RESULTS OF CHRONIC TOXICITY TESTS

3-brood- *Ceriodaphnia dubia* static definitive renewal
7-day - *Pimephales promelas* static definitive renewal

Test date: March 16-23, 2021
Sampling period: March 14-19, 2021
Report date: March 31, 2021

Conducted For:

TOWAMENCIN MA
2225 Kriebel Rd
Lansdale, PA 19446

NPDES: PA0039004

Conducted and Prepared By:

ENVIROSCIENCE, INCORPORATED
5070 Stow Rd.
Stow, OH 44224

EnviroScience
Excellence In Any Environment

For ENVIROSCIENCE, INC.:

Katherine L. Hansler, Aquatic Biologist

For TOWAMENCIN MA:

_____, _____
(signature) (title)

March 31, 2021

Mr. Ralph Jacoby
Towamencin MA
2225 Kriebel Rd
Lansdale, PA 19446

Dear Mr. Jacoby:

Enclosed is a copy of EnviroScience's report for the following Whole Effluent Toxicity (WET) tests that were initiated on March 16, 2021:

(1) 3-brood static, renewal chronic bioassay using *Ceriodaphnia dubia* (water flea) and
(1) 7-day static, renewal chronic bioassay using *Pimephales promelas* (fathead minnow).

The tested concentrations were 24, 48, 72, 96, and 100 percent effluent diluted with moderately hard water. The TIWC is 96%. Endpoints are listed below.

WET endpoints for Towamencin MA; 03/2021
sampling period: 03/14-19/21

C. dubia acute endpoint:	48-hour LC_{50} = >100% effluent, TU_a = <1.0	
C. dubia chronic endpoints:	NOEC=	100% effluent
	LOEC=	>100% effluent
	Ch V=	>100% effluent
	TU_c=	1.0 as 100÷NOEC
	IC_{25} =	>100% effluent (TU_c as 100÷IC_{25} = <1.0)
	TIWC =	Pass (survival and reproduction)
P. promelas acute endpoint:	48-hour LC_{50} = >100% effluent	
	96-hour LC_{50} = >100% effluent; TU_a = <1.0	
P. promelas chronic endpoints:	NOEC=	100% effluent
	LOEC=	>100% effluent
	Ch V=	>100% effluent
	TU_c=	1.00 as 100÷NOEC
	IC_{25} =	>100% effluent (TU_c as 100÷IC_{25} = <1.0)
	TIWC =	Pass (survival and growth)

Please call me if you have any questions.

Sincerely,

Katherine L. Hansler

Katherine L. Hansler, Aquatic Biologist

enclosures

EnviroScience
5070 Stow Road
Stow, OH 44224
Toll Free: 800-940-4025 | Office: 330-688-0111 | Fax: 330-688-3858

TABLE 1.
Toxicity Test Report - General Information

1. Facility/Discharger: Towamencin MA Report Date: 03/31/21

2. Facility Address: 2225 Kriebel Rd, Lansdale, PA 19446

3. NPDES Permit #: PA0039004 4. Receiving Stream: _____

5. Facility Contact: Ralph Jacoby 6. Phone #: 215-855-8165

7. Testing Lab Name: EnviroScience, Inc., 5070 Stow Rd., Stow, OH 44224
PA Certification: 68-01628

8. Lab contact: Kate Hansler 9. Phone #: 330-688-0111

10. Outfall(s) Tested: 001

11. Test Species: *Ceriodaphnia dubia* Method: EPA 1002.0
Pimephales promelas Method: EPA 1000.0

12. Test Conditions: chronic, static-renewal, 3-brood *C. dubia*, 7-day *P. promelas*

13. Dechlorination? yes Original Chlorine Level: <0.02, 0.083, 0.149 mg/l

14. Report Contents:
Report Contents:

General information .....Table 1
Sampling information .....Table 2
Test dates and times.....Table 2
Test conditions.....Table 3
Initial chemistry .....Table 4
Test results *C. dubia* .....Table 5
Test results *P. promelas* .....Table 6
Additional information .....Table 7
SRT information, dechlorination procedure, deviations/relevant information, summary of results, list of endpoints

Chain-of-Custody/bench sheets/analysis Attachment A
SRT Control Charts

Katherine L. Hansler
Signature of preparer

03/31/21
Date

Katherine L. Hansler
Name (typed or printed)

Aquatic Biologist
Title

TABLE 2

Sampling Summary					
Outfall	Sample Type grab/composite	Volume Received	Sample Collection		Flow - MGD
			Begin MM/DD/YY-Time	End MM/DD/YY-Time	
001	composite	3 gal	03/14/21-0800	03/15/21-0800	
001	composite	3 gal	03/16/21-0800	03/17/21-0800	
001	composite	4 gal	03/18/21-0800	03/19/21-0800	

Dates/Times of Test Performance:			
Ceriodaphnia dubia		*Pimephales promelas*	
Start Date: MM/DD/YY	03/16/21	Start Date: MM/DD/YY	03/16/21
Start Time:	1245 hrs	Start Time:	1205 hrs
End Date: MM/DD/YY	03/22/21	End Date: MM/DD/YY	03/23/21
End Time:	1345 hrs	End Time:	1305 hrs

Comments: Sample receipt in the testing laboratory and sample temperature upon receipt:

1. 03/16/21 at 1105 hrs; 2.9 °C
2. 03/18/21 at 0945 hrs; 1.6 °C
3. 03/20/21 at 1130 hrs; 0.5 °C

TABLE 3

Summary of toxicity test conditions for chronic testing with *Ceriodaphnia dubia* or *Pimephales promelas*.			
		Ceriodaphnia dubia	*Pimephales promelas*
1.	Age and origin of test organisms:	12.75-20.75 hours, EnviroScience 03/15/21, 1600-2400	<24 hours, ES 03/15/21-1445
2.	Test type and duration:	static, daily renewal, until 60% of control specimens produce 3rd brood	static, daily renewal, 7 days
3.	Light quality and intensity:	wide spectrum fluorescent/50-100 fc	wide spectrum fluorescent/50-100 fc
4.	Photoperiod:	16/8 hours light/dark	16/8 hours light/dark
5.	Test solution temperatures °C:	25.0±1.0	25.0±1.0
6.	Feeding regime:	daily: alga *Selenastrum capricornutum* to provide approx. 2.3×10^5 cells/ml; and 0.1ml YAT concentrate	200-600 newly hatched brine shrimp, *Artemia salina* per vessel twice daily, at start and end of workday
7.	Size of test vessel:	30 ml plastic cup	600 ml glass beaker
8.	Volume and depth of test solutions:	15 ml and 24 mm	250 ml and 4.2 cm
9.	No. of test organisms per vessel:	1	10
10.	No. of vessels per solution:	10	4
11.	Total no. of organisms per solution:	10	40
12.	Test concentrations as percent effluent:	24, 48, 72, 96, and 100	24, 48, 72, 96, and 100
13.	Renewal MM/DD-test days:	03/16-0,1; 03/18-2,3; 03/20-4,5,6	03/16-0,1; 03/18-2,3; 03/20-4,5,6
14.	Dilution and primary control water:	moderately hard reconstituted water (MHRW)	dilute mineral water (DMW)
15.	Secondary control:	NA	NA
16.	Aeration:	not necessary	not necessary
17.	Endpoints:	mortality - no movement with gentle prodding (LC_{50}, TU_a); survival and reproduction NOEC (TU_c)	mortality - no movement with gentle prodding (LC_{50}, TU_a); survival and growth NOEC (TU_c)
18.	Disease treatment:		no
19.	Drying time and temperature:		24 hours at 60°C, cooled in desiccator

Notes: [1] Adverse effects are also recorded but are not used to calculate toxicity endpoints (e.g. NOEC, TU_c). Adverse effects include cumulative mortality plus behavioral effects such as immobility, atypical swimming, loss of equilibrium, or some other specified condition.

TABLE 4

Initial Water Quality. Values of pH, dissolved oxygen (DO) concentration, conductivity, total alkalinity, total hardness, and total residual chlorine for each new sample of effluent or control water. Values recorded for effluent and renewal solutions on intermediate days and values recorded for final solutions are tabulated on bench sheets in the Attachment.

Sample	DO mg/l	pH s.u.	Conductivity µmho/cm	Alkalinity mg/l $CaCO_3$	Hardness mg/l $CaCO_3$	Residual Chlorine mg/l	Ammonia mg/l
100% effluent:							
16 March 21	8.6	6.8	2200	60	160	<0.02	0.82
18 March 21	8.6	6.8	3070	66	180	0.083/<0.02*	0.57
20 March 21	8.6	7.2	2880	68	168	0.149/<0.02*	1.14

*effluent was dechlorinated using sodium thiosulfate

Comments:
These results are only supporting data. Results cannot be reported to PA DEP for NPDES compliance.

Methods or Instrumentation used in chemical analysis:

Dissolved Oxygen: APHA (1998, 20th ed.) 4500-O G., YSI 5100
pH: APHA (1998, 20th ed.) 4500-H^+ B., Orion 920A/Orion 2Star
Conductivity: APHA (1998, 20th ed.) 2510 B., Orion 160
Total Alkalinity: APHA (1998, 20th ed.) 2320 B.
Total Hardness: APHA (1998, 20th ed.) 2340 C.
Total Residual Chlorine: APHA (1998, 20th ed.) 4500-Cl D., HACH Auto CAT 9000
Ammonia nitrogen: APHA (1992, 18th ed.) 4500-NH_3 C., HI 95715

TABLE 5

Results of a 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test
Conducted 03/16/21 – 03/22/21 using Effluent from Outfall 001.

Test Solutions	Cumulative Percent Survival[a] Test Day							No. Young Produced per Specimen	
	1	2	3	4	5	6	7	Mean[a]	%CV
MHRW control/ dilution water	100	100	100	100	100	100	NA	28.8	6.51
24% Effluent	100	100	100	100	100	100	NA	31.2	21.36
48% Effluent	100	100	100	100	100	100	NA	38.0	8.50
72% Effluent	100	100	100	100	100	100	NA	36.0	13.03
96% Effluent	100	100	100	100	100	100	NA	36.1	15.86
100% Effluent	100	100	100	100	100	100	NA	30.8	31.21

Acute 48-Hour LC_{50} = >100% 95% C.I. Lower Limit: --- 95% C.I. Upper Limit: ---	Survival NOEC = 100%	Reproduction NOEC = 100%	**Chronic Toxicity Unit (TUc):**
	Survival LOEC = >100%	Reproduction LOEC = >100%	**1.0 (100÷NOEC)**
Acute Toxicity Unit (TUa): <1.0 (100÷LC_{50})	Chronic Value Survival = >100%	Chronic Value Reprod. = >100%	
		IC_{25} = >100% IC_{50} = >100%	**TUc as 100÷IC_{25}: <1.0**

Methods used to determine LC_{50}: None needed.

Methods used to determine NOEC: Shapiro-Wilk's, Bartlett's (fail), Steel's, ICp model; Cetis 1.9.6.

[a] - * indicates significant reduction from the primary control group (α= 0.05).

control group % survival	control group mean # young/survivor	control group %CV for mean young	control group % producing 3 broods
100	28.8	6.51	100

TABLE 6

Results of a 7-Day *Pimephales promelas* Survival and Growth Test Conducted 03/16/21 – 03/23/21 Using Effluent from Outfall 001.

Test Solutions	Cumulative Percent Survival[a] Test Day							Dry Weight (mg) (based on number exposed)	
	1	2	3	4	5	6	7	Mean[a]	%CV
DMW control/ dilution water	100	100	100	100	100	100	95	0.416	14.68
24% Effluent	100	100	100	100	100	92	90	0.501	13.12
48% Effluent	100	98	98	88	82	82	82	0.493	8.08
72% Effluent	100	100	98	90	88	88	88	0.472	25.66
96% Effluent	100	100	98	95	88	85	80	0.477	12.53
100% Effluent	100	100	100	98	98	98	95	0.593	9.67

Acute **96**-Hour LC_{50} = >100% (48-Hour LC_{50} = >100%)	Survival NOEC = 100%	Growth NOEC = 100%	**Chronic Toxicity Unit (TUc):** **1.0 (100÷NOEC)**
95% C.I. Lower Limit: --- 95% C.I. Upper Limit: ---	Survival LOEC = >100%	Growth LOEC = >100%	
Acute Toxicity Unit (TUa): <1.0 (100÷96-Hour LC_{50})	Chronic Value Survival = >100%	Chronic Value Growth = >100%	
		IC_{25} = >100%	**TU_c as 100÷IC_{25}: <1.0**

Methods used to determine LC_{50}: None needed.

Methods used to determine NOEC: Shapiro-Wilk's, Bartlett's (pass), Dunnett's, ICp model; Cetis 1.9.6.

[a] - * indicates significant reduction from the primary control group (α= 0.05).

control group mean survival proportion	control group survival % CV	control group mean dry weight per **survivor** (mg)	control group dry weight %CV
0.95	10.5	0.437	7.8

Comments: NA = not applicable. SD = sample standard deviation. CV = SD÷mean.

TABLE 7 - Additional Toxicity Test Information

7.1 Standard Reference Toxicant (SRT) Test results (control charts are attached).

Reference Toxicant Test Results							
Species	Date	Duration	Toxicant/ Diluent	control specimens surviving %	controls: mean # young or mean dry weight (mg)	Results	Within control limits?
*C. dubia**	02/16/21-02/22/21	6 days	NaCl/ MHRW	100	33.5 young	IC_{25}: 1.119 g/L	yes
*P. promelas**	02/16/21-02/23/21	7 days	KCl/ DMW	92	0.384 mg	IC_{25}: 0.959 g/L	yes

* chronic test.

Acute SRT charts maintained for acute test protocols only. For test dates 02/18-20/21, *C. dubia* 48-hr LC_{50} = 2.34 g NaCl/L MHRW at 25°C; 02/18-22/21, *P. promelas* 96-hr LC_{50} = 8.14 g NaCl/L MHRW at 25°C.

7.2 Indicate below any other relevant information that may aid in the evaluation of this report. Include any deviations from EPA methodology that were necessary for these tests as well as any sample manipulations which were performed, such as aeration, dechlorination with sodium thiosulfate, etc. and the justification for such manipulations or deviations. Attach additional pages as needed.

7.2.1 Minnow growth values were calculated according to the most recent edition of U.S. EPA's manual (4th edition), which calculates growth as mean dry weight per fish using the number of specimens exposed rather than the number of survivors.

7.3 Summary of test results:

WET endpoints for Towamencin MA; 03/2021
sampling period: 03/14-19/21

C. dubia acute endpoint: 48-hour LC_{50} = >100% effluent, TU_a = <1.0

C. dubia chronic endpoints:
NOEC= 100% effluent
LOEC= >100% effluent
Ch V= >100% effluent
TU_c= 1.0 as 100÷NOEC
IC_{25} = >100% effluent (TU_c as 100÷IC_{25} = <1.0)
TIWC = Pass (survival and reproduction)

P. promelas acute endpoint: 48-hour LC_{50} = >100% effluent
96-hour LC_{50} = >100% effluent; TU_a = <1.0

P. promelas chronic endpoints:
NOEC= 100% effluent
LOEC= >100% effluent
Ch V= >100% effluent
TU_c= 1.00 as 100÷NOEC
IC_{25} = >100% effluent (TU_c as 100÷IC_{25} = <1.0)
TIWC = Pass (survival and growth)

ATTACHMENTS

Chain-of-Custody/Sample Submission form(s).
Bench sheets and data analysis.
Standard Reference Toxicant (SRT) Control Charts

TERMS

LC_{50} =	median lethal effluent concentration = concentration that would kill half of the exposed specimens for a specified exposure period
TU_a =	Acute Toxicity Unit = 100÷48-hour or 96-hour LC_{50}
NOEC =	No Observed Effect Concentration
LOEC =	Lowest Observed Effect Concentration
Ch V =	Chronic Value = square root of NOEC*LOEC
TU_c =	Chronic Toxicity Unit = 100÷NOEC
IC_{25} =	Inhibition Concentration = concentration that would cause a 25% reduction in water flea reproduction or fathead minnow growth

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

WHOLE EFFLUENT TOXICITY (WET) TEST SUMMARY REPORT
COVER SHEET

NPDES Permit Number: **PA0039004** Facility Name: **Towamencin MA**

Species Tested: ☒ *Ceriodaphnia dubia* ☐ *Pimephales promelas* Test Type: ☒ Chronic ☐ Acute

Re-Test? ☐ Yes ☒ No (If Yes, indicate the date of original test completion: _____)

SAMPLE INFORMATION

	Date/Time	Sample Source	Temperature	Holding Time	Chlorine	Dechlorinated?
1.	03/15/21-0800	001	2.9°C	<36 hrs	<0.02 mg/L	☐ Yes ☒ No
2.	03/17/21-0800	001	1.6°C	<36hrs	0.083 mg/L	☒ Yes ☐ No
3.	03/19/21-0800	001	0.5°C	<36hrs	0.149 mg/L	☒ Yes ☐ No

TEST CONDITIONS

Date/Time of Test Initiation: **03/16/21-1245** Date/Time of Test Termination: **03/22/21-1345**

☒ 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 Tests: **12.75-20.75 hrs**

Number of Replicates: **10** Number of Organisms per Replicate: **1**

Source of Organisms: **ESCulture** Feeding Regimen: **daily**

Light Intensity: **50-100fc** Photoperiod: **16/8 light/dark**

Temperature measurements made at least once per 24-hour period? ☒ Yes ☐ No (attach log sheet)

DO measured daily in at least one replicate of each concentration? ☒ Yes ☐ No (attach log sheet)

Were the test chambers aerated? ☐ Yes ☒ No Rate:

pH measured daily in at least one replicate of each concentration? ☒ Yes ☐ No (attach log sheet)

Were test acceptability criteria in the EPA method met? ☒ Yes ☐ No

Were there any modifications to or deviations from EPA methods (if Yes, explain on separate sheet)? ☐ Yes ☒ No

DILUTION / REAGENT WATER

Date of Last Test for Chemistry: **03/19/21** Conductivity: **291** µmhos/cm

pH: **7.4** TRC: **<0.02** mg/L

CONTROL RESULTS

Ceriodaphnia dubia

Survival: **100%**

Percent that produced 3 broods (if applicable): **100** %

Young per Surviving Female (if applicable): **28.8**

Pimephales promelas

Survival:

Mean Dry Weight of Survivors (if applicable):

REFERENCE TOXICITY TESTS

Date of most recent test: **02/16/21** Same conditions as test? ☒ Yes ☐ No

Were test acceptability criteria in the EPA method met? ☒ Yes ☐ No

TEST RESULTS

Control compared to: ☒ TIWC Dilution ☐ Other:

Survival: ☒ Pass ☐ Fail Growth: ☐ Pass ☐ Fail Reproduction: ☒ Pass ☐ Fail

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.

Katherine L. Hansler		03/31/21	68-01628
Name of Laboratory Manager	Signature of Laboratory Manager	Date	DEP Lab ID No.

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

WHOLE EFFLUENT TOXICITY (WET) TEST SUMMARY REPORT
COVER SHEET

NPDES Permit Number: **PA0039004** Facility Name: **Towamencin MA**

Species Tested: ☐ *Ceriodaphnia dubia* ☒ *Pimephales promelas* Test Type: ☒ Chronic ☐ Acute

Re-Test? ☐ Yes ☒ No (If Yes, indicate the date of original test completion: _____)

SAMPLE INFORMATION

	Date/Time	Sample Source	Temperature	Holding Time	Chlorine	Dechlorinated?
1.	03/15/21-0800	001	2.9°C	<36 hrs	<0.02 mg/L	☐ Yes ☒ No
2.	03/17/21-0800	001	1.6°C	<36hrs	0.083 mg/L	☒ Yes ☐ No
3.	03/19/21-0800	001	0.5°C	<36hrs	0.149 mg/L	☒ Yes ☐ No

TEST CONDITIONS

Date/Time of Test Initiation: **03/16/21-1205** Date/Time of Test Termination: **03/23/21-1305**

☒ 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 Tests: **<24hrs**

Number of Replicates: **4** Number of Organisms per Replicate: **10**

Source of Organisms: **ESCulture** Feeding Regimen: **daily**

Light Intensity: **50-100fc** Photoperiod: **16/8 light/dark**

Temperature measurements made at least once per 24-hour period? ☒ Yes ☐ No (attach log sheet)

DO measured daily in at least one replicate of each concentration? ☒ Yes ☐ No (attach log sheet)

Were the test chambers aerated? ☐ Yes ☒ No Rate:

pH measured daily in at least one replicate of each concentration? ☒ Yes ☐ No (attach log sheet)

Were test acceptability criteria in the EPA method met? ☒ Yes ☐ No

Were there any modifications to or deviations from EPA methods (if Yes, explain on separate sheet)? ☐ Yes ☒ No

DILUTION / REAGENT WATER

Date of Last Test for Chemistry: **03/21/21** Conductivity: **174** µmhos/cm

pH: **7.4** TRC: **<0.02** mg/L

CONTROL RESULTS

Ceriodaphnia dubia ***Pimephales promelas***

Survival: Survival: **95%**

Percent that produced 3 broods (if applicable): % Mean Dry Weight of Survivors (if applicable): **0.437**

Young per Surviving Female (if applicable):

REFERENCE TOXICITY TESTS

Date of most recent test: **02/16/21** Same conditions as test? ☒ Yes ☐ No

Were test acceptability criteria in the EPA method met? ☒ Yes ☐ No

TEST RESULTS

Control compared to: ☒ TIWC Dilution ☐ Other:

Survival: ☒ Pass ☐ Fail Growth: ☒ Pass ☐ Fail Reproduction: ☐ Pass ☐ Fail

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.

Katherine L. Hansler		03/31/21	68-01628
Name of Laboratory Manager	Signature of Laboratory Manager	Date	DEP Lab ID No.

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 MA

Permit No.: PA0039004

Test Completion Date: 11/12/2019

Replicate No.	Control	TIWC
1	20	7
2	24	26
3	27	35
4	31	38
5	27	34
6	33	36
7	31	33
8	30	23
9	36	32
10	31	0
11		
12		
13		
14		
15		
Mean	29.000	26.400
Std Dev.	4.619	12.989
# Replicates	10	10

T-Test Result	1.0939
Deg. of Freedom	12
Critical T Value	0.8726
Pass or Fail	**PASS**

Test Completion Date: 11/10/2020

Replicate No.	Control	TIWC
1	18	15
2	24	23
3	24	28
4	36	13
5	23	20
6	12	21
7	24	19
8	27	13
9	30	0
10	20	2
11		
12		
13		
14		
15		
Mean	23.800	15.400
Std Dev.	6.546	8.884
# Replicates	10	10

T-Test Result	-0.7633
Deg. of Freedom	15
Critical T Value	0.8662
Pass or Fail	**FAIL**

Test Completion Date: 12/14/2020

Replicate No.	Control	TIWC
1	27	36
2	32	0
3	30	0
4	30	0
5	33	33
6	28	33
7	24	31
8	31	38
9	32	0
10	35	0
11		
12		
13		
14		
15		
Mean	30.200	17.100
Std Dev.	3.190	18.120
# Replicates	10	10

T-Test Result	-0.9603
Deg. of Freedom	10
Critical T Value	0.8791
Pass or Fail	**FAIL**

Test Completion Date: 3/22/2021

Replicate No.	Control	TIWC
1	25	31
2	29	36
3	31	37
4	29	37
5	30	22
6	27	38
7	28	39
8	31	41
9	28	41
10	30	39
11		
12		
13		
14		
15		
Mean	28.800	36.100
Std Dev.	1.874	5.724
# Replicates	10	10

T-Test Result	7.7793
Deg. of Freedom	12
Critical T Value	0.8726
Pass or Fail	**PASS**

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 MA

Permit No.

PA0039004

Test Completion Date 11/12/2019

Replicate No.	Control	TIWC
1	1	0
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	0
11		
12		
13		
14		
15		
Mean	1.000	0.800
Std Dev.	0.000	0.422
# Replicates	10	10

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

Test Completion Date 11/10/2020

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

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

Test Completion Date 12/14/2020

Replicate No.	Control	TIWC
1	1	1
2	1	0
3	1	0
4	1	0
5	1	1
6	1	1
7	1	1
8	1	1
9	1	0
10	1	0
11		
12		
13		
14		
15		
Mean	1.000	0.500
Std Dev.	0.000	0.527
# Replicates	10	10

T-Test Result -1.5000
Deg. of Freedom 9
Critical T Value 0.8834
Pass or Fail **FAIL**

Test Completion Date 3/22/2021

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**

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 MA

Permit No.

PA0039004

Test Completion Date 11/12/2019

Replicate No.	Control	TIWC
1	1	1
2	0.9	1
3	1	1
4	1	1
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.975	1.000
Std Dev.	0.050	0.000
# Replicates	4	4

T-Test Result	26.1497
Deg. of Freedom	3
Critical T Value	0.7649
Pass or Fail	**PASS**

Test Completion Date 11/10/2020

Replicate No.	Control	TIWC
1	1	0.8
2	0.8	1
3	1	0.9
4	0.8	0.9
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.900	0.900
Std Dev.	0.115	0.082
# Replicates	4	4

T-Test Result	7.3253
Deg. of Freedom	5
Critical T Value	0.7267
Pass or Fail	**PASS**

Test Completion Date 3/23/2021

Replicate No.	Control	TIWC
1	1	0.8
2	1	0.8
3	1	0.9
4	0.8	0.7
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.950	0.800
Std Dev.	0.100	0.082
# Replicates	4	4

T-Test Result	5.1767
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		
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 MA

Permit No.

PA0039004

Test Completion Date 11/12/2019

Replicate No.	Control	TIWC
1	0.309	0.348
2	0.286	0.391
3	0.32	0.367
4	0.257	0.317
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.293	0.356
Std Dev.	0.028	0.031
# Replicates	4	4

T-Test Result	7.2340
Deg. of Freedom	5
Critical T Value	0.7267
Pass or Fail	**PASS**

Test Completion Date 11/10/2020

Replicate No.	Control	TIWC
1	0.335	0.42
2	0.309	0.433
3	0.396	0.441
4	0.361	0.492
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.350	0.447
Std Dev.	0.037	0.032
# Replicates	4	4

T-Test Result	8.7338
Deg. of Freedom	5
Critical T Value	0.7267
Pass or Fail	**PASS**

Test Completion Date 3/23/2021

Replicate No.	Control	TIWC
1	0.458	0.527
2	0.47	0.531
3	0.396	0.423
4	0.338	0.428
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.416	0.477
Std Dev.	0.061	0.060
# Replicates	4	4

T-Test Result	4.3989
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		
Std Dev.		
# Replicates		

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

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EnviroScience, Inc.
5070 Stow Road
Stow, OH 44224
Phone (330) 688-0111
Fax (330) 688-3858
1-800-940-4025

Client: Towamencin Municipal Authority
Address: 2225 Kriebel Road
Lansdale, PA 19446
Contact: Ralph Jacoby
Phone: 215-855-8165
Permit #: PA0039004

SAMPLE SUBMISSION AND CHAIN OF CUSTODY FORM

Test(s) to be performed:
( ) Chronic Definitive
( ) Acute Definitive
( ) 48 hr. Screening
( ) 24 hr. Stormwater
( ) Pass/Fail _____

Test Species
( ) P. promelas and C. dubia
( ) P. promelas
( ) C. dubia
( ) D. magna
( ) _____

Wastewater Type (Circle One)
~~Industrial~~ Other
Municipal
Other _____

When listing a composite sample in the table below, please provide the start and end time of the composite period.

Start		End		Station No.	Sample Site	Sample Type		Number of Cubitainers	Chemistry				
Date	Time	Date	Time			Comp	Grab		TRC	Cond	D.O.	pH	Temp. °C
3/15/21	8:00Am	3/15/21	8:00Am		EFF Comp.	X		3					

Comp. = Composite, D.O. = Dissolved Oxygen measured in mg/l, pH measured in s.u., Conductivity measured in uohm/cm

Sampling Collector's Information: please ✓ all appropriate boxes

X	Effluent	Collectors Name:	Charles Beatty
	Upstream	Collectors Signature:	
	Near Field	M.G.D. =	
	Far Field	Weather Conditions:	
Plume Determined By What Method?			

EnviroScience Personnel Only

	Effluent	Collected By:	
	Upstream	Collectors Signature:	
	Near Field		
	Far Field		

Comments:

Received from:	Received by:	Date	Time	Transport Information		EnviroScience Use Only	
Charles Beatty				Transport Date		Client	Towamencin MA
	[illegible]	031621	1105	Transport Time		Sample ID's	Towa 031621 EFF
				Transport Method		Cond. Of Container	Good
				ES Vehicle (if applicable)		Temp. °C	2.9

EnviroScience, Inc. Cooler Receipt Form (Form 7050-1 rev. 01/20/21)

Client Tonawanda MA

ES Sample ID Tonwa 031621 EFF

Cooler Received by: KAH

Date Cooler Received and Opened 031621

Received from: FedEX X UPS___ Client Drop Off____ ES Courier____

1. Were custody seals on the outside of cooler? Yes_____ No ✓
   Were custody seals signed, dated and intact? Yes_____ No ✓
2. Did Chain of Custody (COC) accompany the samples? Yes ✓ No_____
3. Were the COC's signed in the appropriate places? Yes_____ No ✓
   If No explain need collector signature
4. Was the sample time and date filled in correctly? Yes ✓ No_____
5. Sample Temperature upon receipt 2.9 °C
6. Did all sample container labels match the samples written on the COC? Yes_____ No ✓
   Were the sample containers in good condition? Yes ✓ No_____
7. Was sufficient quantity received to perform indicated tests? Yes ✓ No_____
8. Was this sample received within required holding time? Yes ✓ No_____

Explain any discrepancies or client notifications that occurred regarding this sample: cubes not labeled

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EnviroScience, Inc.
5070 Stow Road
Stow, OH 44224
Phone (330) 688-0111
Fax (330) 688-3858
1-800-940-4025

Client: Towamencin Municipal Authority
Address: 2225 Kriebel Road
Lansdale, PA 19446
Contact: Ralph Jacoby
Phone: 215-855-8165
Permit #: PA0039004

SAMPLE SUBMISSION AND CHAIN OF CUSTODY FORM

Test(s) to be performed:
( ) Chronic Definitive
( ) Acute Definitive
( ) 48 hr. Screening
( ) 24 hr. Stormwater
( ) Pass/Fail _____

Test Species
( ) P. promelas and C. dubia
( ) P. promelas
( ) C. dubia
( ) D. magna
( ) _____

Wastewater Type (Circle One)
Industrial Other
Municipal
Other _____

When listing a composite sample in the table below, please provide the start and end time of the composite period.

Start		End		Station No.	Sample Site	Sample Type		Number of Cubitainers	Chemistry				
Date	Time	Date	Time			Comp	Grab		TRC	Cond	D.O.	pH	Temp. °C
031621	0800	031721	0800		eff	X		3					

Comp. = Composite, D.O. = Dissolved Oxygen measured in mg/l, pH measured in s.u., Conductivity measured in uohm/cm

Sampling Collector's Information: please ✓ all appropriate boxes

	Effluent	Collectors Name:	per Jacoby 033121
	Upstream	Collectors Signature:	
	Near Field	M.G.D. =	
	Far Field	Weather Conditions:	
Plume Determined By What Method?			

EnviroScience Personnel Only

	Effluent	Collected By:	
	Upstream	Collectors Signature:	
	Near Field		
	Far Field		

Comments:

Received from:	Received by:	Date	Time	Transport Information		EnviroScience Use Only	
				Transport Date		Client	Towamencin
	[signature]	031821	0945	Transport Time		Sample ID's	TOWA 031821 EFF
				Transport Method		Cond. Of Container	Good
				ES Vehicle (if applicable)		Temp. °C	1.6

EnviroScience, Inc. Cooler Receipt Form (Form 7050-1 rev. 01/20/21)

Client Towamencin MA

ES Sample ID TOWA 031821 EFF

Cooler Received by: VAH, CB, AT

Date Cooler Received and Opened 031821

Received from: FedEX ✓ UPS___ Client Drop Off___ ES Courier___

1. Were custody seals on the outside of cooler? Yes___ No ✓
   Were custody seals signed, dated and intact? Yes___ No ✓
2. Did Chain of Custody (COC) accompany the samples? Yes ✓ No___
3. Were the COC's signed in the appropriate places? Yes___ No ✓
   If No explain COC was blank
4. Was the sample time and date filled in correctly? Yes___ No ✓
5. Sample Temperature upon receipt 1.6 °C
6. Did all sample container labels match the samples written on the COC? Yes___ No ✓
   Were the sample containers in good condition? Yes ✓ No___
7. Was sufficient quantity received to perform indicated tests? Yes ✓ No___
8. Was this sample received within required holding time? Yes ✓ No___

Explain any discrepancies or client notifications that occurred regarding this sample: COC was blank; no start/end time or date filled in; no signatures
Assumed sample was recieved within required holding time

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EnviroScience, Inc.
5070 Stow Road
Stow, OH 44224
Phone (330) 688-0111
Fax (330) 688-3858
1-800-940-4025

Client: Towamencin Municipal Authority
Address: 2225 Kriebel Road
Lansdale, PA 19446
Contact: Ralph Jacoby
Phone: 215-855-8165
Permit #: PA0039004

SAMPLE SUBMISSION AND CHAIN OF CUSTODY FORM

Test(s) to be performed:
( ) Chronic Definitive
( ) Acute Definitive
( ) 48 hr. Screening
( ) 24 hr. Stormwater
( ) Pass/Fail _____

Test Species
( ) P. promelas and C. dubia
( ) P. promelas
( ) C. dubia
( ) D. magna
( ) _____

Wastewater Type (Circle One)
Industrial Other
Municipal
Other _____

When listing a composite sample in the table below, please provide the start and end time of the composite period.

Start		End		Station No.	Sample Site	Sample Type		Number of Cubitainers	Chemistry				
Date	Time	Date	Time			Comp	Grab		TRC	Cond	D.O.	pH	Temp. °C
3/18/21	8:00AM	3/19/21	8:00AM		EFF Comp	X		4					

Comp. = Composite, D.O. = Dissolved Oxygen measured in mg/l, pH measured in s.u., Conductivity measured in uohm/cm

Sampling Collector's Information: please ✓ all appropriate boxes

X	Effluent	Collectors Name:	Charles Beatty
	Upstream	Collectors Signature:	
	Near Field	M.G.D. =	
	Far Field	Weather Conditions:	
Plume Determined By What Method?			

EnviroScience Personnel Only

	Effluent	Collected By:	
	Upstream	Collectors Signature:	
	Near Field		
	Far Field		

Comments:

Received from:	Received by:	Date	Time	Transport Information		EnviroScience Use Only	
	Fedex			Transport Date		Client	Towamencin M.A.
Fedex	[illegible]	032021	1130	Transport Time		Sample ID's	TWA 032021 EFF
				Transport Method		Cond. Of Container	good
				ES Vehicle (if applicable)		Temp. °C	0.5°C

EnviroScience, Inc. Cooler Receipt Form (Form 7050-1 rev. 01/20/21)

Client TOWAMENCIN MA

ES Sample ID TOWA 032021 EFF

Cooler Received by: CB

Date Cooler Received and Opened 032021

Received from: FedEX___ UPS___ Client Drop Off____ ES Courier____

1. Were custody seals on the outside of cooler? Yes_____ No Y
   Were custody seals signed, dated and intact? Yes_____ No Y
2. Did Chain of Custody (COC) accompany the samples? Yes Y No_____
3. Were the COC's signed in the appropriate places? Yes X No_____
   If No explain_____
4. Was the sample time and date filled in correctly? Yes X No_____
5. Sample Temperature upon receipt 0.5 °C
6. Did all sample container labels match the samples written on the COC? Yes_____ No Y
   Were the sample containers in good condition? Yes X No_____
7. Was sufficient quantity received to perform indicated tests? Yes X No_____
8. Was this sample received within required holding time? Yes Y No_____

Explain any discrepancies or client notifications that occurred regarding this sample: cubes not labeled

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Form 8100-1 rev. 01/20/21

EnviroScience Inc. ***Ceriodaphnia dubia*** **Survival and Reproduction; EPA 1002.0: pg. 1 of 3**

Project ID:	TOWA 031621	**Start Date:**	031621	**Time:**	1245
Permit No.:	PA0039004	**End Date:**	032221	**Time:**	1345
Diluent:	MHR				

MHR	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Number Adults	# Dead/ # Adversely Affected
	1	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	2	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	3	04	04	04	04	04	04	04	04	04	04	10	0 / 0
	4	39	29	49	39	39	39	39	49	39	39	10	0 / 0
	5	99	109	109	119	129	109	99	109	99	99	10	0 / 0
	6	~~179~~ 139	~~159~~ 179	179	159	149	149	169	179	169	189	10	0 / 0
	7												/
Totals		25	29	31	29	30	27	28	31	28	30	$\bar{x}$ = 28.8	
Number of Broods		3	3	3	3	3	3	3	3	3	3	CV = 6.51	

24%	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Number Adults	# Dead/ # Adversely Affected
	1	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	2	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	3	0	0	0	0	0	0	0	0	0	0	10	0 / 0
	4	4	3	4	6	4	6	6	4	2	3	10	0 / 0
	5	9	11	10	11	15	14	13	9	7	7	10	0 / 0
	6	9	15	19	14	22	22	11	21	18	13	10	0 / 0
	7												/
Totals		22	29	33	31	41	42	30	34	27	23	$\bar{x}$ = 31.2	
Number of Broods		3	3	3	3	3	3	3	3	3	3	CV = 21.36	

48%	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Number Adults	# Dead/ # Adversely Affected
	1	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	2	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	3	0	0	0	0	0	0	0	0	0	0	10	0 / 0
	4	3	3	5	5	5	4	5	4	6	5	10	0 / 0
	5	11	10	14	14	13	14	14	14	14	13	10	0 / 0
	6	21	18	18	18	23	22	21	20	20	24	10	0 / 0
	7												/
Totals		35	31	37	37	41	40	39	38	40	42	$\bar{x}$ = 38.0	
Number of Broods		3	3	3	3	3	3	3	3	3	3	CV = 8.50	

EnviroScience Inc. ***Ceriodaphnia dubia*** **Survival and Reproduction; EPA 1002.0:**

Project ID:	TDWA
Permit No.:	

Start Date:	031621

72%	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Number Adults	# Dead/ # Adversely Affected
	1	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	2	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	3	0	0	0	0	0	0	0	0	0	0	10	0 / 0
	4	2	4	3	4	3	3	5	4	5	4	10	0 / 0
	5	11	7	8	13	13	13	12	15	14	10	10	0 / 0
	6	18	18	20	21	21	26	21	23	20	19	10	0 / 0
	7												/
Totals		31	29	31	38	37	42	38	42	39	33	$\bar{x}$ = 36.0	
Number of Broods		3	3	3	3	3	3	3	3	3	3	CV = 13.03	

96%	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Number Adults	# Dead/ # Adversely Affected
	1	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	2	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	3	0	0	0	0	0	0	0	0	0	0	10	0 / 0
	4	4	4	4	5	4	4	5	5	4	5	10	0 / 0
	5	10	13	11	13	0	14	10	12	14	12	10	0 / 0
	6	17	19	22	19	18	20	24	24	23	22	10	0 / 0
	7												/
Totals		31	36	37	37	22	38	39	41	41	39	$\bar{x}$ = 36.1	
Number of Broods		3	3	3	3	2	3	3	3	3	3	CV = 15.86	

100%	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Number Adults	# Dead/ # Adversely Affected
	1	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	2	/	/	/	/	/	/	/	/	/	/	10	0 / 0
	3	0	0	0	0	0	0	0	0	0	0	10	0 / 0
	4	5	4	5	3	4	5	5	0	4	3	10	0 / 0
	5	12	8	13	12	11	11	11	0	10	14	10	0 / 0
	6	20	13	19	19	22	19	21	6	16	13	10	0 / 0
	7												/
Totals		37	25	37	34	37	35	37	6	30	30	$\bar{x}$ = 30.8	
Number of Broods		3	3	3	3	3	3	3	1	3	3	CV = 31.21	

EnviroScience Inc. ***Ceriodaphnia dubia*** **Survival and Reproduction; EPA 1002.0: pg. 3 of 3**

Project ID:	IOWA
Permit No.:	

Start Date:	031621

KHV

Brood Board Information:

Replicate	1	2	3	4	5	6	7	8	9	10	BB #: 030721A
	1	6	7	8	17	26	28	29	31	37	Date: 031521
											Time: 1600-2400

Test Information:

Day	Initiation	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7
YAT Batch #	YATF 021121	YATF 021121		YATA 031721		YATA 031721		YATA 031721		YATB 031721		—		
Algae Batch #	ESA 021321	ES B 021321		ESB 021321		ESB 021321		ESB 021321		ESC 021321		—		
Test Level:	Solution Temperature °C for Initial (I) and Final (F) solutions													
	I	I	F	I	F	I	F	I	F	I	F	I	F	F
MHR	24.0	24.0	24.0	24.0	24.8	24.0	24.4	24.0	24.0	24.2	24.4	—	24.0	
24h.	24.0	24.0	24.0	24.0	24.6	24.0	24.1	24.0	24.2	24.0	24.0	—	24.0	
48h.	24.0	24.0	24.0	24.0	24.4	24.0	24.0	24.0	24.5	24.0	24.2	—	24.2	
72h.	24.0	24.0	24.0	24.0	24.2	24.0	24.3	24.0	24.1	24.0	24.2	—	24.0	
96h.	24.0	24.0	24.0	24.0	24.2	24.0	24.0	24.0	24.2	24.0	24.0	—	24.0	
100h.	24.0	24.0	24.0	24.0	24.2	24.0	24.6	24.0	24.4	24.0	24.0	—	24.0	
Change time		13	35	11	55	13	00	12	25	13	40	13	45	
✓transfer	✓loading	✓		✓		✓		✓		✓		—		
Initials	TM	MT		TM		TM		EF		TM		MT		

Initial is the initiation temperature, or the temperature of the new board C. dubia are being transferred into.

Comments Section:

Day	Date	Comments	Initials

Typical sample schedule: Sample 1 – days 0, 1; Sample 2 – days 2, 3; Sample 3 – days 4, 5, 6

Key M=Missing, D=Dead, KIT=Killed in transfer, m=empty, g=gravid, y=eyed, r=releasing, N=Sample number, A=Adversely affected

CETIS Analytical Report

Report Date: 26 Mar-21 09:35 (p 1 of 1)
Test Code/ID: 619850E7 / 16-3737-2135

Ceriodaphnia 7-d Survival and Reproduction Test — EnviroScience

Analysis ID:	03-8466-0644	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	26 Mar-21 9:35	**Analysis:**	~~STP 2xK~~ Contingency Tables	**Status Level:**	1

Sample ID:	00-9064-8431	**Code:**	TOWA031621	**Project:**	
Sample Date:	16 Mar-21 12:45	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	16 Mar-21 11:05	**CAS (PC):**		**Station:**	001
Sample Age:	n/a	**Client:**	Towamencin		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Untransformed	C > T	100	>100	n/a	1

Fisher Exact/Bonferroni-Holm Test

Control	vs	Group	Test Stat	P-Type	P-Value	Decision(α:5%)
Dilution Water		24	1.0000	Exact	1.0000	Non-Significant Effect
		48	1.0000	Exact	1.0000	Non-Significant Effect
		72	1.0000	Exact	1.0000	Non-Significant Effect
		96	1.0000	Exact	1.0000	Non-Significant Effect
		100	1.0000	Exact	1.0000	Non-Significant Effect

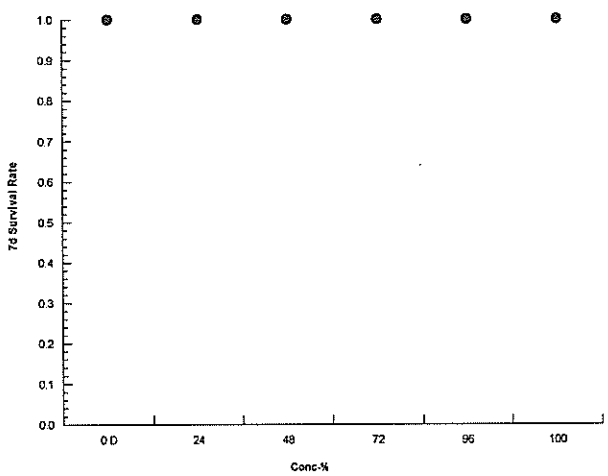
Data Summary

Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	D	10	0	10	1	0	0.0%
24		10	0	10	1	0	0.0%
48		10	0	10	1	0	0.0%
72		10	0	10	1	0	0.0%
96		10	0	10	1	0	0.0%
100		10	0	10	1	0	0.0%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
24		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
48		1.0000	1.0000	1.0000	1.0000	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

Graphics



KHV

CETIS Analytical Report

Report Date: 26 Mar-21 09:35 (p 1 of 2)
Test Code/ID: 619850E7 / 16-3737-2135

Ceriodaphnia 7-d Survival and Reproduction Test — EnviroScience

Analysis ID:	11-9619-8374	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.6
Analyzed:	26 Mar-21 9:35	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Sample ID:	00-9064-8431	**Code:**	TOWA031621	**Project:**	
Sample Date:	16 Mar-21 12:45	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	16 Mar-21 11:05	**CAS (PC):**		**Station:**	001
Sample Age:	n/a	**Client:**	Towamencin		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	20.80%

Steel Many-One Rank Sum Test

Control vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	24	117.5	75	5	18	CDF	0.9824	Non-Significant Effect
	48	154	75	2	18	CDF	1.0000	Non-Significant Effect
	72	148	75	3	18	CDF	1.0000	Non-Significant Effect
	96	144	75	2	18	CDF	1.0000	Non-Significant Effect
	100	129.5	75	2	18	CDF	0.9993	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	679.283	135.857	5	3.966	0.0039	Significant Effect
Error	1849.7	34.2537	54			
Total	2528.98		59			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	23.3	15.09	3.0E-04	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.8871	0.9459	4.6E-05	Non-Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	10	28.8	27.46	30.14	29	25	31	0.5925	6.51%	0.00%
24		10	31.2	26.43	35.97	30.5	22	42	2.107	21.36%	-8.33%
48		10	38	35.69	40.31	38.5	31	42	1.022	8.50%	-31.94%
72		10	36	32.64	39.36	37.5	29	42	1.483	13.03%	-25.00%
96		10	36.1	32.01	40.19	37.5	22	41	1.81	15.86%	-25.35%
100		10	30.8	23.92	37.68	34.5	6	37	3.04	31.21%	-6.94%

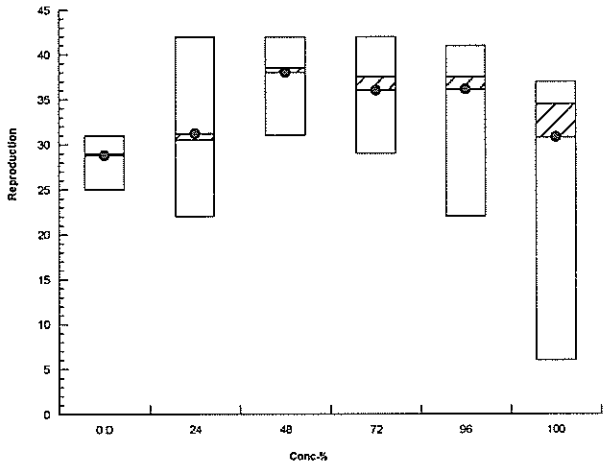
Reproduction Detail

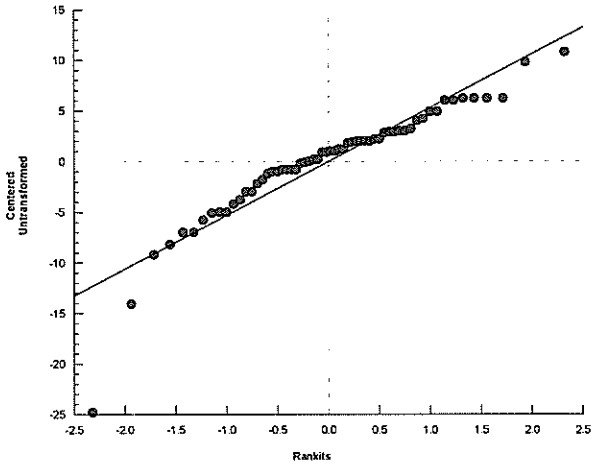
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	25	29	31	29	30	27	28	31	28	30
24		22	29	33	31	41	42	30	34	27	23
48		35	31	37	37	41	40	39	38	40	42
72		31	29	31	38	37	42	38	42	39	33
96		31	36	37	37	22	38	39	41	41	39
100		37	25	37	34	37	35	37	6	30	30

Ceriodaphnia 7-d Survival and Reproduction Test — **EnviroScience**

Analysis ID:	11-9619-8374	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.6
Analyzed:	26 Mar-21 9:35	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Graphics





CETIS Analytical Report

Report Date: 26 Mar-21 09:35 (p 1 of 1)
Test Code/ID: 619850E7 / 16-3737-2135

Ceriodaphnia 7-d Survival and Reproduction Test — **EnviroScience**

Analysis ID:	02-0756-7337	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.6
Analyzed:	26 Mar-21 9:35	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Sample ID:	00-9064-8431	**Code:**	TOWA031621	**Project:**	
Sample Date:	16 Mar-21 12:45	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	16 Mar-21 11:05	**CAS (PC):**		**Station:**	001
Sample Age:	n/a	**Client:**	Towamencin		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	882891	1000	Yes	Two-Point Interpolation

Point Estimates

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

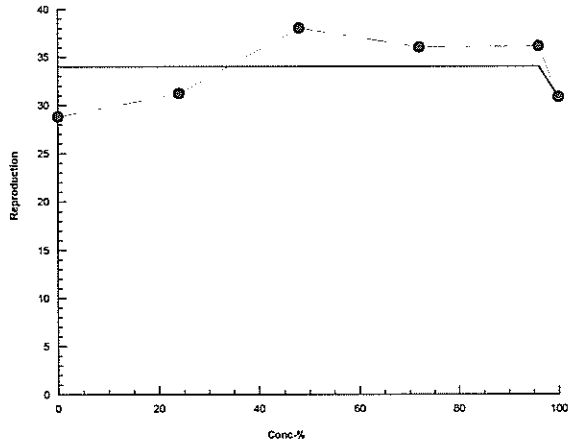
Reproduction Summary

			Calculated Variate						Isotonic Variate	
Conc-%	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	Mean	%Effect
0	D	10	28.8	25	31	1.874	6.51%	0.0%	34.02	0.0%
24		10	31.2	22	42	6.663	21.36%	-8.33%	34.02	0.0%
48		10	38	31	42	3.232	8.51%	-31.94%	34.02	0.0%
72		10	36	29	42	4.69	13.03%	-25.0%	34.02	0.0%
96		10	36.1	22	41	5.724	15.86%	-25.35%	34.02	0.0%
100		10	30.8	6	37	9.612	31.21%	-6.94%	30.8	9.47%

Reproduction Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	25	29	31	29	30	27	28	31	28	30
24		22	29	33	31	41	42	30	34	27	23
48		35	31	37	37	41	40	39	38	40	42
72		31	29	31	38	37	42	38	42	39	33
96		31	36	37	37	22	38	39	41	41	39
100		37	25	37	34	37	35	37	6	30	30

Graphics



KHW

Form 8080-1 rev. 01/20/21

EnviroScience Inc. *Pimephales promelas* Survival Data; EPA 1000.0: pg. 1 of 2

Project ID:	TANA031621	**Start Date:**	031621	**Time:**	1205
Permit No.:	PA0039004	**End Date:**	032321	**Time:**	1305
Hatch #:	031521 1445 JLB CB KAH JCL	**Origin:**	ES cultures	**Diluent:**	DMW

	Rep	n	# of P. promelas Mortalities / # of P. promelas Adversely Affected						
			1	2	3	4	5	6	7
DMW	A	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	B	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	C	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	D	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	2 / 2
	total %'s								
24	A	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	B	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	3 / 3	4 / 4
	C	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	D	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	total %'s								
48	A	10	0 / 0	1 / 1	1 / 1	1 / 1	2 / 2	2 / 2	2 / 2
	B	10	0 / 0	0 / 0	0 / 0	1 / 1	2 / 2	2 / 2	2 / 2
	C	10	0 / 0	0 / 0	0 / 0	2 / 2	2 / 2	2 / 2	2 / 2
	D	10	0 / 0	0 / 0	0 / 0	1 / 1	1 / 1	1 / 1	1 / 1
	total %'s								
72	A	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	B	10	0 / 0	0 / 0	0 / 0	1 / 1	1 / 1	1 / 1	1 / 1
	C	10	0 / 0	0 / 0	0 / 0	2 / 2	2 / 2	2 / 2	2 / 2
	D	10	0 / 0	0 / 0	1 / 1	1 / 1	2 / 2	2 / 2	2 / 2
	total %'s								

Test Solution Temperature - °C. Key: I=initial (fresh renewal solution), F = final (24-hr old solution)

test level:	*I*	*I*	*F*	*I*	*F*	*I*	*F*	*I*	*F*	*I*	*F*	*I*	*F*	*F*
DMW	24.0	24.0	24.1	24.0	24.0	24.0	24.3	24.0	24.3	24.0	24.0	24.0	24.0	24.4
24	24.0	24.0	24.1	24.0	24.0	24.0	24.1	24.0	24.0	24.0	24.2	24.0	24.0	24.0
48	24.0	24.0	24.2	24.0	24.0	24.0	24.3	24.0	25.1	24.0	24.0	24.0	24.0	24.4
72	24.0	24.0	24.2	24.0	24.0	24.0	24.3	24.0	24.5	24.0	24.1	24.0	24.3	24.6
96	24.0	24.0	24.4	24.0	24.0	24.0	24.6	24.0	24.7	24.0	24.1	24.0	24.4	24.7
100	24.0	24.0	24.4	24.0	24.0	24.0	24.2	24.0	24.8	24.0	24.0	24.0	24.0	24.2
renew time		1300		1305		1125		1220		1245		1315		1305
Initials	Set up EF	AT		KAH		CB		CB		TM		EF		EF
	# AT													

EnviroScience Inc. *Pimephales promelas* Survival Data; EPA 1000.0: pg. 2 of 2

Project ID:	IOWA
Permit No.:	

KHV

Start Date:	03/16/21

	Rep	n_i	# of P. promelas Mortalities / # of P. promelas Adversely Affected						
			1	2	3	4	5	6	7
96	A	10	0 / 0	0 / 0	0 / 0	0 / 0	1 / 1	2 / 2	2 / 2
	B	10	0 / 0	0 / 0	0 / 0	1 / 1	1 / 1	1 / 1	2 / 2
	C	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	1 / 1
	D	10	0 / 0	0 / 0	1 / 1	1 / 1	3 / 3	3 / 3	3 / 3
	total %'s								
100	A	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	B	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	C	10	0 / 0	0 / 0	0 / 0	1 / 1	1 / 1	1 / 1	1 / 1
	D	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	1 / 1
	total %'s								
	A		/	/	/	/	/	/	/
	B		/	/	/	/	/	/	/
	C		/	/	/	/	/	/	/
	D		/	/	/	/	/	/	/
	total %'s								
	A		/	/	/	/	/	/	/
	B		/	/	/	/	/	/	/
	C		/	/	/	/	/	/	/
	D		/	/	/	/	/	/	/
	total %'s								

Comments / Corrections:

Day	Date	Comments	Initials

Typical sample schedule: Sample 1 – days 0, 1; Sample 2 – days 2, 3; Sample 3 – days 4, 5, 6

CETIS Analytical Report

Report Date: 26 Mar-21 09:43 (p 1 of 4)
Test Code/ID: 5AC53ECD / 15-2287-6109

Fathead Minnow 7-d Larval Survival and Growth Test — EnviroScience

Analysis ID:	08-6285-1953	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	26 Mar-21 9:43	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Sample ID:	04-8835-3505	**Code:**	TOWA031621	**Project:**	
Sample Date:	15 Mar-21 08:00	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	16 Mar-21 11:05	**CAS (PC):**		**Station:**	001
Sample Age:	28h	**Client:**	Towamencin		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	>100	n/a	1	18.36%

Dunnett Multiple Comparison Test

Control vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	24	0.5145	2.407	0.259	6	CDF	0.6412	Non-Significant Effect
	48	1.798	2.407	0.259	6	CDF	0.1455	Non-Significant Effect
	72	1.089	2.407	0.259	6	CDF	0.3833	Non-Significant Effect
	96	2.068	2.407	0.259	6	CDF	0.0927	Non-Significant Effect
	100	0.04904	2.407	0.259	6	CDF	0.8185	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.17945	0.03589	5	1.555	0.2229	Non-Significant Effect
Error	0.415428	0.0230793	18			
Total	0.594878		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	5.834	15.09	0.3227	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9125	0.884	0.0399	Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	0.9500	0.7909	1.0000	1.0000	0.8000	1.0000	0.0500	10.53%	0.00%
24		4	0.9000	0.5818	1.0000	1.0000	0.6000	1.0000	0.1000	22.22%	5.26%
48		4	0.8250	0.7454	0.9046	0.8000	0.8000	0.9000	0.0250	6.06%	13.16%
72		4	0.8750	0.7227	1.0000	0.8500	0.8000	1.0000	0.0479	10.94%	7.89%
96		4	0.8000	0.6701	0.9299	0.8000	0.7000	0.9000	0.0408	10.21%	15.79%
100		4	0.9500	0.8581	1.0000	0.9500	0.9000	1.0000	0.0289	6.08%	0.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	1.336	1.093	1.578	1.412	1.107	1.412	0.07622	11.41%	0.00%
24		4	1.281	0.8621	1.699	1.412	0.8861	1.412	0.1315	20.54%	4.14%
48		4	1.143	1.03	1.256	1.107	1.107	1.249	0.03547	6.21%	14.46%
72		4	1.219	0.9879	1.45	1.178	1.107	1.412	0.07256	11.91%	8.76%
96		4	1.114	0.9457	1.282	1.107	0.9912	1.249	0.05277	9.48%	16.63%
100		4	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	0.39%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	0.8000
24		1.0000	0.6000	1.0000	1.0000
48		0.8000	0.8000	0.8000	0.9000
72		1.0000	0.9000	0.8000	0.8000
96		0.8000	0.8000	0.9000	0.7000
100		1.0000	1.0000	0.9000	0.9000

KHV

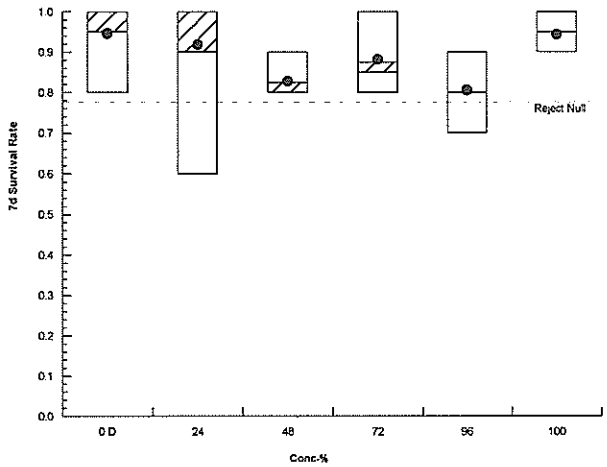
Fathead Minnow 7-d Larval Survival and Growth Test — **EnviroScience**

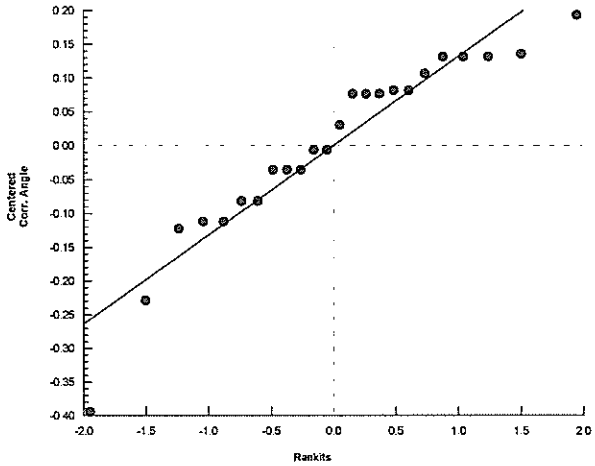
Analysis ID:	08-6285-1953	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	26 Mar-21 9:43	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.412	1.412	1.412	1.107
24		1.412	0.8861	1.412	1.412
48		1.107	1.107	1.107	1.249
72		1.412	1.249	1.107	1.107
96		1.107	1.107	1.249	0.9912
100		1.412	1.412	1.249	1.249

Graphics





Fathead Minnow 7-d Larval Survival and Growth Test — **EnviroScience**

Analysis ID:	19-1694-1397	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	26 Mar-21 9:43	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Sample ID:	04-8835-3505	**Code:**	TOWA031621	**Project:**	
Sample Date:	15 Mar-21 08:00	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	16 Mar-21 11:05	**CAS (PC):**		**Station:**	001
Sample Age:	28h	**Client:**	Towamencin		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	29.51%

Dunnett Multiple Comparison Test

Control vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	24	-1.669	2.407	0.123	6	CDF	0.9975	Non-Significant Effect
	48	-1.526	2.407	0.123	6	CDF	0.9962	Non-Significant Effect
	72	-1.104	2.407	0.123	6	CDF	0.9870	Non-Significant Effect
	96	-1.212	2.407	0.123	6	CDF	0.9904	Non-Significant Effect
	100	-3.48	2.407	0.123	6	CDF	1.0000	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0668159	0.0133632	5	2.575	0.0632	Non-Significant Effect
Error	0.0934133	0.0051896	18			
Total	0.160229		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	3.964	15.09	0.5546	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9721	0.884	0.7187	Normal Distribution

Mean Dry Weight-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	0.4155	0.3184	0.5126	0.427	0.338	0.47	0.0305	14.68%	0.00%
24		4	0.5005	0.396	0.605	0.5125	0.41	0.567	0.03284	13.12%	-20.46%
48		4	0.4932	0.4298	0.5566	0.483	0.457	0.55	0.01992	8.08%	-18.71%
72		4	0.4717	0.2792	0.6643	0.4945	0.321	0.577	0.06052	25.66%	-13.54%
96		4	0.4773	0.3821	0.5724	0.4775	0.423	0.531	0.02991	12.53%	-14.86%
100		4	0.5927	0.5015	0.684	0.5935	0.524	0.66	0.02867	9.67%	-42.66%

Mean Dry Weight-mg Detail

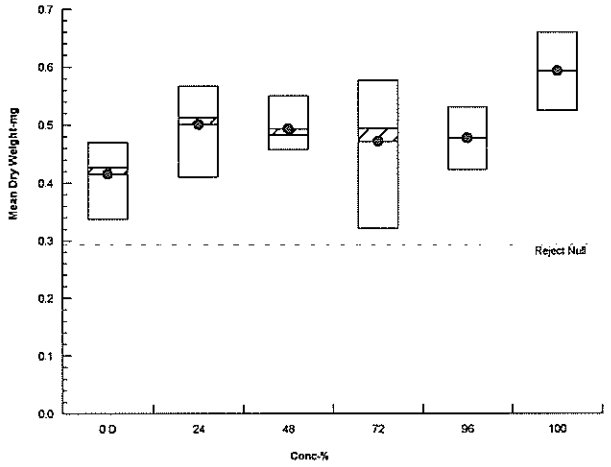
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	0.458	0.47	0.396	0.338
24		0.567	0.41	0.508	0.517
48		0.457	0.55	0.486	0.48
72		0.562	0.577	0.321	0.427
96		0.527	0.531	0.423	0.428
100		0.66	0.611	0.576	0.524

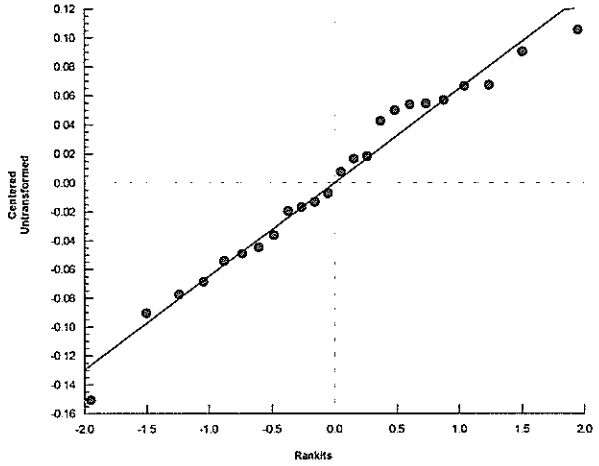
KHV

Fathead Minnow 7-d Larval Survival and Growth Test — **EnviroScience**

Analysis ID:	19-1694-1397	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	26 Mar-21 9:43	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Graphics





CETIS Analytical Report

Report Date: 26 Mar-21 09:43 (p 1 of 1)
Test Code/ID: 5AC53ECD / 15-2287-6109

Fathead Minnow 7-d Larval Survival and Growth Test — **EnviroScience**

Analysis ID:	01-1704-3226	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	26 Mar-21 9:43	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Sample ID:	04-8835-3505	**Code:**	TOWA031621	**Project:**	
Sample Date:	15 Mar-21 08:00	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	16 Mar-21 11:05	**CAS (PC):**		**Station:**	001
Sample Age:	28h	**Client:**	Towamencin		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	882595	1000	Yes	Two-Point Interpolation

Point Estimates

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

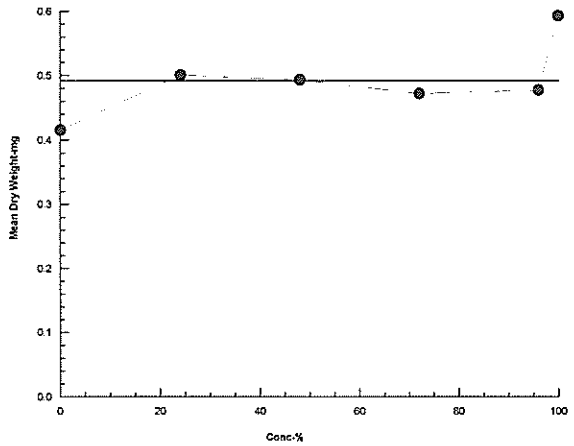
Mean Dry Weight-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	D	4	0.4155	0.338	0.47	0.061	14.68%	0.0%	0.4918	0.0%
24		4	0.5005	0.41	0.567	0.06568	13.12%	-20.46%	0.4918	0.0%
48		4	0.4932	0.457	0.55	0.03984	8.08%	-18.71%	0.4918	0.0%
72		4	0.4717	0.321	0.577	0.121	25.66%	-13.54%	0.4918	0.0%
96		4	0.4773	0.423	0.531	0.05982	12.53%	-14.86%	0.4918	0.0%
100		4	0.5927	0.524	0.66	0.05734	9.67%	-42.66%	0.4918	0.0%

Mean Dry Weight-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	0.458	0.47	0.396	0.338
24		0.567	0.41	0.508	0.517
48		0.457	0.55	0.486	0.48
72		0.562	0.577	0.321	0.427
96		0.527	0.531	0.423	0.428
100		0.66	0.611	0.576	0.524

Graphics



KHV

Form 8080-2 rev. 01/20/21

EnviroScience Inc. *Pimephales promelas* Growth Data; EPA 1000.0: pg. 1 of 2

Project ID:	TDWA 031621
Permit No.:	PA0039004

Start Date:	031621

Concen-tration	Rep. no.	Pan no.	Weight of pan (g)	Total dry wt. (g)	No. fish
DMW	A	U1	1.11996	1.12454	10
	B	U2	1.08177	1.08647	10
	C	U3	1.10166	1.10562	10
	D	U4	1.10138	1.10476	8
24%	A	U5	1.09936	1.10503	10
	B	U6	1.08977	1.09387	10
	C	U7	1.08724	1.09232	10
	D	U8	1.09110	1.09627	10
48%	A	U9	1.09497	1.09954	8
	B	U10	1.08661	1.09211	8
	C	U11	1.08855	1.09341	8
	D	U12	1.09340	1.09820	~~10~~ 9 EF 3/23
72%	A	U13	1.09963	1.10525	10
	B	U14	1.10368	1.10945	9
	C	U15	1.09741	1.10062	8
	D	U16	1.09664	1.10091	8
96%	A	U17	1.09552	1.10079	8
	B	U18	1.10121	1.10652	8
	C	U19	1.10212	1.10635	9
	D	U20	1.09564	1.09992	7
100%	A	U21	1.09893	1.10553	10
	B	U22	1.10278	1.10889	10
	C	U23	1.09829	1.10405	9
	D	U24	1.09443	1.09967	9
Initials		JM	AT	AT	EF

Comments:

Reviewer pgs 1-2 KH

EnviroScience Inc. *Pimephales promelas* Growth Data; EPA 1000.0: pg. 2 of 2

Project ID:	TOWA
Permit No.:	

Start Date:	031621

Concen-tration	Rep. no.	Pan no.	Weight of pan (g)	Total dry wt. (g)	No. fish
	A				
	B				
	C				
	D				

	A				
	B				
	C				
	D				
Initials					

Quality Assurance

					Final-Initial (g)
Pan Tare	A	1129	1.11520	1.11520	
	B	1130	1.11412	1.11414	
	C	1131	1.14882	1.14872	
	D	1132	1.11140	1.11135	
Initials		TM	AT	AT	

S Weight calibrations	S wgt	Date: 031921	S wgt	Date: 032521
	2g	2.00000	2g	2.00005
	1g	0.99995	1g	0.99991
	500mg	0.50000	500mg	0.49998
	100mg	0.10001	100mg	0.10000
Initials		AT		AT

1. pans without fish are dried at 60 °C for 24 hours, and placed in desiccator to cool before they are tared on AND ER-182-A balance
2. pans with fish are dried at 60 °C for 24 hours, and placed in desiccator to cool before weighing on AND ER-182-A balance

Please note time of drying:	Date	Time	Oven °C	By (initials)
Pans w/fish in oven @	032321	1335	65°	EF
Pans w/fish removed @	032421	1335	65	AT

Pans w/dried fish placed in desiccator immediately upon removal from the drying oven.

EnviroScience Inc. Chronic Toxicity - Daily Chemistry Bench Sheet for ☑ *C. dubia* or ☐ FHM (check one)

Project ID:	T	O	W	A	Permit No.:	PA0039004	Date:	03	16	21

Conductivity µmhos/cm - **INITIAL**

level	0	1	2	3	4	5	6
MHR	302	305	294	294	294	295	291
24h.	787	823	950	940	854	966	944
48h.	1292	1273	1663	1758	1527	1539	1564
72h.	1787	1738	2370	2350	2230	2160	2170
96h.	2190	2240	2940	2980	2890	2880	2710
100h.	2290	2300	3110	3150	2970	2920	2890

please initial and enter "I" and "F" in the appropriate instrument box.

	day→	0	1	2	3	4	5	6
TECH	Initial	MT	DB	JM	AT	AT	JM	JM
TECH	Final	CB	CB	AT	EF	MT	JM	
DO	830							
	820							
	YSI	I F	I F	I F	I F	I F	I F	I F
pH	920	I F		I F	I F	I F	I F	I F
	2Star		I F		I			
cond.	160	I	I	I F	I	I	I	I

Dissolved Oxygen mg/l - **INITIAL**

level	0	1	2	3	4	5	6
MHR	8.6	8.6	8.6	8.6	8.6	8.6	8.6
24h.	8.6	8.6	8.6	8.6	8.6	8.6	8.6
48h.	8.6	8.6	8.6	8.6	8.6	8.6	8.6
72h.	8.6	8.6	8.6	8.6	8.6	8.6	8.6
96h.	8.6	8.6	8.6	8.6	8.6	8.6	8.6
100h.	8.5	8.6	8.6	8.6	8.6	8.6	8.6

KH

Dissolved Oxygen mg/l - **FINAL**

level	0	1	2	3	4	5	6
MHR	8.6	8.6	8.6	8.6	8.6	8.6	
24h.	8.6	8.6	8.6	8.6	8.6	8.6	
48h.	8.6	8.6	8.6	8.6	8.6	8.6	
72h.	8.6	8.6	8.6	8.6	8.6	8.6	
96h.	8.6	8.6	8.6	8.6	8.6	8.6	
100h.	8.6	8.6	8.6	8.6	8.6	8.6	

pH s.u. - **INITIAL**

level	0	1	2	3	4	5	6
MHR	7.4	7.2	7.4	7.3	7.5	7.4	7.4
24h.	7.2	7.2	7.3	7.3	7.3	7.4	7.4
48h.	7.1	7.2	7.2	7.1	7.1	7.3	7.2
72h.	7.0	7.2	7.1	7.0	7.0	7.2	7.1
96h.	7.0	7.1	7.0	7.0	7.0	7.1	7.1
100h.	6.9	7.1	7.0	6.9	6.9	7.1	7.0

pH s.u. - **FINAL**

level	0	1	2	3	4	5	6
MHR	7.5	7.5	7.5	7.6	7.6	7.6	
24h.	7.4	7.6	7.3	7.5	7.4	7.5	
48h.	7.5	7.6	7.3	7.6	7.3	7.4	
72h.	7.5	7.7	7.6	7.6	7.6	7.5	
96h.	7.5	7.8	7.6	7.7	7.5	7.7	
100h.	7.5	7.8	7.7	7.7	7.5	7.8	

EnviroScience Inc. Chronic Toxicity - Daily Chemistry Bench Sheet for □*C. dubia* or ☑FHM (check one)

Project ID:	T	O	W	A	031621	Permit No.:	PA0039004	Date:	03	16	21

Conductivity µmhos/cm - INITIAL

level	0	1	2	3	4	5	6
DMW	179	173	175	174	171	175	174
24%.	698	744	876	937	870	855	864
48%.	1208	1272	1598	2180	2090	1505	1443
72%.	1703	1734	2320	2330	2130	2180	2140
96%.	2190	2240	2970	3010	2800	2900	2730
100%.	2290	2300	3110	3150	2970	2920	2890

please initial and enter "I" and "F" in the appropriate instrument box.

	day→	0	1	2	3	4	5	6
TECH	Initial	MT	CB	TM	AT	AT	TM	TM
TECH	Final	CB	TM	AT	AT	TM	TM	MT
DO	830							
	820							
	YSI	I F	I F	I F	I F	I F	I F	I F
pH	920	I F	I	I F	I	I	I F	I F
	2Star	I	F		I F	F		
cond.	160	I	I	I	I	I	I	I

Dissolved Oxygen mg/l - INITIAL

level	0	1	2	3	4	5	6
DMW	8.6	8.6	8.6	8.6	8.6	8.6	8.6
24%.	8.6	8.6	8.6	8.6	8.6	8.6	8.6
48%.	8.6	8.6	8.6	8.6	8.6	8.6	8.6
72%.	8.5	8.6	8.6	8.6	8.6	8.6	8.6
96%.	8.4	8.6	8.6	8.6	8.6	8.6	8.6
100%.	8.5	8.6	8.6	8.6	8.6	8.6	8.6

Dissolved Oxygen mg/l - FINAL

level	0	1	2	3	4	5	6
DMW	8.6	8.6	8.6	8.6	8.6	8.6	8.6
24%.	8.6	8.6	8.6	8.6	8.6	8.6	8.6
48%.	8.6	8.6	8.6	8.6	8.6	8.6	8.6
72%.	8.6	8.6	8.6	8.6	8.6	8.6	8.6
96%.	8.6	8.6	8.6	8.6	8.6	8.6	8.6
100%.	8.6	8.6	8.6	8.6	8.6	8.6	8.6

pH s.u. - INITIAL

level	0	1	2	3	4	5	6
DMW	7.4	7.2	7.4	7.4	7.5	7.5	7.4
24%.	7.3	7.2	7.2	7.5	7.4	7.4	7.3
48%.	7.1	7.2	7.2	7.1	7.1	7.2	7.2
72%.	7.0	7.1	7.1	7.0	7.1	7.1	7.0
96%.	6.9	7.1	7.0	6.9	6.9	7.0	7.0
100%.	6.9	7.1	7.0	6.9	6.9	7.1	7.0

pH s.u. - FINAL

level	0	1	2	3	4	5	6
DMW	7.5	7.6	7.4	7.3	7.1	7.0	7.2
24%.	7.5	7.5	7.2	7.2	7.0	7.0	7.3
48%.	7.4	7.5	7.2	7.0	7.1	7.2	7.3
72%.	7.3	7.4	7.3	7.1	7.1	7.1	7.3
96%.	7.2	7.4	7.3	7.0	7.1	7.1	7.3
100%.	7.2	7.4	7.3	7.0	7.2	7.2	7.3

Form 5000-2 rev. 01/20/21
CHRONIC BIOASSAY:
INITIAL WATER QUALITY CHECKS (DO, pH, conductivity); CHLORINE, ALKALINITY, HARDNESS DATA.

Project ID: TOWA 031621 Permit No.: PA0039004
Test Date: 031621

Sample Type: →	EFFLUENT					
EnviroScience No.:	TOWA 031621 EFF	TOWA 031821	TOWA 032021 EFF			
D. Oxygen (mg/l-%sat) **>4 & <100%?**	8.6	8.6	8.6			
pH (s.u) **6-9?**	6.8	6.8	7.2			
Conductivity (µmhos/cm)	2200	3070	2880			
Alkalinity (mg/l $CaCO_3$) **MDL = 20 mg/l**	(3.0) 60	(3.3) 66	(3.4) 68			
Hardness (mg/l $CaCO_3$) **MDL = 5 mg/l**	(4.0) 160	(4.5) 180	(4.2) 168			
TRC_I (mg/l) **<0.02?**	<0.02	~~0.07~~ 0.083	0.149			
TRC_A (mg/l) <0.02?	–	<0.02	<0.02			
Ammonia as N (mg/L)	0.82	0.57	1.14			
Tech Initials:	MT	TM	AT			

Methods/Instrumentation:
DO: APHA (1998) 4500-O G, YSI 5100; pH: APHA (1998) 4500-H B, Orion 920A/2Star; Conductivity: APHA (1998) 2510-B, Orion 160; Hardness: APHA (1998) 2340-C; Alkalinity: APHA (1998) 2320-B; Chlorine: APHA (1998) 4500-Cl D, HACH Auto CAT9000

Sample Type: effluent (outfall # if more than one), upstream, downstream (NF, FF), lab water, etc.

EnviroScience No.: Tracking number from C-O-C (client code+date received+type/outfall/unique #)

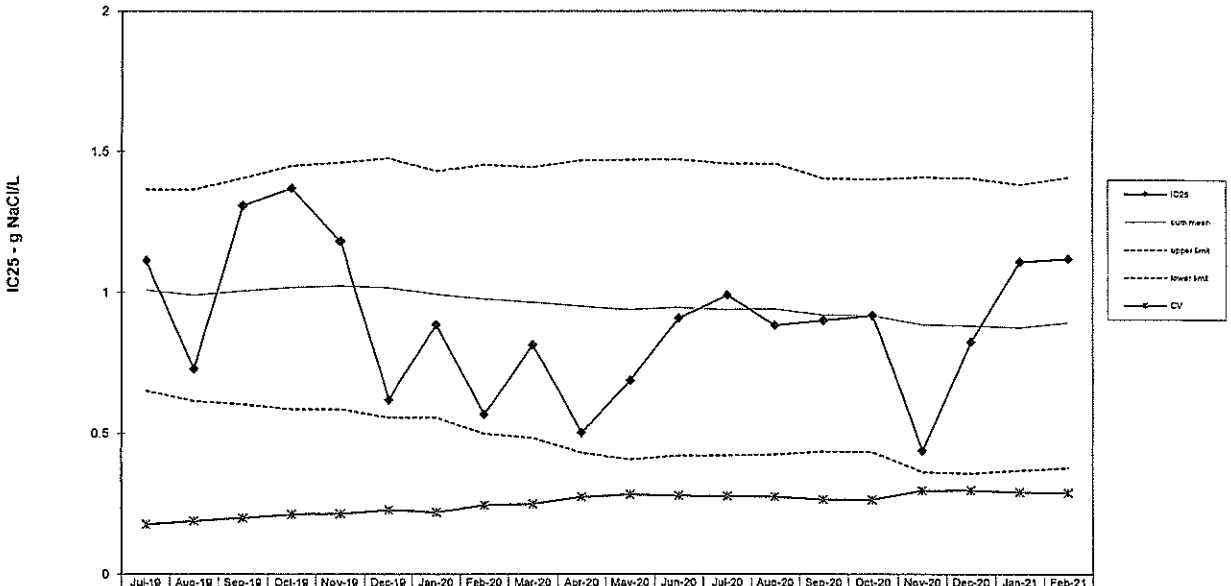
Dechlorination procedure:
TRC_I = total residual chlorine, initial value measured prior to dilution or use of sample.
TRC_A = TRC value measured after dechlorination.

Sodium thiosulfate is used to reduce Total Residual Chlorine by dosing with 6.7 mg $Na_2S_2O_3$ per mg TRC.
A 6.7 mg/ml $Na_2S_2O_3$ solution is used; dose mls = X mg/l * liters in sample container being treated.

Comments: Describe dechlorination/pH-adjustments including lot numbers, concentration, volumes of sodium thiosulfate or acid/base solutions and volume of sample treated, preparation of blanks; problems associated with data collection, etc. Initial all entries along with date/time/sample #. Attach additional pages if necessary.

KH✓

EnviroScience QC Chart - *Ceriodaphnia dubia*
Chronic Toxicity Endpoint - Reproduction IC_{25}



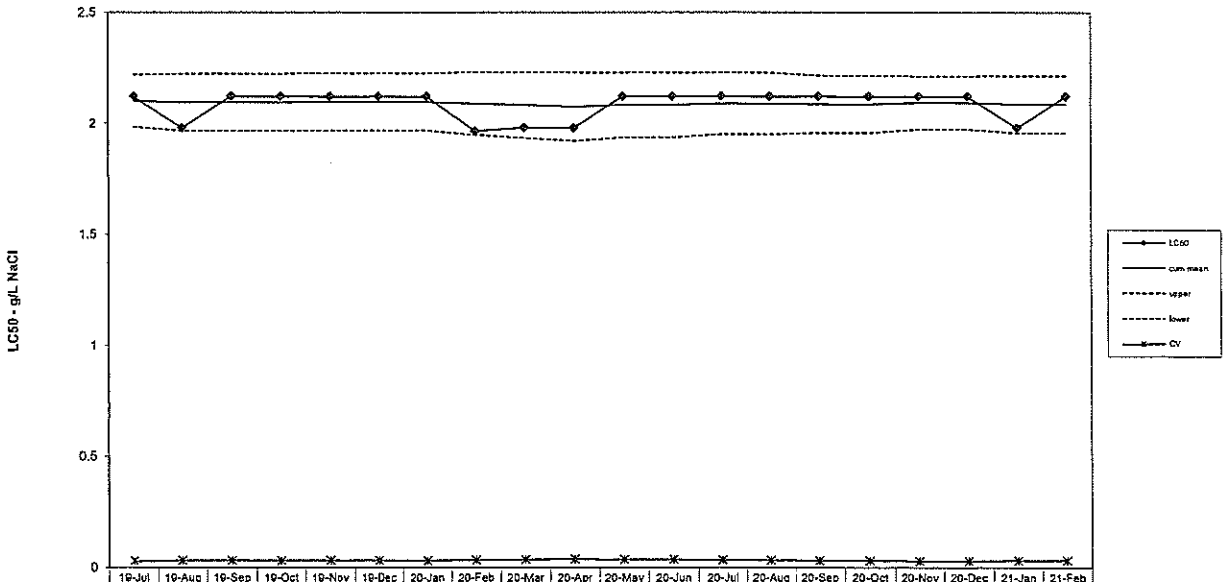
	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21
IC25	1.114	0.7289	1.308	1.37	1.182	0.6177	0.8853	0.5672	0.8133	0.5022	0.6875	0.9084	0.9889	0.8826	0.9003	0.915	0.4373	0.8242	1.108	1.119
cum mean	1.00875	0.99015	1.00445	1.01795	1.02385	1.01639	0.99385	0.9763	0.95437	0.94957	0.93857	0.94592	0.93807	0.94049	0.91971	0.91705	0.88552	0.88192	0.87502	0.89314
upper limit	1.36601	1.36548	1.40578	1.44982	1.45127	1.47646	1.43162	1.45323	1.44525	1.45868	1.4706	1.47166	1.45586	1.45668	1.40477	1.40151	1.40913	1.40622	1.38251	1.40864
lower limit	0.65149	0.61481	0.60311	0.58607	0.58602	0.55631	0.55608	0.49937	0.48348	0.43046	0.40653	0.42018	0.42027	0.4243	0.43464	0.43259	0.3619	0.35762	0.36753	0.37764
CV	0.17708	0.18953	0.19878	0.21213	0.21376	0.22633	0.22024	0.24426	0.24933	0.27334	0.28343	0.2779	0.27599	0.27443	0.26371	0.26414	0.29566	0.29725	0.28999	0.28859

Test Date

EnviroScience QC/SRT Chart rev. 02/25/21

Tests conducted with MHRW

EnviroScience QC Chart- *Ceriodaphnia dubia*
Chronic Toxicity Endpoint - Survival LC50



	19-Jul	19-Aug	19-Sep	19-Oct	19-Nov	19-Dec	20-Jan	20-Feb	20-Mar	20-Apr	20-May	20-Jun	20-Jul	20-Aug	20-Sep	20-Oct	20-Nov	20-Dec	21-Jan	21-Feb
LC50	2.121	1.979	2.121	2.121	2.121	2.121	2.121	1.985	1.979	1.979	2.121	2.121	2.121	2.121	2.121	2.121	2.121	2.121	1.979	2.121
cum mean	2.1013	2.0942	2.0942	2.0942	2.0961	2.0961	2.0961	2.0883	2.0812	2.0741	2.0819	2.0819	2.089	2.089	2.0848	2.0848	2.0919	2.0919	2.0848	2.0848
upper	2.21864	2.22313	2.22313	2.22313	2.22546	2.22546	2.22546	2.2266	2.22987	2.22803	2.22818	2.22818	2.22784	2.22784	2.21359	2.21359	2.21145	2.21145	2.21359	2.21359
lower	1.98396	1.96527	1.96527	1.96527	1.96674	1.96674	1.96674	1.947	1.93273	1.92017	1.93562	1.93562	1.95016	1.95016	1.95601	1.95601	1.97235	1.97235	1.95601	1.95601
CV	0.02792	0.03078	0.03078	0.03078	0.03086	0.03086	0.03086	0.03363	0.03587	0.03711	0.03513	0.03513	0.03323	0.03323	0.03089	0.03089	0.02858	0.02858	0.03089	0.03089

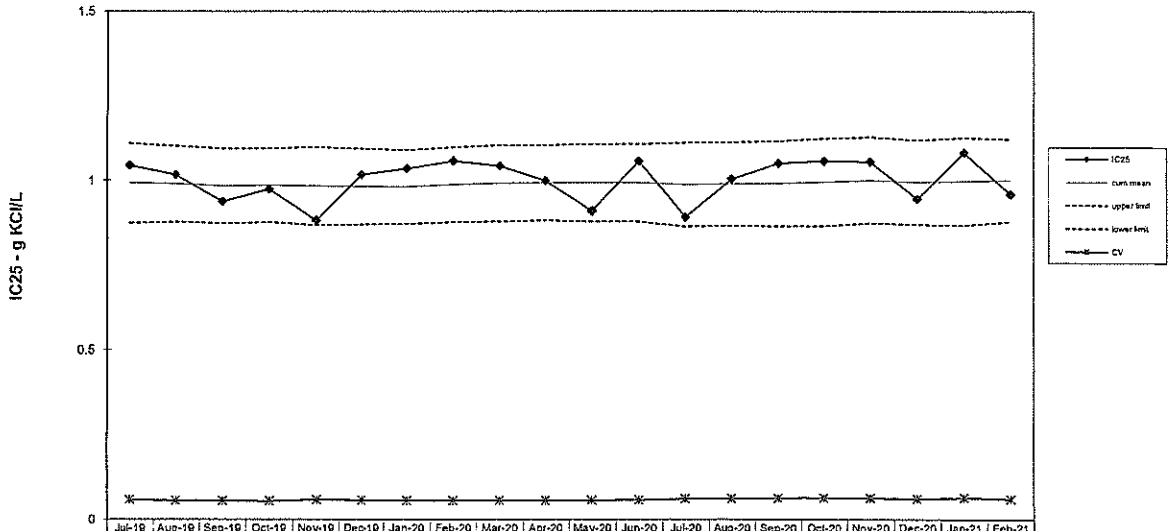
Test Date

EnviroScience QC/SRT Chart rev. 02/25/21

Tests conducted with MHRW

EnviroScience QC Chart - *Pimephales promelas*

Chronic Toxicity Endpoint - Growth IC_{25}



	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21
IC25	1.044	1.016	0.9367	0.974	0.8826	1.016	1.035	1.057	1.042	0.9985	0.9093	1.056	0.891	1.003	1.05	1.057	1.055	0.9451	1.082	0.9591
cum mean	0.99278	0.98988	0.98407	0.98556	0.98336	0.98171	0.98056	0.98734	0.99137	0.99336	0.99244	0.99284	0.98729	0.98925	0.9909	0.99479	1.00138	0.99494	0.99739	1.00047
upper limit	1.1101	1.10147	1.09392	1.09393	1.09835	1.09354	1.08963	1.09777	1.10368	1.10464	1.10628	1.10756	1.11056	1.11219	1.11827	1.12342	1.12605	1.11914	1.12658	1.12237
lower limit	0.87546	0.87829	0.87421	0.87719	0.86837	0.86978	0.87149	0.87691	0.87905	0.88208	0.8786	0.87812	0.88402	0.88631	0.88553	0.86615	0.87471	0.87073	0.86819	0.87856
CV	0.05909	0.05637	0.05582	0.05498	0.05647	0.05701	0.05561	0.05592	0.05665	0.05601	0.05735	0.05777	0.06243	0.06214	0.06326	0.06465	0.06325	0.06242	0.06477	0.06092

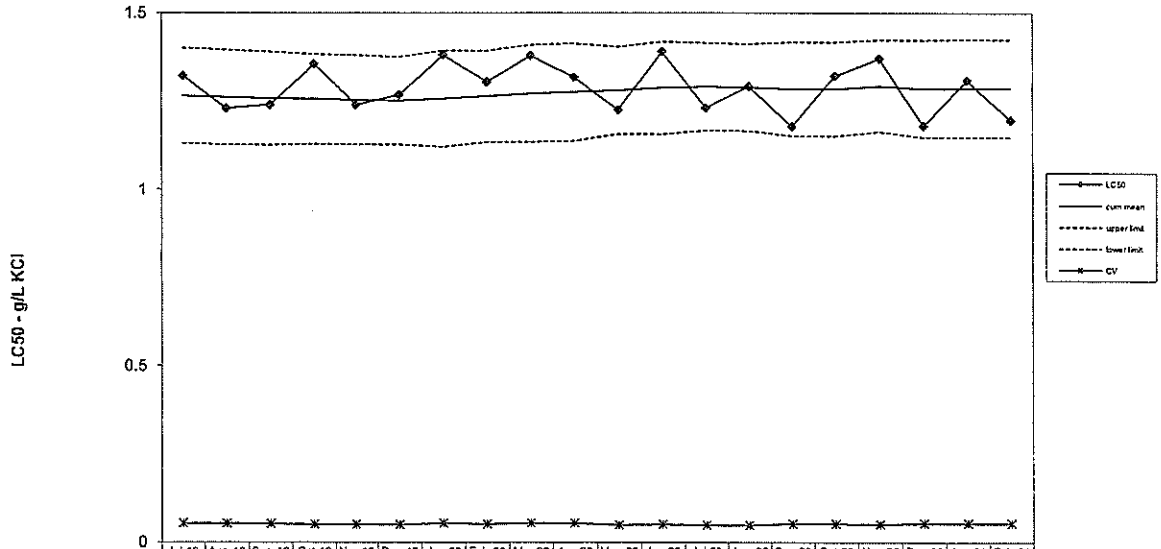
Test Date

EnviroScience QC/SRT Chart rev. 02/25/21

Tests conducted with DMW

EnviroScience QC Chart - *Pimephales promelas*

Chronic Toxicity Endpoint - Survival LC50



	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21
LC50	1.321	1.229	1.239	1.355	1.238	1.267	1.38	1.304	1.378	1.317	1.224	1.39	1.229	1.291	1.177	1.321	1.37	1.179	1.308	1.195
cum mean	1.265	1.2611	1.257	1.2558	1.2529	1.2511	1.2559	1.2633	1.2712	1.275	1.2705	1.2871	1.2897	1.2883	1.2836	1.2838	1.2927	1.2848	1.2856	1.2856
upper limit	1.4003	1.3957	1.3869	1.3833	1.3792	1.3754	1.3925	1.393	1.4088	1.4133	1.4034	1.4187	1.414	1.4117	1.4166	1.4167	1.4232	1.4220	1.4241	1.424
lower limit	1.1297	1.1264	1.125	1.1282	1.1265	1.1267	1.1193	1.1336	1.1335	1.1366	1.1556	1.1555	1.1654	1.1646	1.1505	1.1505	1.1621	1.1466	1.147	1.1472
CV	0.0535	0.0534	0.0525	0.0508	0.0504	0.0497	0.0544	0.0513	0.0541	0.0542	0.0484	0.0511	0.0482	0.0479	0.0518	0.0518	0.0505	0.0538	0.0539	0.0538

Test Date

EnviroScience QC/SRT Chart rev. 02/25/21

Tests conducted with DMW