 3	12 2	0	6	0	6	0	TAP
7	N	B	0	8 3	16 3	0	0	18 3	18 3	14 3	8 3	15 3	TAP
8	N	B											
	Tot N	Tot B	29 3	22 3	32 3	32 3	14 2	30 3	29 3	28 3	20 3	29 3	Tot A
													10

Average Neonates per Female = ~~23.3~~ (1) % Females with 3rd Brood = 90

Day	Conc. 100%		Replicate 1	2	3	4	5	6	7	8	9	10	Initals
1	N	B	0	0	0	0	0	0	0	0	0	0	MO
2	N	B	0	0	0	0	0	0	0	0	0	0	JO
3	N	B	0	0	0	0	0	0	0	0	0	0	JK
4	N	B	4 1	5 1	6 1	6 1	4 1	4 1	6 1	7 1	6 1	4 1	TAP
5	N	B	10 2	9 2	8 2	8 2	8 2	8 2	8 2	9 2	6 2	8 2	MO
6	N	B	14 3	8	10 3	10 3	12 3	0	6	6	0	6	TAP
7	N	B	0	16 3	0	0	0	12 3	15 3	18 3	14 3	17 3	TAP
8	N	B										(2)	
	Tot N	Tot B	28 3	30 3	24 3	24 3	24 3	24 3	29 3	34 3	26 3	31 3	Tot A
													10

Average Neonates per Female = ~~27.4~~ (3) % Females with 3rd Brood = 100

(N=Neonates, B=Broods, A=Alive)

Observations: (1) 26.5 (2) 29 (3) 27.2 ER 8/30

CHCDLCRP.wk3

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

Start Date & Time: 8-22-17 1510
End Date & Time: 8-29-17 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	8.1	8.0	8.2	8.2	8.0	7.9	8.3	
	24%	8.3	8.3	8.2	8.2	8.3	8.1	8.4	
	48%	8.7	8.4	8.2	8.3	8.4	8.4	8.7	
	72%	9.1	8.8	8.6	8.4	8.1	8.4	8.9	
	96%	9.6	9.2	8.9	8.6	8.4	8.8	9.3	
	100%	10.2	9.9	9.3	8.9	8.9	8.9	9.9	
	—								
pH	Control	7.9	7.9	8.0	8.1	8.1	8.1	7.9	
	24%	7.9	7.9	7.9	7.9	8.0	7.9	7.9	
	48%	7.8	7.9	7.8	7.9	7.9	7.8	7.7	
	72%	7.8	7.8	7.8	7.9	7.7	7.8	7.6	
	96%	7.8	7.8	7.8	7.9	7.6	7.7	7.6	
	100%	7.8	7.8	7.7	7.9	7.6	7.6	7.5	
	—								
	Initials	JO	EKH	JK	EKH	MF	MP	EKH	
	Date	8/22	8/23	8/24	8/25	8/26	8/27	8/28	

Conductivity (umhos/cm)		
Date	Control	100%
8/22	273	2989
8/24	295	3005
8/26	295	2707

Alkalinity (mg/L as CaCO3)		
Date	Control	100%
8/22	50	120
8/24	70	130
8/26	70	110

Hardness (mg/L as CaCO3)		
Date	Control	100%
8/22	100	180
8/24	100	190
8/26	100	230
Initials	EKH	EKH

Final Readings

Parameter	Concentration	Day 1	2	3	4	5	6	7	8
Dissolved Oxygen (mg/L)	Control	7.7	7.6	7.8	8.0	7.4	8.0	7.3	
	24%	7.8	7.6	7.7	7.9	7.4	7.9	7.6	
	48%	7.3	7.4	7.8	8.1	7.4	8.0	7.6	
	72%	7.3	7.7	7.9	8.1	7.4	7.8	7.3	
	96%	7.2	7.9	7.9	8.1	7.4	8.1	7.4	
	100%	7.2	7.9	7.9	8.2	7.4	8.0	7.5	
	—								
pH	Control	7.8	7.8	7.9	7.9	7.9	7.7	7.8	
	24%	7.7	7.8	7.8	7.9	8.0	7.7	7.8	
	48%	7.7	7.8	7.8	7.9	7.9	7.7	7.7	
	72%	7.8	7.9	7.8	8.0	7.8	7.8	7.7	
	96%	7.8	7.9	7.9	8.0	7.8	7.8	7.7	
	100%	7.9	8.0	8.0	8.0	7.9	7.8	7.8	
	—								
	Initials	JO	MF	MF	TAP	MP	TAP	EKH	
	Date	8/23	8/24	8/25	8/26	8/27	8/28	8/29	

Chlorine (mg/L)		
Date	Control	100%
8/22	0.00	0.02
8/24	0.00	0.01
8/26	0.00	0.00

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

Observations:

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	8/22/2017	Test ID:	4140101cdc	Sample ID:	Towamencin
End Date:	8/29/2017	Lab ID:	AAT, Inc	Sample Type:	Composite
Sample Date:		Protocol:	EPAF 94-EPA/600/4-91/002	Test Species:	CD-Ceriodaphnia dubia
Comments:					

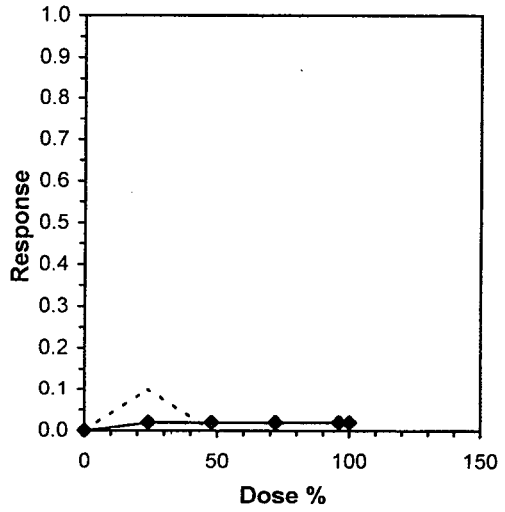
Conc-%	1	2	3	4	5	6	7	8	9	10
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
24	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
48	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
72	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
96	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000	1.0000	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	0.9000	0.9000	1	9	10	10	0.5000	0.0500	0.9800	0.9800
48	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0.9800	0.9800
72	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0.9800	0.9800
96	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0.9800	0.9800
100	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0.9800	0.9800

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	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



ToxCalc v5.0.23

Reviewed by: EK

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	8/22/2017	Test ID:	4140101cdc	Sample ID:	Towamencin
End Date:	8/29/2017	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	32.000	31.000	18.000	27.000	31.000	24.000	29.000	32.000	36.000	32.000
24	34.000	38.000	38.000	5.000	30.000	32.000	25.000	33.000	36.000	33.000
48	32.000	30.000	32.000	32.000	34.000	24.000	37.000	30.000	26.000	32.000
72	30.000	28.000	30.000	27.000	25.000	24.000	34.000	30.000	26.000	29.000
96	29.000	22.000	32.000	32.000	14.000	30.000	29.000	28.000	20.000	29.000
100	28.000	30.000	24.000	24.000	24.000	24.000	29.000	34.000	26.000	29.000

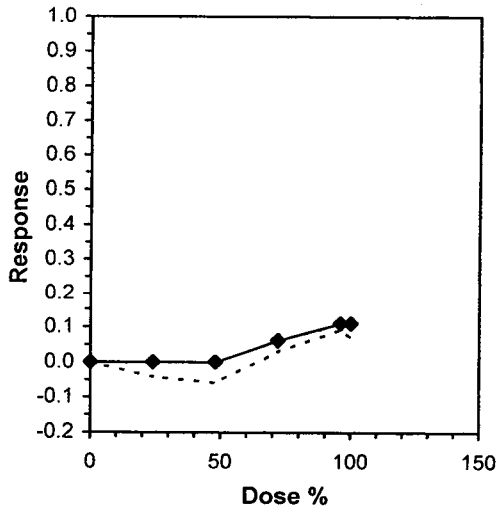
			Transform: Untransformed						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	29.200	1.0000	29.200	18.000	36.000	17.447	10				30.167	1.0000
24	30.400	1.0411	30.400	5.000	38.000	31.975	10	-0.478	2.287	5.743	30.167	1.0000
48	30.900	1.0582	30.900	24.000	37.000	12.056	10	-0.677	2.287	5.743	30.167	1.0000
72	28.300	0.9692	28.300	24.000	34.000	10.409	10	0.358	2.287	5.743	28.300	0.9381
96	26.500	0.9075	26.500	14.000	32.000	22.236	10	1.075	2.287	5.743	26.850	0.8901
100	27.200	0.9315	27.200	24.000	34.000	12.474	10	0.796	2.287	5.743	26.850	0.8901

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.05)	1.19122	0.895	-2.0759	7.6749
Bartlett's Test indicates unequal variances (p = 2.60E-03)	18.2959	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	5.74303	0.19668	30.43	31.5389	0.44755	5, 54
Treatments vs Control										

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL	Skew
IC05	67.393			
IC10	91.034			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



ToxCalc v5.0.23

Reviewed by: ER

Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)	Date Time	Temp (C)
8/22/17 10:19	25.33	8/24/17 1:19	24.89	8/25/17 16:19	25.39	8/27/17 7:19	24.06	8/28/17 22:19	25.28
8/22/17 10:49	25.39	8/24/17 1:49	24.89	8/25/17 16:49	25.33	8/27/17 7:49	24.06	8/28/17 22:49	25.22
8/22/17 11:19	25.44	8/24/17 2:19	24.83	8/25/17 17:19	25.28	8/27/17 8:19	24.11	8/28/17 23:19	25.17
8/22/17 11:49	25.5	8/24/17 2:49	24.78	8/25/17 17:49	25.28	8/27/17 8:49	24.22	8/28/17 23:49	25.06
8/22/17 12:19	25.56	8/24/17 3:19	24.78	8/25/17 18:19	25.22	8/27/17 9:19	24.39	8/29/17 0:19	24.94
8/22/17 12:49	25.61	8/24/17 3:49	24.72	8/25/17 18:49	25.17	8/27/17 9:49	24.5	8/29/17 0:49	24.89
8/22/17 13:19	25.67	8/24/17 4:19	24.67	8/25/17 19:19	25.17	8/27/17 10:19	24.61	8/29/17 1:19	24.78
8/22/17 13:49	25.67	8/24/17 4:49	24.61	8/25/17 19:49	25.11	8/27/17 10:49	24.72	8/29/17 1:49	24.67
8/22/17 14:19	25.72	8/24/17 5:19	24.56	8/25/17 20:19	25.11	8/27/17 11:19	24.83	8/29/17 2:19	24.61
8/22/17 14:49	25.78	8/24/17 5:49	24.56	8/25/17 20:49	25.06	8/27/17 11:49	24.89	8/29/17 2:49	24.5
8/22/17 15:19	25.83	8/24/17 6:19	24.5	8/25/17 21:19	25.06	8/27/17 12:19	25.06	8/29/17 3:19	24.44
8/22/17 15:49	25.89	8/24/17 6:49	24.5	8/25/17 21:49	25.06	8/27/17 12:49	25.17	8/29/17 3:49	24.33
8/22/17 16:19	25.89	8/24/17 7:19	24.5	8/25/17 22:19	25.06	8/27/17 13:19	25.28	8/29/17 4:19	24.28
8/22/17 16:49	25.89	8/24/17 7:49	24.56	8/25/17 22:49	25	8/27/17 13:49	25.33	8/29/17 4:49	24.17
8/22/17 17:19	25.89	8/24/17 8:19	24.56	8/25/17 23:19	24.94	8/27/17 14:19	25.44	8/29/17 5:19	24.11
8/22/17 17:49	25.89	8/24/17 8:49	24.61	8/25/17 23:49	24.89	8/27/17 14:49	25.5	8/29/17 5:49	24.06
8/22/17 18:19	25.89	8/24/17 9:19	24.61	8/26/17 0:19	24.83	8/27/17 15:19	25.56	8/29/17 6:19	24.06
8/22/17 18:49	25.83	8/24/17 9:49	24.67	8/26/17 0:49	24.78	8/27/17 15:49	25.61	8/29/17 6:49	24
8/22/17 19:19	25.78	8/24/17 10:19	24.78	8/26/17 1:19	24.72	8/27/17 16:19	25.61	8/29/17 7:19	24
8/22/17 19:49	25.72	8/24/17 10:49	24.94	8/26/17 1:49	24.61	8/27/17 16:49	25.56	8/29/17 7:49	24.06
8/22/17 20:19	25.72	8/24/17 11:19	25.11	8/26/17 2:19	24.56	8/27/17 17:19	25.56	8/29/17 8:19	24.06
8/22/17 20:49	25.67	8/24/17 11:49	25.28	8/26/17 2:49	24.5	8/27/17 17:49	25.5	8/29/17 8:49	24.11
8/22/17 21:19	25.61	8/24/17 12:19	25.44	8/26/17 3:19	24.44	8/27/17 18:19	25.44	8/29/17 9:19	24.17
8/22/17 21:49	25.56	8/24/17 12:49	25.5	8/26/17 3:49	24.39	8/27/17 18:49	25.39	8/29/17 9:49	24.22
8/22/17 22:19	25.5	8/24/17 13:19	25.56	8/26/17 4:19	24.28	8/27/17 19:19	25.33	8/29/17 10:19	24.33
8/22/17 22:49	25.44	8/24/17 13:49	25.56	8/26/17 4:49	24.22	8/27/17 19:49	25.33	8/29/17 10:49	24.44
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8/23/17 0:19	25.33	8/24/17 15:19	25.56	8/26/17 6:19	24.06	8/27/17 21:19	25.22	8/29/17 12:19	24.78
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8/23/17 1:49	25.22	8/24/17 16:49	25.5	8/26/17 7:49	24.06	8/27/17 22:49	25.17	8/29/17 13:49	25.11
8/23/17 2:19	25.22	8/24/17 17:19	25.44	8/26/17 8:19	24.11	8/27/17 23:19	25.11	8/29/17 14:19	25.22
8/23/17 2:49	25.17	8/24/17 17:49	25.39	8/26/17 8:49	24.11	8/27/17 23:49	25.06	8/29/17 14:49	25.33
8/23/17 3:19	25.17	8/24/17 18:19	25.39	8/26/17 9:19	24.22	8/28/17 0:19	24.94	8/29/17 15:19	25.44
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8/23/17 12:19	25.44	8/25/17 3:19	24.67	8/26/17 18:19	25.61	8/28/17 9:19	24.44		
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8/23/17 14:19	25.61	8/25/17 5:19	24.44	8/26/17 20:19	25.44	8/28/17 11:19	24.78		
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8/23/17 17:49	25.5	8/25/17 8:49	24.83	8/26/17 23:49	25.06	8/28/17 14:49	25.33		
8/23/17 18:19	25.44	8/25/17 9:19	25	8/27/17 0:19	24.94	8/28/17 15:19	25.39		
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8/23/17 19:19	25.33	8/25/17 10:19	25.11	8/27/17 1:19	24.78	8/28/17 16:19	25.56		
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8/23/17 21:19	25.17	8/25/17 12:19	25.39	8/27/17 3:19	24.5	8/28/17 18:19	25.67		
8/23/17 21:49	25.11	8/25/17 12:49	25.39	8/27/17 3:49	24.44	8/28/17 18:49	25.61		
8/23/17 22:19	25.11	8/25/17 13:19	25.44	8/27/17 4:19	24.33	8/28/17 19:19	25.56		
8/23/17 22:49	25.11	8/25/17 13:49	25.44	8/27/17 4:49	24.28	8/28/17 19:49	25.5		
8/23/17 23:19	25.06	8/25/17 14:19	25.39	8/27/17 5:19	24.22	8/28/17 20:19	25.44		
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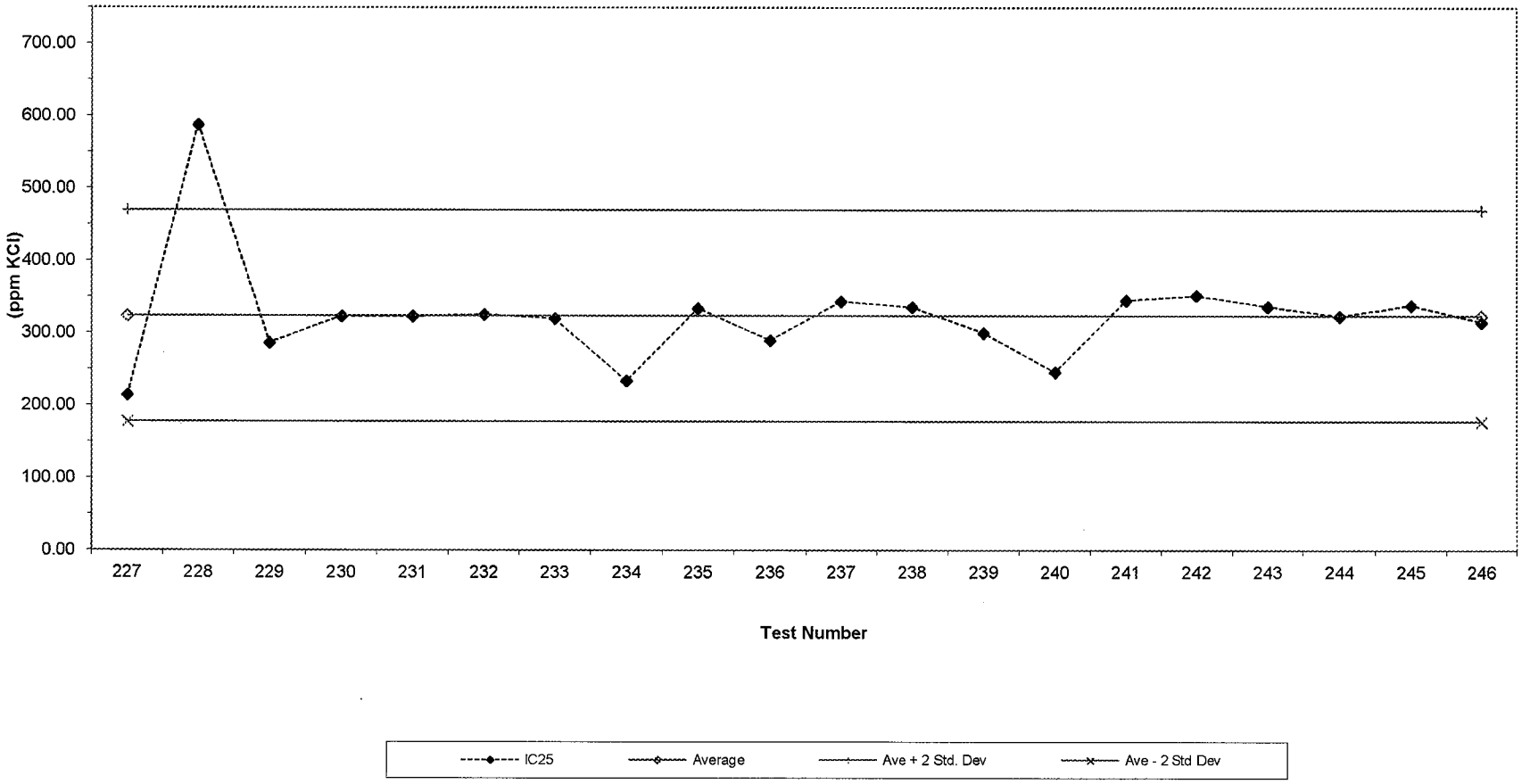
8/24/17 0:19	25	8/25/17 15:19	25.39	8/27/17 6:19	24.11	8/28/17 21:19	25.33		
8/24/17 0:49	24.94	8/25/17 15:49	25.39	8/27/17 6:49	24.06	8/28/17 21:49	25.33		

Quality Control Chart *Ceriodaphnia dubia*

IC_{25}

American Aquatic Testing, Inc. - Chronic Toxicity
Chart date: 7/27/17 Chart #: 232