RESULTS OF CHRONIC TOXICITY TESTS

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

Test date: May 4-11, 2021
Sampling period: May 2-7, 2021
Report date: May 18, 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)

May 18, 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 May 4, 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%. The PMSD for the growth endpoint was below the lower bound. Endpoints are listed below.

WET endpoints for Towamencin MA; 05/2021
sampling period: 05/02-07/21

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=	1.00 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: 05/18/21

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? no Original Chlorine Level: <0.02 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

05/18/21
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	05/02/21-0830	05/03/21-0830	
001	composite	3 gal	05/04/21-0800	05/05/21-0800	
001	composite	4 gal	05/06/21-0820	05/07/21-0820	

Dates/Times of Test Performance:			
Ceriodaphnia dubia		*Pimephales promelas*	
Start Date: MM/DD/YY	05/04/21	Start Date: MM/DD/YY	05/04/21
Start Time:	1430 hrs	Start Time:	1520 hrs
End Date: MM/DD/YY	05/10/21	End Date: MM/DD/YY	05/11/21
End Time:	1430 hrs	End Time:	1445 hrs

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

1. 05/04/21 at 1135 hrs; 6.0 °C
2. 05/06/21 at 1025 hrs; 6.0 °C
3. 05/08/21 at 1155 hrs; 6.0 °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:	6.5-14.5 hours, EnviroScience 05/04/21, 0000-0800	<24 hours, ES 05/03/21-1550
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:	05/04-0,1; 05/06-2,3; 05/08-4,5,6	05/04-0,1; 05/06-2,3; 05/08-4,5,6
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:							
04 May 21	8.6	7.2	2560	68	184	<0.02	0.46
06 May 21	8.6	7.4	2780	104	160	<0.02	0.17
08 May 21	8.6	7.2	2870	100	132	<0.02	0.00

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 05/04/21 – 05/10/21 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	31.0	26.60
24% Effluent	100	90	90	90	90	90	NA	31.8	37.50
48% Effluent	100	100	100	100	100	100	NA	34.2	13.49
72% Effluent	100	100	100	100	90	90	NA	28.5	38.76
96% Effluent	100	100	100	100	100	100	NA	36.3	14.92
100% Effluent	100	100	100	100	90	90	NA	26.7	34.55

Acute 48-Hour LC_{50} = >100% 95% C.I. Lower Limit: --- 95% C.I. Upper Limit: ---	Survival NOEC = 100% Survival LOEC = >100%	Reproduction NOEC = 100% Reproduction LOEC = >100%	**Chronic Toxicity Unit (TUc):** **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	31.0	26.60	90

TABLE 6

Results of a 7-Day *Pimephales promelas* Survival and Growth Test Conducted 05/04/21 – 05/11/21 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	98	98	95	0.374	3.53
24% Effluent	100	100	100	98	98	98	95	0.384	4.54
48% Effluent	100	100	100	100	100	100	100	0.403	3.12
72% Effluent	100	100	100	100	98	98	90	0.397	4.47
96% Effluent	100	100	100	100	98	95	92	0.418	5.09
100% Effluent	100	100	100	100	100	100	95	0.411	5.31

Acute **96**-Hour LC_{50} = >100% (48-Hour LC_{50} = >100%)	Survival NOEC = 100%	Growth NOEC = 100%	**Chronic Toxicity Unit (TUc):**
95% C.I. Lower Limit: --- 95% C.I. Upper Limit: ---	Survival LOEC = >100%	Growth LOEC = >100%	**1.0 (100÷NOEC)**
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. PMSD below lower bound.

[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	6.1	0.394	4.8

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**	04/13/21-04/19/21	6 days	NaCl/ MHRW	100	33.0 young	IC_{25}: 0.810 g/L	yes
P. promelas *	04/13/21-04/20/21	7 days	KCl/ DMW	100	0.451 mg	IC_{25}: 0.968 g/L	yes

* chronic test.
Acute SRT charts maintained for acute test protocols only. For test dates 04/15-17/21, *C. dubia* 48-hr LC_{50} = 2.38 g NaCl/L MHRW at 25°C; 04/15-19/21, *P. promelas* 96-hr LC_{50} = 6.40 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; 05/2021
sampling period: 05/02-07/21

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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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.	05/03/21-0830	001	6.0°C	<36 hrs	<0.02 mg/L	☐ Yes ☒ No
2.	05/05/21-0800	001	6.0°C	<36hrs	<0.02 mg/L	☐ Yes ☒ No
3.	05/07/21-0820	001	6.0°C	<36hrs	<0.02 mg/L	☐ Yes ☒ No

TEST CONDITIONS

Date/Time of Test Initiation: **05/04/21-1430** Date/Time of Test Termination: **05/10/21-1430**

☒ 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: **6.5-14.5 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: **05/06/21** Conductivity: **289** µmhos/cm

pH: **7.0** TRC: **<0.02** mg/L

CONTROL RESULTS

Ceriodaphnia dubia

Survival: **100%**

Percent that produced 3 broods (if applicable): **90 %**

Young per Surviving Female (if applicable): **31.0**

Pimephales promelas

Survival:

Mean Dry Weight of Survivors (if applicable):

REFERENCE TOXICITY TESTS

Date of most recent test: **04/13/21** 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		05/18/21	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.	05/03/21-0830	001	6.0°C	<36 hrs	<0.02 mg/L	☐ Yes ☒ No
2.	05/05/21-0800	001	6.0°C	<36hrs	<0.02 mg/L	☐ Yes ☒ No
3.	05/07/21-0820	001	6.0°C	<36hrs	<0.02 mg/L	☐ Yes ☒ No

TEST CONDITIONS

Date/Time of Test Initiation: **05/04/21-1520** Date/Time of Test Termination: **05/11/21-1445**

☒ 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: **05/08/21** Conductivity: **178** µmhos/cm

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

CONTROL RESULTS

Ceriodaphnia dubia

Survival:

Percent that produced 3 broods (if applicable): %

Young per Surviving Female (if applicable):

Pimephales promelas

Survival: **95%**

Mean Dry Weight of Survivors (if applicable): **0.394**

REFERENCE TOXICITY TESTS

Date of most recent test: **04/13/21** 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		05/18/21	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: 11/10/2020

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**

Test Completion Date: 5/10/2021

Replicate No.	Control	TIWC
1	11	35
2	33	31
3	31	40
4	30	34
5	28	30
6	34	39
7	33	40
8	35	46
9	44	39
10	31	29
11		
12		
13		
14		
15		
Mean	31.000	36.300
Std Dev.	8.246	5.417
# Replicates	10	10

T-Test Result	5.0194
Deg. of Freedom	17
Critical T Value	0.8633
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: 11/10/2020

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		
Deg. of Freedom		
Critical T Value		
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**	

Test Completion Date: 5/10/2021

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 5/11/2021

Replicate No.	Control	TIWC
1	0.9	1
2	0.9	1
3	1	0.9
4	1	0.8
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.950	0.925
Std Dev.	0.058	0.096
# Replicates	4	4

T-Test Result	8.0792
Deg. of Freedom	4
Critical T Value	0.7407
Pass or Fail	**PASS**

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 5/11/2021

Replicate No.	Control	TIWC
1	0.363	0.443
2	0.372	0.393
3	0.393	0.426
4	0.368	0.411
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.374	0.418
Std Dev.	0.013	0.021
# Replicates	4	4

T-Test Result	11.7247
Deg. of Freedom	4
Critical T Value	0.7407
Pass or Fail	**PASS**

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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
5/2/2021	8:30 AM	5/3/2021	8:30 AM		EFF 1+2 SAMPLERS	EFF SAMPLE		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:	Marcus 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	
	[illegible]	05/04/21	1135	Transport Date		Client	Towamencin
				Transport Time		Sample ID's	TOWAUG0421EFF
				Transport Method		Cond. Of Container	good
				ES Vehicle (if applicable)		Temp. °C	6.0

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

Client TOWAMENCIN

ES Sample ID TOWA 050~~3~~421 EFF

Cooler Received by: AT

Date Cooler Received and Opened 050321

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___
4. Was the sample time and date filled in correctly? Yes ✓ No___
5. Sample Temperature upon receipt 6.0 °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: no labels on cubes

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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
5/4/2021	8:10Am	5/5/2021	8:10Am		EFF Samplers.	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 Pettijohn
	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	
	[illegible]	05/06/21	1025	Transport Date		Client	Towamencin MA
				Transport Time		Sample ID's	TMA 5/6/21 EFF
				Transport Method		Cond. Of Container	good
				ES Vehicle (if applicable)		Temp. °C	6.0

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

Client Towamencin

ES Sample ID TOWA 050621 EFF

Cooler Received by: CB

Date Cooler Received and Opened 050621

Received from: FedEX X UPS ___ Client Drop Off ___ ES Courier ___

1. Were custody seals on the outside of cooler? Yes ___ No X
   Were custody seals signed, dated and intact? Yes ___ No X
2. Did Chain of Custody (COC) accompany the samples? Yes X 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 6.0 °C
6. Did all sample container labels match the samples written on the COC? Yes ___ No X
   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 X 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
5/16/2021	8:30Am	5/17/2021	8:30Am	EFF Sampler		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:	[illegible]
	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
	[illegible]	050821	1155	Transport Time		Sample ID's	TOWA050821EFF
				Transport Method		Cond. Of Container	Good
				ES Vehicle (if applicable)		Temp. °C	6.0°C

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

Client Towamencin

ES Sample ID TOWA 050821 EFF

Cooler Received by: CB

Date Cooler Received and Opened 050821

Received from: FedEX X UPS___ Client Drop Off____ ES Courier____

1. Were custody seals on the outside of cooler? Yes____ No X
   Were custody seals signed, dated and intact? Yes____ No Y
2. Did Chain of Custody (COC) accompany the samples? Yes X 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 _____ ° C
6. Did all sample container labels match the samples written on the COC? Yes____ No X
   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 X No____

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

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Fax (330) 688-3858

Form 8100-1 rev. 01/20/21

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

Project ID:	IOWA 050421	**Start Date:**	050421	**Time:**	1430
Permit No.:	PA0039004	**End Date:**	051021	**Time:**	1430
Diluent:	MHR				

MHR	Day	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	59	49	69	49	29	59	69	69	49	10	0 / 0
	5	04	79	99	109	99	119	149	79	209	109	10	0 / 0
	6	89	219	199	149	159	219	~~229~~ 149	229	189	179	10	0 / 0
	7												/
Totals		11	33	31	30	28	34	33	35	44	31	$\bar{x}$ = 31.0	
Number of Broods		2	3	3	3	3	3	3	3	3	3	CV = 26.60	

24%	Day	1	2	3	4	5	6	7	8	9	10	Number Adults	# Dead/ # Adversely Affected
	1											10	0 / 0
	2										D	10	1 / 1
	3	04	04	04	04	04	04	04	04	04		10	1 / 1
	4	3	5	4	6	5	3	4	2	3		10	1 / 1
	5	8	11	13	5	13	20	9	8	13		10	1 / 1
	6	20	23	20	17	21	19	19	22	20		10	1 / 1
	7												/
Totals		33	39	37	28	39	42	32	32	36	0	$\bar{x}$ = 31.8	
Number of Broods		3	3	3	3	3	3	3	3	3	0	CV = 37.50	

48%	Day	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	2	4	2	5	3	2	3	5	10	0 / 0
	5	21	17	12	14	15	8	9	10	16	9	10	0 / 0
	6	19	14	18	17	18	21	20	18	21	13	10	0 / 0
	7												/
Totals		43	34	32	35	35	34	32	30	40	27	$\bar{x}$ = 34.2	
Number of Broods		3	3	3	3	3	3	3	3	3	3	CV = 13.49	

EnviroScience Inc. ***Ceriodaphnia dubia*** **Survival and Reproduction; EPA 1002.0: pg. 2 of 3**

Project ID:	TDWA
Permit No.:	

Start Date:	050421

72%	Day	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	3	10	0 / 0
	4	4	3	4	2	1	4	3	4	3	0	10	0 / 0
	5	18	16	11	8	D	7	8	6	10	4	10	1 / 1
	6	19	19	20	18	↓	20	17	14	20	19	10	1 / 1
	7												/
Totals		41	38	35	28	1	31	28	24	33	26	$\bar{X}$ = 28.5	
Number of Broods		3	3	3	3	1	3	3	3	3	3	CV = 38.76	

96%	Day	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	4	10	0 / 0
	4	3	3	4	2	3	5	4	5	3	0	10	0 / 0
	5	13	10	18	15	12	14	22	20	16	9	10	0 / 0
	6	19	18	18	17	15	20	14	21	20	16	10	0 / 0
	7												/
Totals		35	31	40	34	30	39	40	46	39	29	$\bar{X}$ = 36.3	
Number of Broods		3	3	3	3	3	3	3	3	3	3	CV = 14.92	

100%	Day	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	5	10	0 / 0
	4	2	3	4	6	4	2	3	5	4	0	10	0 / 0
	5	8	D	5	5	4	6	7	8	13	10	10	0 / 1
	6	13	↓	17	19	20	23	18	15	21	17	10	1 / 1
	7												/
Totals		23	3	26	30	28	31	28	28	38	32	$\bar{X}$ = 26.7	
Number of Broods		3	1	3	3	3	3	3	3	3	3	CV = 34.55	

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

Project ID:	TDWA
Permit No.:	

Start Date:	050421

YHV

Brood Board Information:

Replicate	1	2	3	4	5	6	7	8	9	10	BB #: 042221
	1	2	4	7	10	11	20	21	31	32	Date: 050321 - 050421
											Time: 2400-0800

Test Information:

Day	Initiation	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7
YAT Batch #	YATD 041321	YATD 041321		YATD 041321		YATE 041321		YATE 041321		YATE 041321		—		
Algae Batch #	ESB 042421	ESB 042421		ESA 050121		ESA 050121		ESA 050121		ESA 050121		—		
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	240	243	24.0	24.6	240	244	24.3	24.0	—	24.0	
24h.	24.0	24.0	24.1	240	246	24.0	24.0	240	247	24.0	24.0	—	24.4	
48h.	24.0	24.0	24.2	240	245	24.0	24.0	240	246	24.0	24.0	—	24.4	
72h.	24.0	24.0	24.0	240	241	24.0	24.1	240	243	24.0	24.0	—	24.2	
96h.	24.0	24.0	24.0	240	241	24.0	24.0	240	242	24.0	24.0	—	24.0	
100%	24.0	24.0	24.0	240	242	24.0	24.0	240	244	24.0	24.0	—	24.0	
Change time		14	45	13	25	12	35	13	20	14	00	14	30	
✓transfer	✓Loading	✓		✓		✓		✓		✓		—		
Initials	TM	CB		CB		AT		CB		KAH		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: 17 May-21 09:03 (p 1 of 1)
Test Code/ID: FB134E4 / 02-6327-1652

Ceriodaphnia 7-d Survival and Reproduction Test — EnviroScience

Analysis ID:	00-8037-7147	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	17 May-21 9:03	**Analysis:**	~~STP 2xK~~ Contingency Tables	**Status Level:**	1

Sample ID:	03-6179-9481	**Code:**	TOWA050421	**Project:**	
Sample Date:	03 May-21 08:30	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	04 May-21 11:35	**CAS (PC):**		**Station:**	001
Sample Age:	30h	**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	0.5000	Exact	1.0000	Non-Significant Effect
		48	1.0000	Exact	1.0000	Non-Significant Effect
		72	0.5000	Exact	1.0000	Non-Significant Effect
		96	1.0000	Exact	1.0000	Non-Significant Effect
		100	0.5000	Exact	1.0000	Non-Significant Effect

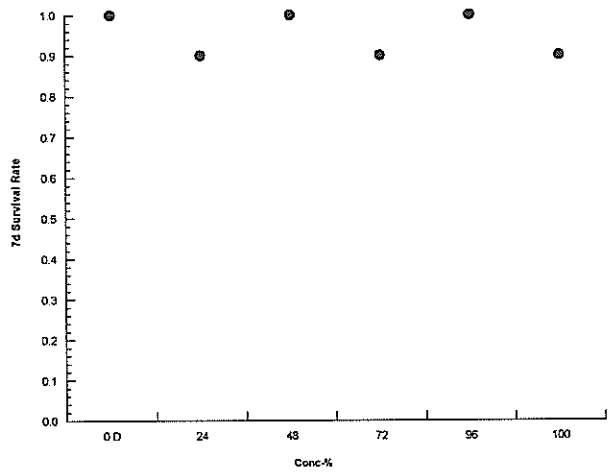
Data Summary

Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	D	10	0	10	1	0	0.0%
24		9	1	10	0.9	0.1	10.0%
48		10	0	10	1	0	0.0%
72		9	1	10	0.9	0.1	10.0%
96		10	0	10	1	0	0.0%
100		9	1	10	0.9	0.1	10.0%

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	0.0000
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	0.0000	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	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Graphics



KHV

CETIS Analytical Report

Report Date: 17 May-21 09:03 (p 1 of 2)
Test Code/ID: FB134E4 / 02-6327-1652

Ceriodaphnia 7-d Survival and Reproduction Test — EnviroScience

Analysis ID:	17-3284-9758	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.6
Analyzed:	17 May-21 9:03	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Sample ID:	03-6179-9481	**Code:**	TOWA050421	**Project:**	
Sample Date:	03 May-21 08:30	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	04 May-21 11:35	**CAS (PC):**		**Station:**	001
Sample Age:	30h	**Client:**	Towamencin		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	29.17%

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	2	18	CDF	0.9824	Non-Significant Effect
	48	118.5	75	3	18	CDF	0.9860	Non-Significant Effect
	72	96.5	75	4	18	CDF	0.5806	Non-Significant Effect
	96	125.5	75	4	18	CDF	0.9977	Non-Significant Effect
	100	82	75	3	18	CDF	0.1407	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	626.683	125.337	5	1.607	0.1739	Non-Significant Effect
Error	4211.9	77.9981	54			
Total	4838.58		59			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	11.02	15.09	0.0509	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.823	0.9459	5.3E-07	Non-Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	10	31	25.1	36.9	32	11	44	2.608	26.60%	0.00%
24		10	31.8	23.27	40.33	34.5	0	42	3.771	37.50%	-2.58%
48		10	34.2	30.9	37.5	34	27	43	1.459	13.49%	-10.32%
72		10	28.5	20.6	36.4	29.5	1	41	3.494	38.76%	8.06%
96		10	36.3	32.42	40.18	37	29	46	1.713	14.92%	-17.10%
100		10	26.7	20.1	33.3	28	3	38	2.918	34.55%	13.87%

Reproduction Detail

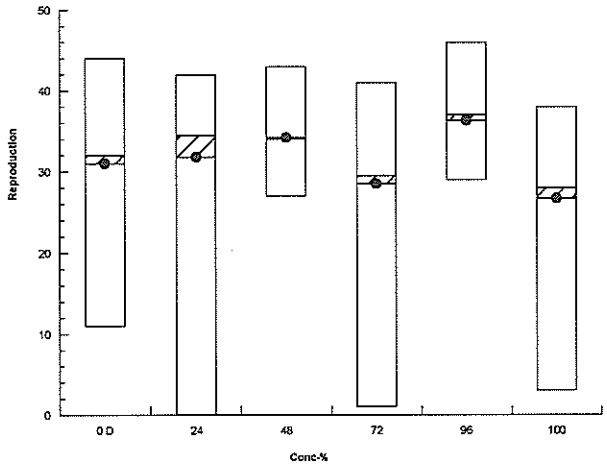
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	11	33	31	30	28	34	33	35	44	31
24		33	39	37	28	39	42	32	32	36	0
48		43	34	32	35	35	34	32	30	40	27
72		41	38	35	28	1	31	28	24	33	26
96		35	31	40	34	30	39	40	46	39	29
100		23	3	26	30	28	31	28	28	38	32

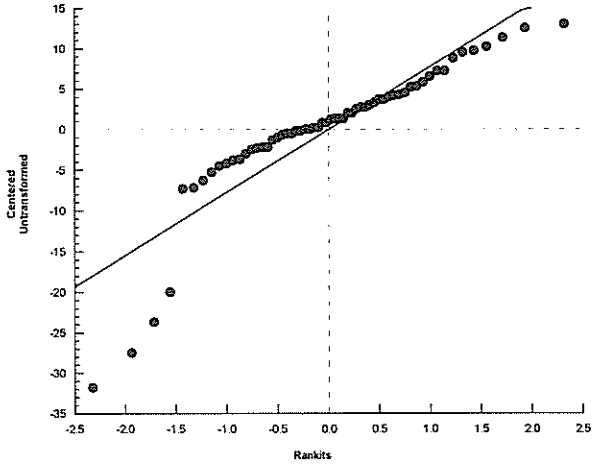
KHV

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

Analysis ID:	17-3284-9758	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.6
Analyzed:	17 May-21 9:03	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Graphics





CETIS Analytical Report

Report Date: 17 May-21 09:03 (p 1 of 1)
Test Code/ID: FB134E4 / 02-6327-1652

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

Analysis ID:	14-0353-6703	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.6
Analyzed:	17 May-21 9:03	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Sample ID:	03-6179-9481	**Code:**	TOWA050421	**Project:**	
Sample Date:	03 May-21 08:30	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	04 May-21 11:35	**CAS (PC):**		**Station:**	001
Sample Age:	30h	**Client:**	Towamencin		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	237053	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

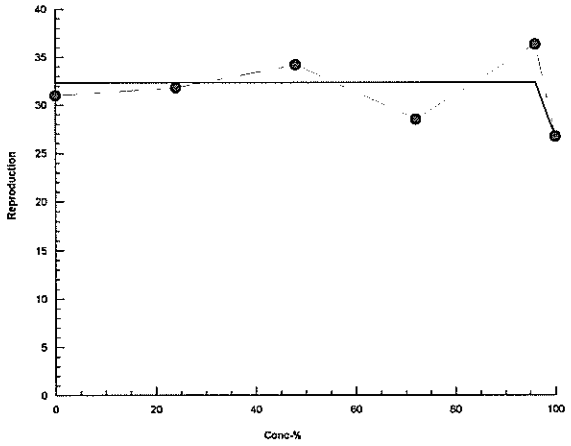
Reproduction Summary

			Calculated Variate						Isotonic Variate	
Conc-%	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	Mean	%Effect
0	D	10	31	11	44	8.246	26.60%	0.0%	32.36	0.0%
24		10	31.8	0	42	11.92	37.50%	-2.58%	32.36	0.0%
48		10	34.2	27	43	4.614	13.49%	-10.32%	32.36	0.0%
72		10	28.5	1	41	11.05	38.76%	8.07%	32.36	0.0%
96		10	36.3	29	46	5.417	14.92%	-17.1%	32.36	0.0%
100		10	26.7	3	38	9.226	34.55%	13.87%	26.7	17.49%

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	11	33	31	30	28	34	33	35	44	31
24		33	39	37	28	39	42	32	32	36	0
48		43	34	32	35	35	34	32	30	40	27
72		41	38	35	28	1	31	28	24	33	26
96		35	31	40	34	30	39	40	46	39	29
100		23	3	26	30	28	31	28	28	38	32

Graphics



Form 8080-1 rev. 01/20/21

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

Project ID:	TOWA050421	**Start Date:**	~~04~~ 050421	**Time:**	1520
Permit No.:	PA0039004	**End Date:**	051121	**Time:**	1445
Hatch #:	050321 1550 JM ABC SOV JAX USA	**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	1 / 1	1 / 1	1 / 1
	B	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	1 / 1
	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								
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	0 / 0	0 / 0
	C	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	1 / 1
	D	10	0 / 0	0 / 0	0 / 0	1 / 1	1 / 1	1 / 1	1 / 1
	total %'s								
48	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	0 / 0
	total %'s								
72	A	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	2 / 2
	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	1 / 1	1 / 1	1 / 1
	D	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	1 / 1
	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	24.0	24.0	24.2	24.0	24.3	24.0	24.3	24.0
24	24.0	24.0	24.0	24.0	24.2	24.0	24.2	24.0	24.2	24.0	24.3	24.0	24.3	24.0
48	24.9	24.0	24.0	24.0	24.4	24.0	24.0	24.0	24.4	24.0	24.1	24.0	24.4	24.0
72	25.0	24.0	24.0	24.0	24.3	24.0	24.2	24.0	24.6	24.0	24.4	24.0	24.4	24.0
96	26.0	24.0	24.0	24.2	24.4	24.0	24.4	24.0	24.6	24.0	24.4	24.0	24.7	24.0
100	26.0	24.0	24.0	24.0	24.5	24.0	24.4	24.0	24.7	24.0	24.4	24.0	24.4	24.0
renew time	1520	1520		1450		1320		1410		1420		1540		1445
Initials	Set up NN	MT		DD		NN		DD		NN		DD		KAH
	n# ~~K~~ MT													

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

Project ID:	TOWA
Permit No.:	

KAH

Start Date:	050421

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

KAH

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: 17 May-21 09:09 (p 1 of 4)
Test Code/ID: 182619D / 00-2532-1885

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

Analysis ID:	06-9190-1540	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	17 May-21 9:09	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Sample ID:	05-6037-4784	**Code:**	TOWA050421	**Project:**	
Sample Date:	03 May-21 08:30	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	04 May-21 11:35	**CAS (PC):**		**Station:**	001
Sample Age:	31h	**Client:**	Towamencin		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100.	>100	n/a	1	11.90%

Steel Many-One Rank Sum Test

Control vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	24	18	10	3	6	CDF	0.8333	Non-Significant Effect
	48	22	10	2	6	CDF	0.9908	Non-Significant Effect
	72	15	10	3	6	CDF	0.4761	Non-Significant Effect
	96	17	10	3	6	CDF	0.7334	Non-Significant Effect
	100	18	10	3	6	CDF	0.8333	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0542208	0.0108442	5	1.022	0.4341	Non-Significant Effect
Error	0.191047	0.0106137	18			
Total	0.245267		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.9395	0.884	0.1592	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	0.8581	1.0000	0.9500	0.9000	1.0000	0.0289	6.08%	0.00%
24		4	0.9500	0.8581	1.0000	0.9500	0.9000	1.0000	0.0289	6.08%	0.00%
48		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	-5.26%
72		4	0.9000	0.7701	1.0000	0.9000	0.8000	1.0000	0.0408	9.07%	5.26%
96		4	0.9250	0.7727	1.0000	0.9500	0.8000	1.0000	0.0479	10.35%	2.63%
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	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	0.00%
24		4	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	0.00%
48		4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.00%	-6.12%
72		4	1.254	1.056	1.453	1.249	1.107	1.412	0.06231	9.93%	5.73%
96		4	1.295	1.061	1.529	1.331	1.107	1.412	0.07348	11.35%	2.67%
100		4	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	0.00%

7d Survival Rate Detail

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

KHV

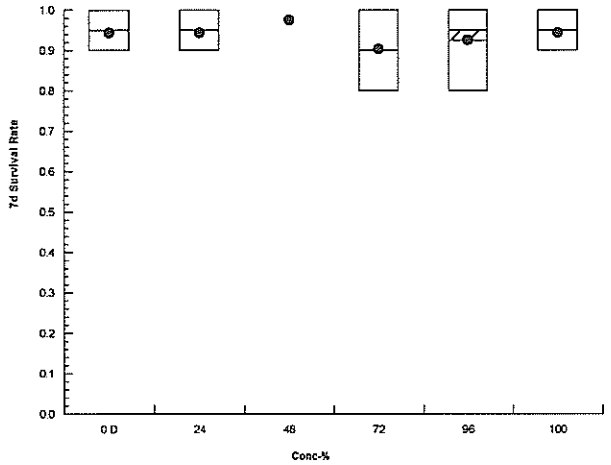
Fathead Minnow 7-d Larval Survival and Growth Test — **EnviroScience**

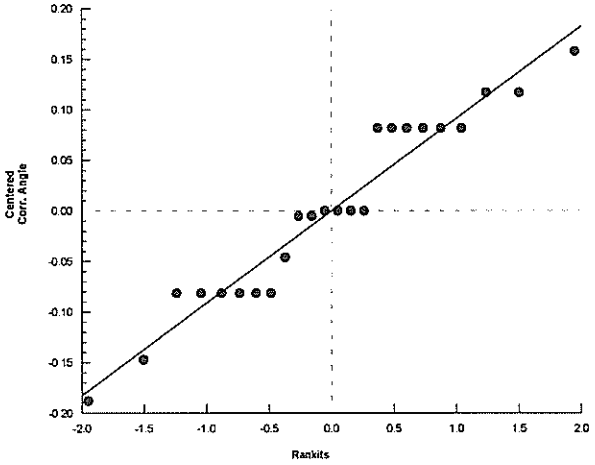
Analysis ID:	06-9190-1540	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	17 May-21 9:09	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Angular (Corrected) Transformed Detail

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

Graphics





CETIS Analytical Report

Report Date: 17 May-21 09:09 (p 3 of 4)
Test Code/ID: 182619D / 00-2532-1885

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

Analysis ID:	10-1364-0124	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	17 May-21 9:09	**Analysis:**	~~Parametric-Control vs Treatments~~	**Status Level:**	1

Sample ID:	05-6037-4784	**Code:**	TOWA050421	**Project:**	
Sample Date:	03 May-21 08:30	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	04 May-21 11:35	**CAS (PC):**		**Station:**	001
Sample Age:	31h	**Client:**	Towamencin		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	* 8.06%

below limit

Dunnett Multiple Comparison Test

Control vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	24	-0.7988	2.407	0.030	6	CDF	0.9707	Non-Significant Effect
	48	-2.296	2.407	0.030	6	CDF	0.9997	Non-Significant Effect
	72	-1.857	2.407	0.030	6	CDF	0.9986	Non-Significant Effect
	96	-3.534	2.407	0.030	6	CDF	1.0000	Non-Significant Effect
	100	-2.915	2.407	0.030	6	CDF	0.9999	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0054437	0.0010887	5	3.473	0.0226	Significant Effect
Error	0.0056426	0.0003135	18			
Total	0.0110863		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	1.36	15.09	0.9286	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9571	0.884	0.3829	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	0.374	0.353	0.395	0.37	0.363	0.393	0.006597	3.53%	0.00%
24		4	0.384	0.3562	0.4118	0.3915	0.358	0.395	0.008725	4.54%	-2.67%
48		4	0.4027	0.3828	0.4227	0.398	0.394	0.421	0.00628	3.12%	-7.69%
72		4	0.3973	0.369	0.4255	0.3965	0.379	0.417	0.008873	4.47%	-6.22%
96		4	0.4182	0.3843	0.4522	0.4185	0.393	0.443	0.01065	5.09%	-11.83%
100		4	0.4105	0.3758	0.4452	0.42	0.378	0.424	0.0109	5.31%	-9.76%

Mean Dry Weight-mg Detail

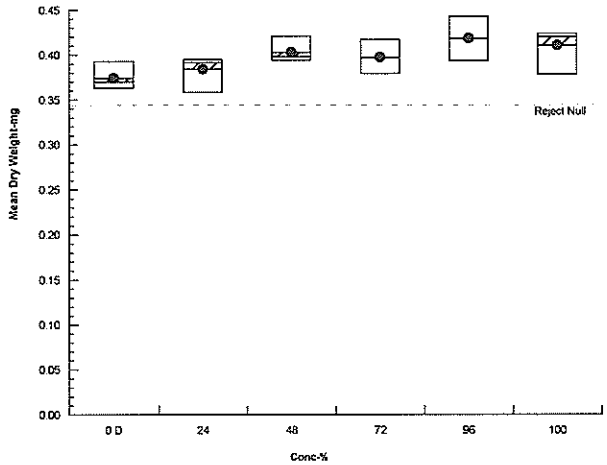
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	0.363	0.372	0.393	0.368
24		0.39	0.358	0.393	0.395
48		0.401	0.395	0.394	0.421
72		0.386	0.379	0.417	0.407
96		0.443	0.393	0.426	0.411
100		0.424	0.378	0.422	0.418

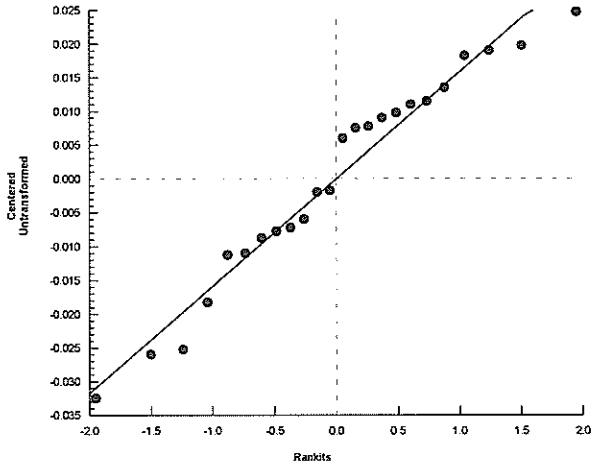
KHV

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

Analysis ID:	10-1364-0124	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	17 May-21 9:09	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Graphics





CETIS Analytical Report

Report Date: 17 May-21 09:09 (p 1 of 1)
Test Code/ID: 182619D / 00-2532-1885

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

Analysis ID:	20-4709-6027	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	17 May-21 9:09	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Sample ID:	05-6037-4784	**Code:**	TOWA050421	**Project:**	
Sample Date:	03 May-21 08:30	**Material:**	POTW Effluent	**Source:**	Discharge Monitoring Report
Receipt Date:	04 May-21 11:35	**CAS (PC):**		**Station:**	001
Sample Age:	31h	**Client:**	Towamencin		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1916653	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

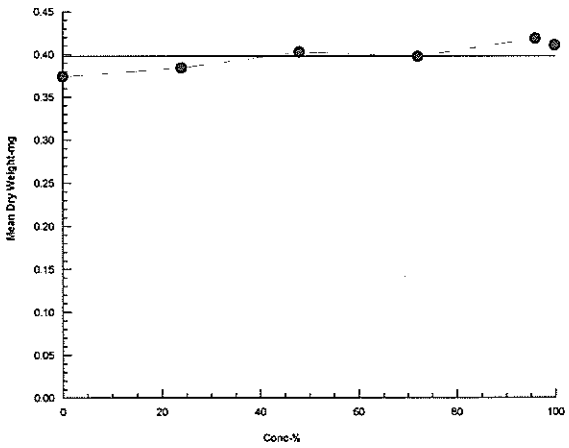
Mean Dry Weight-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	Mean	%Effect
0	D	4	0.374	0.363	0.393	0.01319	3.53%	0.0%	0.3978	0.0%
24		4	0.384	0.358	0.395	0.01745	4.54%	-2.67%	0.3978	0.0%
48		4	0.4027	0.394	0.421	0.01256	3.12%	-7.69%	0.3978	0.0%
72		4	0.3973	0.379	0.417	0.01775	4.47%	-6.22%	0.3978	0.0%
96		4	0.4182	0.393	0.443	0.02131	5.10%	-11.83%	0.3978	0.0%
100		4	0.4105	0.378	0.424	0.02181	5.31%	-9.76%	0.3978	0.0%

Mean Dry Weight-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	0.363	0.372	0.393	0.368
24		0.39	0.358	0.393	0.395
48		0.401	0.395	0.394	0.421
72		0.386	0.379	0.417	0.407
96		0.443	0.393	0.426	0.411
100		0.424	0.378	0.422	0.418

Graphics



KHV

Form 8080-2 rev. 01/20/21

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

Project ID:	TOWA050421
Permit No.:	PA0039004

Start Date:	050421

Concen-tration	Rep. no.	Pan no.	Weight of pan (g)	Total dry wt. (g)	No. fish
DMW	A	W1	1.09814	1.10177	9
	B	W2	1.09419	1.09791	9
	C	W3	1.10963	1.11356	10
	D	W4	1.10240	1.10608	10
24	A	W5	1.09244	1.09634	10
	B	W6	1.08432	1.08790	10
	C	W7	1.08749	1.09142	9
	D	W8	1.10681	1.11076	9
48	A	W9	1.07923	1.08324	10
	B	W10	1.07624	1.08019	10
	C	W11	1.08667	1.09061	10
	D	W12	1.10758	1.11179	10
72	A	W13	1.08562	1.08948	8
	B	W14	1.07564	1.07943	10
	C	W15	1.10146	1.10563	9
	D	W16	1.10728	1.11135	9
96	A	W17	1.10614	1.11057	10
	B	W18	1.10912	1.11305	10
	C	W19	1.11191	1.11617	9
	D	W20	1.08497	1.08908	8
100	A	W21	1.10960	1.11384	KAH ~~9~~ 10
	B	W22	1.09139	1.09517	~~10~~ 9
	C	W23	1.09660	1.10082	9
	D	W24	1.10314	1.10732	10
Initials		AT	JV	KH	KAH

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:	050421

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	W27	1.10133	1.10138	
	B	W28	1.10080	1.10084	
	C	W29	1.09668	1.09661	
	D	W30	1.07952	1.07957	
Initials		AT	JV	KH	

S Weight calibrations	S wgt	Date: 050621	S wgt	Date: 051221
	2g	2.00003	2g	2.00004
	1g	0.99999	1g	0.99993
	500mg	0.49999	500mg	0.49996
	100mg	0.09999	100mg	0.10003
Initials		JV		KH

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 @	051121	1520	63	KH
Pans w/fish removed @	051221	1520	~~60~~ 70	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	050421	Permit No.:	PA0039004	Date:	05	04	21

Conductivity µmhos/cm - **INITIAL**

level	0	1	2	3	4	5	6
MHR	286	288	289	304	291	291	289
24	856	801	914	931	919	860	947
48	1362	1315	1492	1540	1537	1487	~~1476~~
72	1992	1990	2100	2080	2100	2040	2100
96	2460	2480	2700	2690	2730	2580	2610
100	2580	2620	2810	2790	2780	2740	2760

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

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

Final chemistry **must** be analyzed within 15 minutes of sampling.

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
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

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~~ 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
MHR	7.4	7.3	7.2	7.2	7.4	7.3	7.0
24	7.4	7.3	7.4	7.4	7.5	7.4	7.5
48	7.3	7.3	7.4	7.3	7.4	7.4	7.5
72	7.3	7.3	7.4	7.3	7.4	7.3	7.5
96	7.2	7.3	7.4	7.3	7.3	7.3	7.4
100	7.2	7.3	7.3	7.1	7.2	7.3	7.3

pH s.u. - **FINAL**

level	0	1	2	3	4	5	6
MHR	7.4	7.4	7.4	7.5	7.4	7.5	
24	7.5	7.4	7.5	7.5	7.3	7.5	
48	7.6	7.5	7.6	7.6	7.3	7.6	
72	7.7	7.6	7.6	7.7	7.5	7.7	
96	7.8	7.6	7.8	7.8	7.5	7.8	
100	7.8	7.6	7.9	7.8	7.7	7.8	

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

Project ID:	T	O	W	A	050421	Permit No.:	PA0039004	Date:	05	04	21

Conductivity µmhos/cm - **INITIAL**

level	0	1	2	3	4	5	6
DMW	175	186	185	182	176	177	178
24	792	758	837	820	813	850	839
48	1380	1356	1430	1418	1451	1404	1471
72	1853	1917	2090	2050	2060	2000	2020
96	2460	2460	2660	2610	2680	2640	2620
100	2580	2620	2810	2790	2780	2740	2760

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

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

Final chemistry **must** be analyzed within 15 minutes of sampling.

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	8.6	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

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	7.5	7.4	7.5	7.2	7.5	7.3	7.4
24	7.5	7.4	7.3	7.3	7.3	7.4	~~7.4~~ 7.4
48	7.4	7.4	7.3	7.3	7.3	7.3	7.5
72	7.3	7.3	7.3	7.2	7.2	7.3	7.4
96	7.2	7.3	7.2	7.1	7.1	7.2	7.3
100	7.2	7.3	7.3	7.1	7.2	7.3	7.3

pH s.u. - **FINAL**

level	0	1	2	3	4	5	6
DMW	7.5	7.4	7.3	7.2	7.2	~~7.0~~ 7.2	7.2
24	7.5	7.6	7.4	7.3	7.3	~~7.4~~ 7.3	7.3
48	7.5	7.5	7.4	7.4	7.3	7.4	7.3
72	7.4	7.7	7.5	7.4	7.4	7.5	7.3
96	7.4	7.6	7.5	7.5	7.5	7.6	7.4
100	7.4	7.6	7.5	7.5	7.6	7.6	7.4

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

Project ID: TUWA 050421 Permit No.: PA0039004
Test Date: 050421

Sample Type: →	EFFLUENT					
EnviroScience No.:	TUWA 050421EFF	TUWA 050621EFF	TUWA 050821EFF			
D. Oxygen (mg/l-%sat) **>4 & <100%?**	8.6	8.6	8.6			
pH (s.u) **6-9?**	7.2	7.4	7.2			
Conductivity (µmhos/cm)	2560	2780	2870			
Alkalinity (mg/l $CaCO_3$) **MDL = 20 mg/l**	(3.4) 68	(5.2) 104	(5.0) 100			
Hardness (mg/l $CaCO_3$) **MDL = 5 mg/l**	(4.6) 184	(4.0) 160	(4.4) 132			
TRC_I (mg/l) **<0.02?**	<0.02	<0.02	<0.02			
TRC_A (mg/l) <0.02?	—	—	—			
Ammonia as N (mg/L)	0.46	0.17	0.00			
Tech Initials:	CB	AT	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 #)

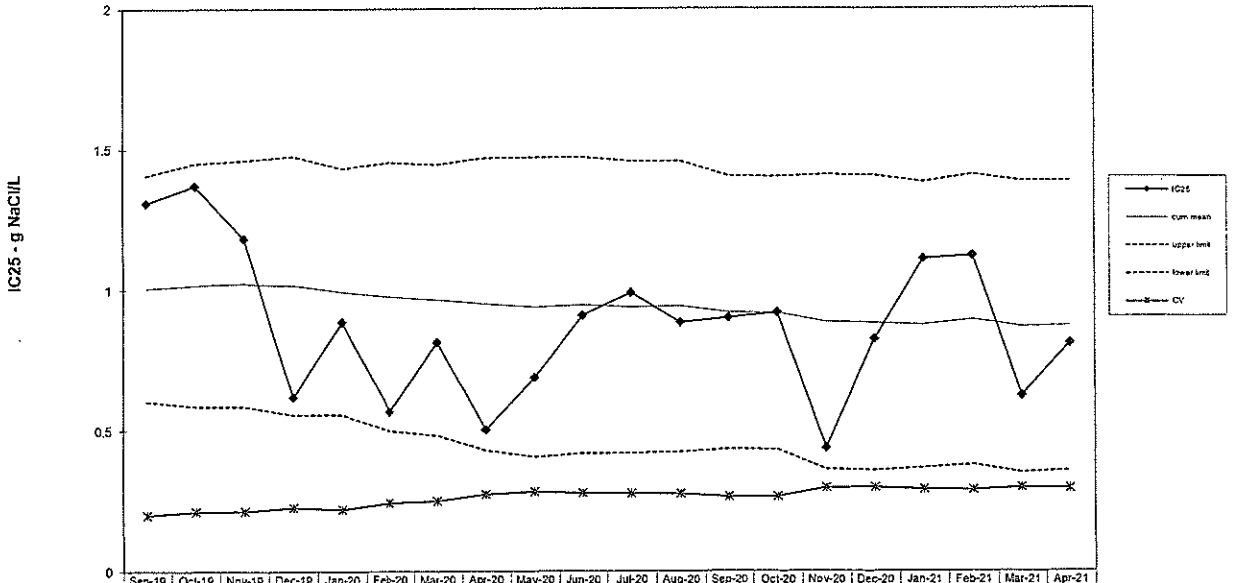
Dechlorination procedure:
TRC_I = total residual chlorine, initial value measured prior to dilution or use of sample.
TRC_A = TRC value measured after dechlorination.

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.

KHV

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



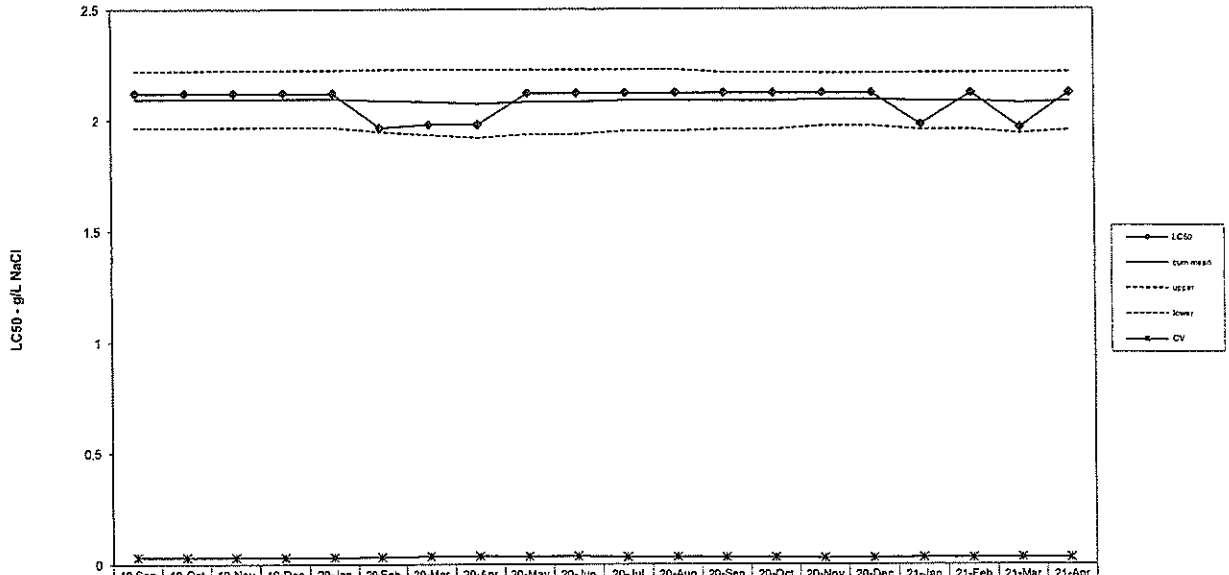
	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21
IC25	1.308	1.37	1.182	0.6177	0.8653	0.5672	0.8133	0.5022	0.6875	0.9084	0.9889	0.8826	0.9003	0.918	0.4373	0.8242	1.108	1.119	0.6228	0.8103
cum mean	1.00445	1.01765	1.02365	1.01639	0.99385	0.9763	0.96437	0.94657	0.93857	0.94592	0.93807	0.94049	0.91971	0.91705	0.88552	0.88192	0.87502	0.89314	0.86858	0.87285
upper limit	1.40578	1.44982	1.48127	1.47648	1.43162	1.45323	1.44525	1.46868	1.4706	1.47166	1.45586	1.45668	1.40477	1.40151	1.40913	1.40622	1.38251	1.40584	1.38657	1.38729
lower limit	0.60311	0.58607	0.56602	0.55631	0.55605	0.49937	0.48348	0.43046	0.40653	0.42018	0.42027	0.4243	0.43484	0.43259	0.3519	0.35762	0.36753	0.37764	0.35059	0.35801
CV	0.19978	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	0.28659	0.29618	0.29487

Test Date

EnviroScience QC/SRT Chart rev. 04/26/21

Tests conducted with MHRW

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



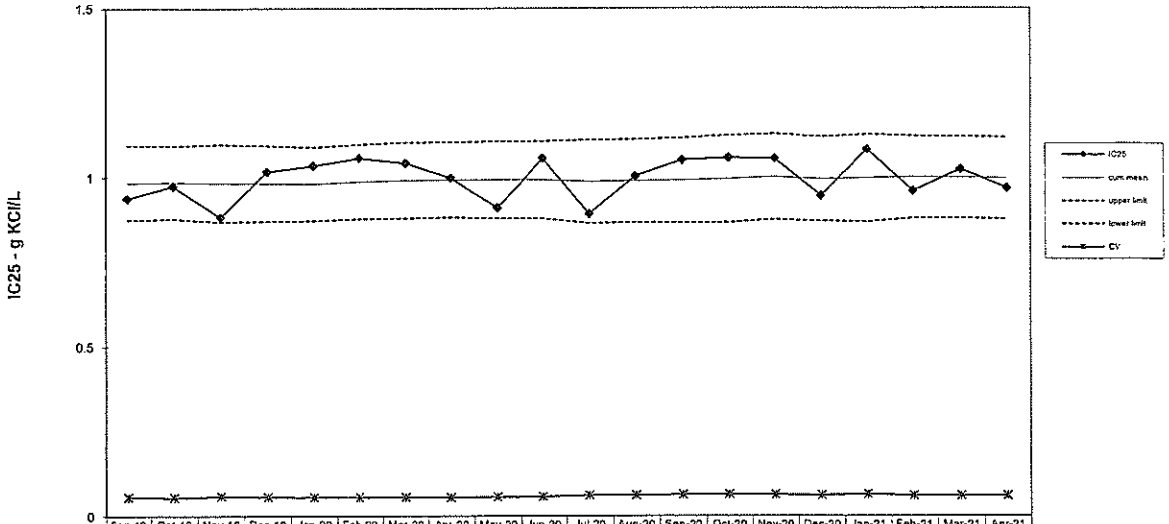
	19-Sep	19-Oct	19-Nov	19-Dec	20-Jan	20-Feb	20-Mar	20-Apr	20-May	20-Jun	20-Jul	20-Aug	20-Sep	20-Oct	20-Nov	20-Dec	21-Jan	21-Feb	21-Mar	21-Apr
LC50	2.121	2.121	2.121	2.121	2.121	1.965	1.979	1.979	2.121	2.121	2.121	2.121	2.121	2.121	2.121	2.121	1.979	2.121	1.965	2.121
cum mean	2.0942	2.0942	2.0951	2.0951	2.0951	2.0863	2.0812	2.0741	2.0819	2.0819	2.089	2.089	2.0848	2.0848	2.0919	2.0919	2.0848	2.0848	2.077	2.0841
upper	2.22313	2.22313	2.22546	2.22546	2.22546	2.2296	2.22967	2.22803	2.22818	2.22818	2.22784	2.22784	2.21359	2.21359	2.21145	2.21145	2.21359	2.21359	2.21511	2.21543
lower	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	1.93889	1.95277
CV	0.03078	0.03078	0.03086	0.03086	0.03086	0.03383	0.03567	0.03711	0.03513	0.03513	0.03323	0.03323	0.03089	0.03089	0.02858	0.02858	0.03089	0.03089	0.03325	0.03151

Test Date

EnviroScience QC/SRT Chart rev. 04/26/21

Tests conducted with MHRW

EnviroScience QC Chart - *Pimephales promelas*
Chronic Toxicity Endpoint - Growth IC $_{25}$



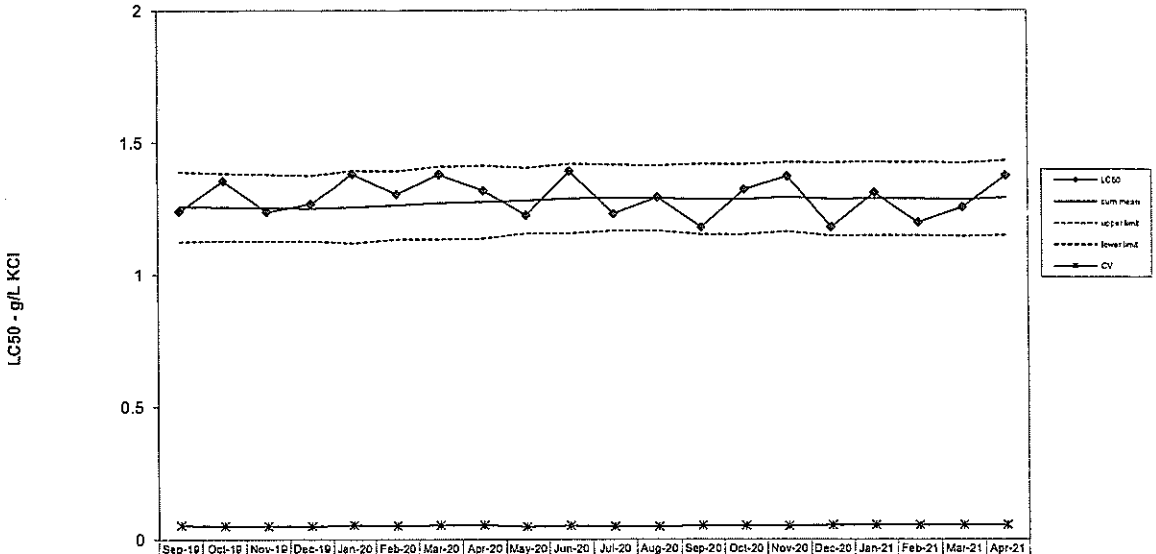
	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21
IC25	0.9367	0.974	0.8826	1.016	1.035	1.057	1.042	0.9985	0.9093	1.056	0.891	1.003	1.05	1.057	1.055	0.9451	1.082	0.9591	1.023	0.9677
cum mean	0.98407	0.98558	0.98336	0.98171	0.98056	0.98734	0.99137	0.99336	0.99244	0.99284	0.98729	0.98825	0.9909	0.99479	1.00138	0.99494	0.99739	1.00047	0.99942	0.997
upper limit	1.09392	1.09393	1.09835	1.09364	1.08983	1.09777	1.10355	1.10464	1.10626	1.10755	1.11056	1.11219	1.11627	1.12342	1.12805	1.11914	1.12658	1.12237	1.12009	1.11821
lower limit	0.87421	0.87719	0.86837	0.86978	0.87149	0.87691	0.87905	0.88208	0.8788	0.87812	0.85402	0.86631	0.86553	0.86615	0.87471	0.87073	0.86819	0.87856	0.87874	0.87579
CV	0.05582	0.05498	0.05847	0.05701	0.05561	0.05592	0.05665	0.05601	0.05735	0.05777	0.06243	0.06214	0.06328	0.06465	0.06325	0.06242	0.05477	0.06092	0.06038	0.06079

Test Date

EnviroScience QC/SRT Chart rev. 04/26/21

Tests conducted with DMW

EnviroScience QC Chart - *Pimephales promelas*
Chronic Toxicity Endpoint - Survival LC50



	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	Mar-21	Apr-21
LC50	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	1.253	1.373
cum mean	1.257	1.2558	1.2529	1.2511	1.2559	1.2633	1.2712	1.275	1.2795	1.2871	1.2897	1.2883	1.2836	1.2836	1.2927	1.2848	1.2856	1.2858	1.2822	1.2894
upper limit	1.3889	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	1.4229	1.4241	1.424	1.4203	1.4308
lower limit	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	1.1441	1.148
CV	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	0.0538	0.0548

Test Date

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