Pennsylvania Department of Environmental Protection

NORTHWEST REGIONAL OFFICE
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0026379**
Facility Type	**Sewage**	APS ID	**1075146**
Major / Minor	**Major**	Authorization ID	**1416685**

NPDES PERMIT FACT SHEET ADDENDUM

Applicant and Facility Information

Applicant Name	**Bradford Sanitary Authority Mckean County**	Facility Name	**Bradford STP**
Applicant Address	28 Kennedy Street	Facility Address	410 Seaward Avenue
	Bradford, PA 16701-2006		Bradford, PA 16701-3112
Applicant Contact	Steve Disney	Facility Contact	Steve Disney
Applicant Phone	(814) 368-6254	Facility Phone	(814) 368-7105
Client ID	81373	Site ID	264727
SIC Code	4952	Municipality	Foster Township
SIC Description	Trans. & Utilities - Sewerage Systems	County	McKean
Date Published in PA Bulletin	November 15, 2025	EPA Waived?	No
Comment Period End Date	December 15, 2024	If No, Reason	

Purpose of Application: Application for a renewal of an NPDES permit for discharge of treated Sewage.

Internal Review and Recommendations

There were several comments received on the draft permit from the Bradford Sanitary Authority as well as the Environmental Protection Agency. This document will serve as the Department's response to these comments. Submitted comments will be attached below the responses.

Bradford Sanitary Authority:

1.1 BSA Comment 1:

The draft permit includes a Monitor and Report requirement for Total Nitrogen during the first three years of the permit followed by permit limits with a monitoring frequency of once per day. BSA feels that the monitoring frequency for Total Nitrogen is excessive and requests that the frequency be reduced to once per month for the first three years of the permit. The cost burden on the Authority's rate payers for daily sampling and analysis is estimated to be $105,850 over the life of the permit.

Conducting monthly sampling during the first three years of the permit will generate a sufficient number of data points to demonstrate whether BSA will need to modify treatment plant operations to ensure compliance with the permit limits when they go into effect.

Modification of the monitoring frequency from one per day to once per month for the first three years of the permit term is requested. Reduction of the monitoring frequency to once per week after the first three years of the permit cycle is requested.

Department Response to BSA Comment 1:

Approve	Deny	Signatures	Date
X		Dustin Hargenrater Dustin Hargenrater / Project Manager	January 22, 2026
X		Adam Olesnanik Adam Olesnanik, P.E. / Environmental Engineer Manager	January 22, 2026

Internal Review and Recommendations

The Department recognizes the hefty cost burden associated with increased monitoring frequency for Total Nitrogen during the first three years of the permit term and will accommodate the request to decrease the monitoring frequency to 1/month for the first three years of the permit term with the reduction of the monitoring frequency, the Department believes that the number of data points this will provide will still be sufficient to gauge if additional treatment technologies will be needed. Additionally, the reduction from once per day testing to once per week testing after the first 3 years of the permit term will be accommodated as the Department believes there should not be much daily variation between the parameters.

1.2 BSA Comment 2:

The draft permit includes a M&R requirement for Total Phosphorous during the first three years of the permit followed by permit limits with a monitoring frequency of once per day. BSA feels that he monitoring frequency be reduced to one per month for the first three years of the permit.

The cost burden on the Authority's rate payers for daily sampling analysis is estimated to be $54,750 over the five-year permit term.

Conducting monthly sampling during the first three years of the permit will generate sufficient number of data points to demonstrate whether BSA will need to modify treatment plant operations to ensure compliance with permit limits when they go into effect.

Modification of the monitoring frequency from one per day to one per month for the first three years of the permit term is requested. Reduction of the monitoring frequency to once per week after the first three years of the permit cycle is requested.

Department Response to BSA Comment 2:

The Department recognizes the hefty cost burden associated with daily testing of Total Phosphorous and has decided to reduce the monitoring frequency to once per month during the first three years of the permit term, the Department believes that the number of data points this will provide will still be sufficient to gauge if additional treatment technologies will be needed. Additionally, the request to reduce the monitoring frequency from once per day to once per week after the first three years of the permit term will be accommodated as the Department believes there should not be much daily variation between the parameters.

1.3 BSA Comment 3:

The draft permit includes a weekly M&R requirement for 2,6-Dinitrotoluene during the first three years of the permit followed by permit limits.

This requirement was due to a detect of the parameter during the sampling conducted as part of the permit renewal testing consisting of three samples. The PA DEP's required Quantitation Limit (QL) for this parameter is 1.0 ug/L. The laboratory Reporting Limit (RL)/QL for the parameter is 0.630 ug/L. All three samples were non-detectable at the DEP's required QL. However, the laboratory reported the sample results for one of the three samples as a "J" qualifier at 0.320 ug/L. It appears that this figure was used to establish the need for a permit limit, but it is important to note that the "J" qualifier is not a quantifiable result. The reported value is an estimate of the amount of the parameter that is less than the QL/RL but is greater than the laboratory's Method Detection Limit (MDL).

Since the permit's M&R and permit limits appear to be based on the use of an estimated result that is less than the laboratory's ability to accurately quantify the level present in one of the three samples, BSA requests that the monitoring frequency be reduced from once per week to one per month for the first three years of the permit. This frequency will allow for gathering of a sufficient number of data points to determine if there is a quantifiable level of 2,6-Dinitrotoluene in the effluent from the treatment plant.

If, at the end of the three-year monitoring period there are no detects of 2,6-Dinitrotulene greater than the DEP's required QL, BSA will request that the monitoring requirement and permit limits for this parameter be removed from the permit.

The cost burden on the Authority's rate payers for weekly sampling and analysis is estimated to be $58,500 over the five-year term of the permit.

Internal Review and Recommendations

BSA requests modification of the monitoring frequency from one per week to one per month.

Department Response to BSA Comment 3:

The Department is willing to adjust the monitoring frequency for 2,6-Dinitrotoluene from one per week to twice per month. Since this facility is not an industrial waste facility but does receive wastes from industrial facilities the Department recognizes that twice per month should still capture any monthly variations the facility may have of 2,6-Dinitrotoluene.

1.4 BSA Comment 4:

The draft permit includes weekly monitoring requirements and limits for Free Cyanide that go into effect at the start of the new permit cycle.

This permit limit appears to be based on one of three of the samples collected during the permit renewal testing. Two of the samples were non-detectable at the laboratory's MDL of 0.0005 mg/L and the third sample showed a level of 0.008 mg/L. BSA requests that, due to the limited number of samples used to establish this new permit limit and since only one of the three samples contained a detectable level of Free Cyanide, the permit limit slated to be immediately implemented be revised to a compliance schedule that includes a monthly M&R requirement for the first three years of the permit. A monthly monitoring frequency will generate 36 data points during the first three years of the permit which will be sufficient to accurately quantify the levels of Free Cyanide present in the treatment plant effluent.

At the end of the three-year monitoring period, the data may be used to modify the permit limits and required monitoring frequency.

The cost burden on the Authority's rate payers for weekly sampling and analysis is estimated to be $13,500 over the fiver-year permit term.

BSA requests modification of the monitoring frequency from one per week to one per month and implementation of the proposed limits be modified to be included in a compliance schedule for the first three years of the permit cycle.

Department Response to BSA Comment 4:

Based on PA Code Chapter 92a.51 the need for determining eligibility for a compliance schedule is defined as "With respect to an existing discharge that is not in compliance with the water quality standards and effluent limitations or standards in 92a.44 or 92a.12 (relating to establishing limitations, standards, and other permit conditions; and treatment requirements), the applicant shall be required in the permit to take specific steps to remedy a violation of the standards and limitations in accordance with a legally applicable schedule of compliance, in the shortest, reasonable, period of time, the period to be consistent with the Federal Act. Except as otherwise set forth in this subsection, a schedule of compliance specified in the permit must require compliance with final enforceable effluent limitations as soon as practicable, but in no case longer than 5 years, unless a court competent jurisdiction issues an order allowing a longer time for compliance. Compliance schedules granted to CSO dischargers may exceed 5 years but may not exceed the period of implementation specified in an approved long-term control plan (LTCP)." Based on PA Code Chapter 92a.51 and the Pre-Draft Survey completed by the permittee the Department believes the facility should be able to comply with the limits upon permit issuance. Free Cyanide is expected in industries involved in the production of refined metals, leather, paints, pigments, wood preservatives, electronics, and chemicals and since the facility receives industrial waste from industries in these categories the Department will reduce the monitoring frequency for Free Cyanide from 1/week to 2/month.

1.5 BSA Comment 5:

The draft permit includes weekly monitoring requirements and limits for Total Phenolics which will go into effect at the start of the new permit cycle.

This permit limit appears to be based on the results of the three of the samples collected during the permit renewal testing. Two of the samples were detected at levels less than the PA DEP's required QL: One was detected at 5 ug/L, one had a detect at 7 ug/L and the third was non-detectable at 2 ug/L.

BSA requests that, due to the limited number of samples used to establish this new permit limit and since none of the three samples contained a level of Total Phenolics greater than the PA DEP's required quantitation limit, the permit limit slated to

Internal Review and Recommendations

be immediately implemented be revised to a compliance schedule that includes a monthly M&R requirement for the first three years of the permit. A monthly monitoring frequency will generate 36 data points during the first three years of the permit which will be sufficient to accurately quantify the levels of Total Phenolics present in the treatment plant effluent.

At the end of the three-year monitoring period, the data may be used to modify the permit limits and required monitoring frequency.

The cost burden on the Authority's rate payers for weekly sampling and analysis is estimated to be $12,480 over the five-year term of the permit.

BSA Requests modification of the monitoring frequency from one per week to one per month and the implementation proposed permit limits be modified to be included in a compliance schedule for the first three years of the permit cycle.

Department Response to BSA Comment 5:

Based on PA Code Chapter 92a.51 the need for determining eligibility for a compliance schedule is defined as "With respect to an existing discharge that is not in compliance with the water quality standards and effluent limitations or standards in 92a.44 or 92a.12 (relating to establishing limitations, standards, and other permit conditions; and treatment requirements), the applicant shall be required in the permit to take specific steps to remedy a violation of the standards and limitations in accordance with a legally applicable schedule of compliance, in the shortest, reasonable, period of time, the period to be consistent with the Federal Act. Except as otherwise set forth in this subsection, a schedule of compliance specified in the permit must require compliance with final enforceable effluent limitations as soon as practicable, but in no case longer than 5 years, unless a court competent jurisdiction issues an order allowing a longer time for compliance. Compliance schedules granted to CSO dischargers may exceed 5 years but may not exceed the period of implementation specified in an approved long-term control plan (LTCP)." Based on PA Code Chapter 92a.51 and the Pre-Draft Survey completed by the permittee the Department believes the facility should be able to comply with the limits upon permit issuance. Phenolic compounds are expected in industries involved in the production of wood preservatives, pharmaceuticals, petrochemical and petroleum refining, pulp and paper, plastics, metals, and organic chemicals. Since the facility receives wastewaters from industries in at least one of the categories above the Department will adjust the monitoring frequency of Total Phenolics from 1/week to 2/month.

1.6 BSA Comment 6:

The draft permit includes a weekly M&R Requirement for Total Dissolved Solids (TDS) and Chloride.

The need for data regarding the amount of these parameters is somewhat excessive and requests that he monitoring frequency be reduced to one per month. Monthly sampling for these parameters will generate 60 data points over the five-year term of the permit which will be sufficient to accurately quantify the levels of TDS and Chloride present in the treatment plant effluent.

The cost burden on the Authority's rate payers for weekly sampling and analysis of TDS and Chloride is estimated to be $12,200 over the five-year term of the permit.

BSA requests modification of the monitoring frequency from one per week to one per month is requested for the first three years of the permit cycle.

Department Response to BSA Comment 6:

The Department recognizes the increased financial burden on the Authority for weekly testing. The Department is willing to reduce the monitoring frequency of TDS and Chloride to 2/month in order to ensure that the levels of TDS and Chloride is not a concern considering there is a Public Water Supply (NY State Line) less than a mile downstream.

1.7 BSA Comment 7:

The draft permit includes a weekly M&R requirement for Iron and Manganese.

The need for data regarding the amount of these parameters in the plant's effluent is acknowledged. However, BSA feels that weekly testing for these parameters is somewhat excessive and requests that the monitoring frequency be reduced to

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one per month. Monthly sampling for these parameters will generate 60 data points over the five-year term of the permit which will be sufficient to accurately quantify the levels of Iron and Manganese is estimated to be $7,500 over the five-year term of the permit.

Modification of the monitoring frequency from one per week to one per month is requested.

Department Response to BSA Comment 7:

The Department recognizes the financial burden the increased monitoring will impose on the authority and its rate payers. The Department will adjust the monitoring frequency from one per week to two per month. The Department feels that due to the facility receiving waste from industrial waste facilities and a good portion of those facilities being metals manufacturing the two per month frequency will allow the facility to characterize monthly variations of Total Iron and Total Manganese in the effluent.

EPA Comments:

2.1 EPA Comment 1:

The factsheet indicates that the permits monitoring frequencies were determined using table 6-3 of DEP's Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits. However, for some parameters, less frequent monitoring requirements were proposed than are indicated in the guidance in table 6-3. The guidance calls for a sampling frequency for TRC of one per shift, but the permit requires a frequency of 1x/day. Similarly, the guidance calls for daily sampling frequencies for both ammonia and fecal coliform, but the permit requires frequencies of 5x/week. Please provide the rationale for having assigned monitoring requirements that are not consistent with DEP's Technical Guidance for these parameters.

Department Response to EPA Comment 1:

The Department recognizes that some monitoring frequencies were carried over from the previous permit which is the rationale for including the monitoring frequencies not consistent with Table 6-3 of DEP's Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits. The following reference from the SOP for New and Reissuance Individual Sewage Permits will serve as the Department's rationale for continuing the existing monitoring frequency for Ammonia-Nitrogen: "For existing facilities in which there is no history of non-compliance with effluent limitations over the past two years according to DMR data, and the existing monitoring frequencies are less stringent than Table 6-3, the existing frequencies may be continued in the renewed permit except as noted in Section IV E.2, above." Over the last 4 years there have been no violations of Ammonia-Nitrogen at the facility. However, there is a history of Fecal Coliform violations over the last 4 years so the monitoring frequencies for Fecal Coliform will be adjusted to match those found in Table 6-3. The Department believes that daily monitoring of the Total Residual Chlorine should remain in the permit since this method of disinfection is not the primary means of disinfection. The Conventional Activated Sludge side of the treatment system where the TRC Disinfection is utilized typically only treats the remaining flow when the SBR side of the treatment plant exceeds 10 MGD.

2.2 EPA Comment 2:

Please provide further clarification on why the draft permit proposes compliance schedules for Nitrogen and Phosphorous. Page 12 of the factsheet states that a compliance schedule is required, per the department's SOP for New and Reissued Individual Sewage NPDES Permits, if existing data cannot demonstrate compliance with a new WQBEL or TBEL at least 75% of the time. However, Page 10 of the factsheet indicates that the past 4 years of DMR data demonstrates compliance with the Nitrogen and Phosphorous TBEL limits 87.5% and 75% of the time respectively. Considering the department's guidance and the DMR data, it is unclear why a compliance schedule was determined to be necessary for these parameters.

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Department Response to EPA Comment 2:

The Department believes a compliance schedule is necessary for Total Nitrogen and Total Phosphorous parameters because the facility currently only has a monitor and report requirement on a quarterly basis for the maximum concentration at the facility. Although the facility meets the new limits 87.5% and 75% of the time for Total Nitrogen and Total Phosphorous respectively, there are still exceedances of the limits in the existing data set and the Department believes that additional testing could increase the number of exceedances in the data set due to seasonal variations of the parameters as well as additional monthly variations that the current quarterly testing may not capture. Additional treatment or operational changes may be necessary to comply with the final limits which the department believes could be costly and time consuming to install.

2.3 EPA Comment 3:

The Toxics Management Spreadsheet (TMS) evaluation recommended reporting requirements for zinc; however, this condition was not included in the draft permit. Please clarify why reporting requirements for zinc were not included in the draft permit.

Department Response to EPA Comment 3:

This was an oversight on the Department's end and the exclusion of the zinc monitoring was not intended. The Department will include the Total Zinc monitoring at a frequency of 2/month to remain consistent with other similar parameters.

2.4 EPA Comment 4:

Page 3 of the factsheet states that the receiving water, Tunungwant creek, is impaired by mercury. The TMS model does not reflect this impairment, as the background stream concentration entered for Mercury was 0 ug/L. If the stream is impaired by mercury, the background stream concentration should be higher than 0 ug/l. If no site-specific background data is available, we recommend requiring monitoring for mercury and other such parameters of concern to ensure a more accurate TMS analysis in the future.

Department Response to EPA Comment 4:

According to the Departments biologists, the mercury impairment is more aimed towards a fish consumption advisory. They were not able to provide background data for the in-stream concentration of mercury in the receiving waters but did have fish tissue data that confirmed the impairment was still active. The Department agrees that Mercury monitoring included in the permit would help determine that Bradford STP is not a contributor to the impairment and therefore will be adding Total Mercury monitoring in the final permit with a frequency of 1/quarter. The Department believes this monitoring frequency would be sufficient to show if Bradford STP is a contributor to the impairment due to the sampling submitted with the application being below the Target Quantitation Limit and no reasonable potential being shown with the existing data.

2.5 EPA Comment 5:

Please provide EPA with the data corresponding to the Ceriodaphnia dubia (C. dubia) reproduction endpoint test which was conducted on 3/14/2022. The WET Analysis Spreadsheet has data from the survival endpoint instead of the reproduction endpoint for the species.

Department Response to EPA Comment 5:

An updated WET Analysis Spreadsheet will be included in the document as attachment 3 to reflect the proper C. Dubia reproduction endpoint data.

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2.6 EPA Comment 6:

The C. Dubia survival data corresponding to the test conducted on 5/6/2019 was not included on the WET Analysis Spreadsheet. Please provide EPA with this data as soon as possible.

Department Response to EPA Comment 6:

The 5/6/2019 data was mistakenly omitted due to the 2/16/22 endpoint failure. The updated WET Analysis Spreadsheet provided as Attachment 3 will include this data as well.

2.7 EPA Comment 7:

Please clarify whether there was a species failure for C. Dubia in 2022. The C. Dubia reproduction tab of the WET Analysis Spreadsheet has data corresponding to two tests for 2022, one which took place on 2/16/2022 and the other on 3/14/2022. These tests were conducted a month apart, which is the timeframe within which species failure retests are conducted. If there was a C. Dubia species failure in 2022, please provide EPA with the reproduction endpoint data corresponding to the test conducted on 2/16/22, for our records.

Department Response to EPA Comment 7:

According to the WET Test data submitted by the facility with the permit renewal there was a failure for the C. Dubia reproduction on 2/16/2022. When inputting this data into the WET Analysis Spreadsheet the data does not show a failure. The Department will provide the test results to EPA for verification and include them in this comment response document as attachment 4.

Summary of Changes Reflected in the Final Permit

Changes based on comments made from BSA:

Change 1:
Monitoring for Total Nitrogen during the Compliance Schedule's Interim Period 1 adjusted from daily to 1/month. After Interim Period 1 is complete the monitoring frequency will be adjusted from daily to 1/week.

Change 2:
Monitoring for Total Phosphorous during the Compliance Schedule's Interim Period 1 adjusted from daily to 1/month. After Interim Period 1 is complete the monitoring frequency will be adjusted from daily to 1/week.

Change 3:
Monitoring frequency for 2,6-Dinitrotoluene adjusted from 1/week to 2/month.

Change 4:
Based on the Pre-Draft Survey the permittee believes the limitation for Free Cyanide can be met upon permit issuance. The monitoring frequency will be adjusted from 1/week to 2/month.

Change 5:
Based on the Pre-Draft Survey the permittee believes the limitation for Total Phenolics can be met upon permit issuance. The monitoring frequency will be adjusted from 1/week to 2/month.

Change 6:
Monitoring frequency for Total Dissolved Solids and Chloride has been adjusted from 1/week to 2/month.

Change 7:
Monitoring frequency for Total Iron and Total Manganese has been adjusted from 1/week to 2/month.

Changes based on comments made from EPA:

Change 1 (Based on EPA Comment 1):
No changes to Ammonia-Nitrogen or TRC monitoring frequency. Monitoring frequency for Fecal Coliform adjusted to match Table 6-3 which has Fecal Coliform being monitored 1/day.

Change 2 (Based on EPA Comment 3):

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Total Zinc monitoring has been added to Part A.1.C which includes the testing requirements for the permit upon permit issuance. Total Zinc monitoring will be added on a frequency of 2/month to remain consistent with other parameters of a similar nature.

Change 3 (Based on EPA Comment 4):
Total Mercury monitoring will be added to the permit limitations found in Part A.1.C of the final permit due to the impairment for Mercury in the receiving waters. The monitoring frequency of this parameter will be set to 1/quarter since the parameter showed no reasonable potential in the TMS and the discharge concentration submitted with the application was less than the Target Quantitation Limit.

3.1 Changes Based on Department Findings
Change 1:
Ultraviolet Light Intensity monitoring has been added to the Part A.1.C Limits table in the final permit. This was originally included in the WMS limits but mistakenly left out of the draft permit due to oversight.

Additional items mentioned in EPA comments will be attached to this document and provided to EPA via email.

There are no open violations for the subject Client ID (81373) as of 12/29/25.

Due to the changes made during the first draft comment period, Bradford Sanitary Authority has requested to re-draft the permit to provide additional comments for the changes made to the draft permit during the first public comment period. The changes made to the limits will be included below and highlighted in the limits tables, most changes reflected in the tables were monitoring frequencies, however entire rows that were highlighted were added to the permit after the comment period based on the comments received. No additional modeling results should be necessary for this re-draft besides those included for clarification regarding EPA's comments.

PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS

I. A. For Outfall 001 , **Latitude** 41º 59' 18.37" , **Longitude** -78º 37' 31.20" , **River Mile Index** 0.88 , **Stream Code** 56932

Receiving Waters: Tunungwant Creek (WWF)

Type of Effluent: Sewage Effluent

1. The permittee is authorized to discharge during the period from **Permit Effective Date** through **3 Years after Permit Effective Date**.

2. Based on the anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly	Minimum	Average Monthly	Maximum	Instant. Maximum		
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/month 1.1	24-Hr Composite
Total Phosphorus	XXX	XXX	XXX	Report	XXX	XXX	1/month 1.2	24-Hr Composite
2,6-Dinitrotoluene (ug/L)	XXX	XXX	XXX	Report	Report Daily Max	XXX	2/month 1.3	24-Hr Composite

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):

at Outfall 001, after disinfection.

PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS

I. B. For Outfall 001 , **Latitude** 41º 59' 18.37" , **Longitude** -78º 37' 31.20" , **River Mile Index** 0.88 , **Stream Code** 56932

Receiving Waters: Tunungwant Creek (WWF)

Type of Effluent: Sewage Effluent

1. The permittee is authorized to discharge during the period from **3 Years after Permit Effective Date** through **Permit Expiration Date**.

2. Based on the anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly	Minimum	Average Monthly	Maximum	Instant. Maximum		
Total Nitrogen	XXX	XXX	XXX	5.0	XXX	10	1/week[1.1]	24-Hr Composite
Total Phosphorus	XXX	XXX	XXX	0.5	XXX	1	1/week[1.2]	24-Hr Composite
2,6-Dinitrotoluene (ug/L)	XXX	XXX	XXX	0.39	0.61	0.97	2/month[1.3]	24-Hr Composite

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):

at Outfall 001, after disinfection.

PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS

I. C. For Outfall 001 , **Latitude** 41º 59' 18.37" , **Longitude** -78º 37' 31.20" , **River Mile Index** 0.88 , **Stream Code** 56932

Receiving Waters: Tunungwant Creek (WWF)

Type of Effluent: Sewage Effluent

1. The permittee is authorized to discharge during the period from **Permit Effective Date** through **Permit Expiration Date**.
2. Based on the anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Average Monthly	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/day	Grab
Dissolved Oxygen	XXX	XXX	6.0 Daily Min	XXX	XXX	XXX	1/day	Grab
Total Residual Chlorine (TRC)	XXX	XXX	XXX	0.12	XXX	0.41	1/day	Grab
Carbonaceous Biochemical Oxygen Demand (CBOD5)	475	715	6.5	9.75 Wkly Avg	XXX	13	5/week	24-Hr Composite
Biochemical Oxygen Demand (BOD5) Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	5/week	24-Hr Composite
Total Suspended Solids Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	5/week	24-Hr Composite
Total Suspended Solids	2200	3300	10.0	15.0 Wkly Avg	XXX	20	5/week	24-Hr Composite
Total Dissolved Solids	XXX	XXX	XXX	Report	Report	XXX	2/month[1.6]	24-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	1/day[2.1]	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	1/day[2.1]	Grab
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	XXX	Report	1/month	Grab

Ultraviolet light intensity (µw/cm^2)	XXX	XXX	XXX	Report	XXX	XXX	1/day	Measured[3.1]
Ammonia-Nitrogen Nov 1 - Apr 30	440	XXX	XXX	6.0	XXX	12	5/week	24-Hr Composite
Ammonia-Nitrogen May 1 - Oct 31	145	XXX	XXX	2.0	XXX	4	5/week	24-Hr Composite
Copper, Total	XXX	XXX	XXX	0.016	XXX	0.032	1/week	24-Hr Composite
Cyanide, Free (ug/L)	XXX	XXX	XXX	8.76	13.7	21.9	2/month[1.4]	24-Hr Composite
Iron, Dissolved (ug/L)	XXX	XXX	XXX	Report	Report	XXX	2/month[1.7]	24-Hr Composite
Manganese, Total (ug/L)	XXX	XXX	XXX	Report	Report	XXX	2/month[1.7]	24-Hr Composite
Mercury, Total (ug/L)	XXX	XXX	XXX	XXX	Report	XXX	1/quarter	24-Hr Composite[2.4]
Zinc, Total (ug/L)	XXX	XXX	XXX	Report	Report	XXX	2/month	24-Hr Composite[2.3]
Chloride	XXX	XXX	XXX	Report	Report	XXX	2/month[1.6]	24-Hr Composite
Phenolics, Total (ug/L)	XXX	XXX	XXX	11.7	18.2	29.2	2/month[1.5]	24-Hr Composite
PFOA (ng/L) (3)	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab
PFOS (ng/L) (3)	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab
PFBS (ng/L) (3)	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab
HFPO-DA (ng/L) (3)	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):

at Outfall 001, after disinfection.

*Superscript denotes comment where changes are explained.

Attachment 1
Environmental Protection Agency Comment Submission

Hargenrater, Dustin

From: Fulton, Jennifer <Fulton.Jennifer@epa.gov>
Sent: Wednesday, December 3, 2025 10:26 AM
To: Hargenrater, Dustin
Cc: Olesnanik, Adam; Furjanic, Sean; Hawley, Harmonie; Moncavage, Carissa; Hales, Dana; Yachera, Kelly; Sanchez Gonzalez, Natalie
Subject: [External] Bradford STP (PA0026379)

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Dustin,

According to our Memorandum of Agreement, the Environmental Protection Agency (EPA) Region III has received the draft National Pollutant Discharge Elimination System (NPDES) permit for:

Permittee name: Bradford Sanitary Authority Mckean County
Facility name: Bradford STP
NPDES Number: PA0026379
EPA Received: 11/3/2025
30-day response due date: 12/3/2025

This is a major permit that discharges to Tunungwant creek. EPA has performed a limited review of the draft permit based on whole effluent toxicity testing (WETT) requirements, compliance schedule determinations, pretreatment implementation requirements, PFAS reporting requirements, and permit limit determinations. EPA has completed its review and offers the following comment(s):

1. The factsheet indicates that the permit's monitoring frequencies were determined using table 6-3 of DEP's Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits. However, for some parameters, less frequent monitoring requirements were proposed than are indicated in the guidance in table 6-3. The guidance calls for a sampling frequency for TRC of once per shift, but the permit requires a frequency of 1x/day. Similarly, the guidance calls for daily sampling frequencies for both ammonia and fecal coliform, but the permit requires frequencies of 5x/week. Please provide the rationale for having assigned monitoring requirements that are not consistent with DEP's Technical Guidance for these parameters.
2. Please provide further clarification on why the draft permit proposes compliance schedules for Nitrogen and Phosphorus. Page 12 of the factsheet states that a compliance schedule is required, per the department's SOP for New and Reissued Individual Sewage NPDES Permits, if existing data cannot demonstrate compliance with a new WQBEL or TBEL at least 75% of the time. However, Page 10 of the factsheet indicates that the past 4 years of DMR data demonstrates compliance with the nitrogen and phosphorus TBEL limits 87.5% and 75% of the time, respectively. Considering the department's guidance and the

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DMR data, it is unclear why a compliance schedule was determined to be necessary for these parameters.

3. The Toxics Management Spreadsheet (TMS) evaluation recommended reporting requirements for zinc; however, this condition was not included in the draft permit. Please clarify why reporting requirements for zinc were not included in the draft permit.

4. Page 3 of the factsheet states that the receiving water, Tunungwant creek, is impaired by mercury. The TMS model input does not reflect this impairment, as the background stream concentration entered for mercury was 0 ug/l. If the stream is impaired by mercury, the background stream concentration should be higher than 0 ug/l. If no site-specific background data is available, we recommend requiring monitoring for mercury and other such parameters of concern to ensure a more accurate TMS analysis in the future.

5. Please provide EPA with the data corresponding to the *Ceriodaphnia dubia* (*C. dubia*) reproduction endpoint test which was conducted on 3/14/2022. The WET Analysis Spreadsheet has data from the survival endpoint instead of the reproduction endpoint for this species.

6. The *C. dubia* survival data corresponding to the test conducted on 5/6/2019 was not included on the WET Analysis Spreadsheet. Please provide EPA with this data as soon as possible.

7. Please clarify whether there was a species failure for *C. dubia* in 2022. The *C. dubia* reproduction tab of the WET Analysis Spreadsheet has data corresponding to two tests for 2022, one which took place on 2/16/2022 and the other on 3/14/22. These tests were conducted a month apart, which is the timeframe within which species failure retests are conducted. If there was a *C. dubia* species failure in 2022, please provide EPA with the reproduction endpoint data corresponding to the test conducted on 2/16/22, for our records.

Please address the above and provide us with any changes to the draft permit and/or fact sheet, if necessary. Please contact Natalie Sanchez Gonzalez on my staff via telephone at 215-814-2078 or via electronic mail at sanchez-gonzalez.natalie@epa.gov.

Thank you,
Jen Fulton

Jennifer Fulton
Chief, Clean Water Branch
EPA Region 3
Phone: 304-234-0248
Email: fulton.jennifer@epa.gov

Attachment 2
Bradford Sanitary Authority Comment Submission

BRADFORD SANITARY AUTHORITY
PO Box 546, 28 Kennedy Street, Bradford, PA 16701
Phone: 814-368-6254 Fax: 814-362-3811

December 8, 2025

Via Electronic Mail

Dustin Hargenrater, *Project Manager*
Pennsylvania Department of Environmental Protection/Clean Water Program
Northwest Regional Office
230 Chestnut Street
Meadville, PA 16335-3481

RE: Bradford Sanitary Authority
NPDES Permit No. PA0026379
Draft Permit Response

Dear Mr. Hargenrater:

We ask for your consideration, our proposal for the new draft NPDES permit limits, as discussed during our meeting with DEP staff on December 3, 2025, the following comments and requests are submitted:

Total Nitrogen

The draft permit includes a Monitor and Report (M&R) requirement for Total Nitrogen during the first three years of the permit followed by permit limits with a monitoring frequency of one per day. BSA feels that the monitoring frequency for Total Nitrogen is excessive and requests that the frequency be reduced to one per month for the first three years of the permit.

The cost burden on the Authority's rate payers for daily sampling and analysis is estimated to be $105,850 over the life of the permit.

Conducting monthly sampling during the first three years of the permit will generate a sufficient number of data points to demonstrate whether BSA will need to modify treatment plant operations to ensure compliance with the permit limits when they go into effect.

Modification of the monitoring frequency from one per day to one per month for the first three years of the permit term is requested. Reduction of the monitoring frequency to once per week after the first three years of the permit cycle is requested.

Total Phosphorous

The draft permit includes a M&R requirement for Total Phosphorous during the first three years of the permit followed by permit limits with a monitoring frequency of one per day. BSA feels that the monitoring frequency for Total Phosphorous is excessive and requests that the frequency be reduced to one per month for the first three years of the permit.

The cost burden on the Authority's rate payers for daily sampling and analysis is estimated to be $54,750 over the five-year term of the permit.

Conducting monthly sampling during the first three years of the permit will generate a sufficient number of data points to demonstrate whether BSA will need to modify treatment plant operations to ensure compliance with the permit limits when they go into effect.

Modification of the monitoring frequency from one per day to one per month for the first three years of the permit term is requested. Reduction of the monitoring frequency to once per week after the first three years of the permit cycle is requested.

2,6-Dinitrotoluene

The draft permit includes a weekly M&R requirement for 2,6-Dinitrotoluene during the first three years of the permit followed by permit limits.

This requirement is due to a detect of the parameter during the sampling conducted as part of the permit renewal testing consisting of three samples. The PA DEP's required Quantitation Limit (QL) for this parameter is 1.00 ug/L. The laboratory Reporting Limit (RL)/QL for the parameter is 0.630 ug/L. All three samples were non-detectable at the DEP's required QL. However, the laboratory reported the sample results for one of the three samples as a "J" qualifier at 0.320 ug/L. It appears that this figure was used to establish the need for a permit limit, but it is important to note that the "J" qualifier is not a quantifiable result. The reported value is an estimate of the amount of the parameter that is less than the QL/RL but is greater than the laboratory's Method Detection Limit (MDL).

Since the permit's M&R and permit limits appear to be based on the use of an estimated result that is less than the laboratory's ability to accurately quantify the level present in one of the three samples, BSA requests that the monitoring frequency be reduced from one per week to one per month for the first three years of the permit. This frequency will allow for gathering of a sufficient number of data points to determine if there is a quantifiable level of 2,6-Dinitrotoluene in the effluent from the treatment plant.

If, at the end of the three-year monitoring period there are no detects of 2,6-Dinitrotoluene greater than the DEP's required QL, BSA will request that the monitoring requirement and permit limits for this parameter be removed from the permit.

The cost burden on the Authority's rate payers for weekly sampling and analysis is estimated to be $58,500 over the five-year term of the permit.

BSA requests modification of the monitoring frequency from one per week to one per month.

Free Cyanide

The draft permit includes weekly monitoring requirements and limits for Free Cyanide that go into effect at the start of the new permit cycle.

This permit limit appears to be based on one of three of the samples collected during the permit renewal testing. Two of the samples were non-detectable at the laboratory's MDL of 0.0005 mg/L and the third sample showed a level of 0.008 mg/L.

BSA requests that, due to the limited number of samples used to establish this new permit limit and since only one of the three samples contained a detectable level of Free Cyanide, the permit limit slated to be immediately implemented be revised to a compliance schedule that includes a monthly M&R requirement for the first three years of the permit. A monthly monitoring frequency will generate 36 data points during the first three years of the permit which will be sufficient to accurately quantify the levels of Free Cyanide present in the treatment plant effluent.

At the end of the three-year monitoring period, the data may be used to modify the permit limits and required monitoring frequency.

The cost burden on the Authority's rate payers for weekly sampling and analysis is estimated to be $13,500 over the five-year term of the permit.

BSA requests modification of the monitoring frequency from one per week to one per month and implementation of the proposed permit limits be modified to be included in a compliance schedule for the first three years of the permit cycle.

Total Phenolics

The draft permit includes weekly monitoring requirements and limits for Total Phenolics which will go into effect at the start of the new permit cycle.

This permit limit appears to be based on the results of the three of the samples collected during the permit renewal testing. Two of the samples were detected at levels less than the PA DEP's required QL: One was detected at 5 ug/L, one had a detect at 7 ug/L and the third was non-detectable at 2 ug/L.

BSA requests that, due to the limited number of samples used to establish this new permit limit and since none of the three samples contained a level of Total Phenolics greater than the PA DEP's required quantitation limit, the permit limit slated to be immediately implemented be revised to a compliance schedule that includes a monthly M&R requirement for the first three years of the permit. A monthly monitoring frequency will generate 36 data points during the first three years of the permit which will be sufficient to accurately quantify the levels of Total Phenolics present in the treatment plant effluent.

At the end of the three-year monitoring period, the data may be used to modify the permit limits and required monitoring frequency.

The cost burden on the Authority's rate payers for weekly sampling and analysis is estimated to be $12,480 over the five-year term of the permit.

BSA requests modification of the monitoring frequency from one per week to one per month and implementation proposed permit limits be modified to be included in a compliance schedule for the first three years of the permit cycle.

Total Dissolved Solids and Chloride

The draft permit includes a weekly M&R requirement for Total Dissolved Solids (TDS) and Chloride.

The need for data regarding the amount of these parameters in the plant's effluent is acknowledged. However, BSA feels that weekly testing for these parameters is somewhat excessive and requests that

the monitoring frequency be reduced to one per month. Monthly sampling for these parameters will generate 60 data points over the five-year term of the permit which will be sufficient to accurately quantify the levels of TDS and Chloride present in the treatment plant effluent.

The cost burden on the Authority's rate payers for weekly sampling and analysis of TDS and Chloride is estimated to be $12,220 over the five-year term of the permit.

BSA requests modification of the monitoring frequency from one per week to one per month is requested for the first three years of the permit cycle.

Iron & Manganese

The draft permit includes a weekly M&R requirement for Iron and Manganese.

The need for data regarding the amount of these parameters in the plant's effluent is acknowledged. However, BSA feels that weekly testing for these parameters is somewhat excessive and requests that the monitoring frequency be reduced to one per month. Monthly sampling for these parameters will generate 60 data points over the five-year term of the permit which will be sufficient to accurately quantify the levels of Iron and Manganese present in the treatment plant effluent.

The cost burden on the Authority's rate payers for weekly sampling and analysis of Iron and Manganese is estimated to be $7,500 over the five-year term of the permit.

Modification of the monitoring frequency from one per week to one per month is requested.

The overall cost burden on the Authority's rate payers for the new permit sampling requirements is estimated to be $300,000 over the five-year term of the permit. BSA feels that this amount of money will be better spent in making investments into the improvement of the treatment and collection systems rather than to gather what appears to be a more than sufficient amount of data than what will be needed to accurately characterize the treatment plant's effluent quality.

We appreciate the Department's willingness to consider these comments and requested modifications to the draft permit.

If you have any questions concerning the above information, please contact Steve Disney at sdisney@bradfordwater.com

Sincerely,

Steve Disney

Steve Disney
Executive Director

cc: GFT Inc.
File

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Attachment 3
Updated WET Analysis Spreadsheet Regarding EPA Comment 5 and 6

Instructions for Using PADEP WET Analysis Spreadsheet

This spreadsheet is designed to analyze Whole Effluent Toxicity (WET) test data using the statistical approach in EPA's "Test of Significant Toxicity" (TST) guidance document (EPA 833-R-10-003). Control replicate data are compared statistically with the target instream waste concentration (TIWC) replicate data. The intent is for permittees to provide an electronic or printed version of this spreadsheet with the NPDES permit renewal application that includes at least 16 endpoint results for chronic tests (4 tests, 4 endpoints each) or 8 endpoint results for acute tests (4 tests, 2 endpoints each) using the last four consecutive WET tests. The spreadsheet should also be used to determine whether an endpoint PASSES or FAILS specific tests during the permit term. Questions on the use of this form should be directed to DEP's Bureau of Clean Water at 717-787-5017.

Instructions:

Users can enter data into all cells with a green border, and can change the "TIWC" table header to a different value. Each worksheet is specific to one endpoint and can accommodate up to 4 test results for that endpoint. Four endpoint worksheets are provided ("Endpoint 1," "Endpoint 2," "Endpoint 3," and "Endpoint 4"). For chronic tests, all four worksheets should be used when reporting the last four consecutive test results for NPDES permit applications, and for acute tests, the first two worksheets should be used.

1. Enter the Facility Name and Permit No. for which the WET test(s) were completed.
2. Select, from the dropdown menus, the type of test (Chronic or Acute), the species tested (Ceriodaphnia dubia or Pimephales promelas), and the measured endpoint (survival, reproduction or growth). If you require a different option for a dropdown menu, contact DEP with your request.
3. Enter the Target Instream Waste Concentration (TIWC) value from the NPDES permit in decimal format. This is typically contained in the Part C condition for WET. The value of the TIWC itself is not critical for the TST calculations, but it is important that you enter the correct results associated with the TIWC dilution in the results table.
4. In the cell next to "No. per Replicate", enter the number of organisms used within each test condition replicate. Note that the numbers used in the results table cannot exceed this number for Survival endpoints.
5. Enter the Test Completion Date below the cell containing the same name.
6. Enter results for each replicate in the appropriate cells below the "Control" and "TIWC" table headers, corresponding to the number of organisms that survived at the end of the study, growth data, or reproduction data, corresponding to the endpoint selected above.

The mean, standard deviation and number of replicates are calculated below the results table. If there is no variability in both conditions, the T-test, degrees of freedom, and critical T-test results are not displayed, and the decision on whether a test passes or fails is based on the mean difference between the control and TIWC conditions (if less than the "b" value calculated above, the test passes, otherwise it fails). If there is variability in at least one condition, the T-test, degrees of freedom and critical T-test results are displayed, and the decision on whether a test passes or fails is based on a comparison of the T-test and critical T-test results (if the T-test result is greater than or equal to the critical T-test result, the test passes, otherwise it fails). In any case, if the mean result of the TIWC condition is greater than or equal to the mean result of the control condition, the test passes. Note that when the endpoint "Survival" is selected by the user, the results are transformed using an arcsine transformation in accordance with EPA's guidance, and the T-test, degrees of freedom, and critical T-test results are based on the arcsine transformed data.

In the event that a test condition that exceeds the TIWC condition would pass, the user may report that condition in lieu of the TIWC condition. If this is done, change the header above the results table accordingly. For example, if the TIWC value of 0.5 (50%) would fail, but a higher dilution of 0.75 (75%) would pass, change the table header from "TIWC" to "0.75".

The worksheet named "Evaluation" is generally used by DEP to evaluate Reasonable Potential and calculate WET limits, dilution series, and species as applicable for NPDES permits.

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Ceriodaphnia
Endpoint	Reproduction
TIWC (decimal)	0.43
No. Per Replicate	1
TST b value	0.75
TST alpha value	0.2

Facility Name
Bradford Sewage Treatment Plant

Permit No.
PA0026379

Test Completion Date: 5/6/2019

Replicate No.	Control	TIWC
1	32	33
2	32	33
3	35	36
4	29	20
5	36	29
6	32	20
7	37	32
8	36	36
9	31	33
10	28	13
11		
12		
13		
14		
15		
Mean	32.800	28.500
Std Dev.	3.084	7.962
# Replicates	10	10

T-Test Result	1.4875
Deg. of Freedom	12
Critical T Value	0.8726
Pass or Fail	PASS

Test Completion Date: 4/26/2020

Replicate No.	Control	TIWC
1	23	28
2	23	21
3	21	26
4	27	29
5	20	24
6	26	28
7	23	25
8	25	31
9	30	25
10	16	26
11		
12		
13		
14		
15		
Mean	23.400	26.300
Std Dev.	3.921	2.830
# Replicates	10	10

T-Test Result	6.7789
Deg. of Freedom	17
Critical T Value	0.8633
Pass or Fail	PASS

Test Completion Date: 2/1/2021

Replicate No.	Control	TIWC
1	32	36
2	43	45
3	39	33
4	39	40
5	39	39
6	40	40
7	44	41
8	38	36
9	46	42
10	41	36
11		
12		
13		
14		
15		
Mean	40.100	38.800
Std Dev.	3.843	3.553
# Replicates	10	10

T-Test Result	6.0311
Deg. of Freedom	16
Critical T Value	0.8647
Pass or Fail	PASS

Test Completion Date: 3/14/2022

Replicate No.	Control	TIWC
1	22	0
2	25	31
3	20	0
4	11	30
5	12	24
6	24	6
7	12	28
8	20	28
9	24	35
10	20	27
11		
12		
13		
14		
15		
Mean	19.000	20.900
Std Dev.	5.375	13.445
# Replicates	10	10

T-Test Result	1.4982
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)	0.43
No. Per Replicate	1
TST b value	0.75
TST alpha value	0.2

Facility Name
Bradford Sewage Treatment Plant

Permit No.
PA0026379

Test Completion Date 5/6/2019

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	0
11		
12		
13		
14		
15		
Mean	1.000	0.900
Std Dev.	0.000	0.316
# Replicates	10	10

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

Test Completion Date 4/26/2020

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 2/1/2021

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 3/14/2022

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)	0.43
No. Per Replicate	10
TST b value	0.75
TST alpha value	0.25

Facility Name
Bradford Sewage Treatment Plant

Permit No.
PA0026379

Replicate No.	Test Completion Date 5/7/2019 Control	TIWC
1	1	0.9
2	1	0.9
3	1	1
4	1	1
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	1.000	0.950
Std Dev.	0.000	0.058
# Replicates	4	4
T-Test Result	14.6031	
Deg. of Freedom	3	
Critical T Value	0.7649	
Pass or Fail	PASS	

Replicate No.	Test Completion Date 4/28/2020 Control	TIWC
1	1	0.8
2	1	1
3	0.9	0.8
4	1	0.9
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.975	0.875
Std Dev.	0.050	0.096
# Replicates	4	4
T-Test Result	6.8869	
Deg. of Freedom	4	
Critical T Value	0.7407	
Pass or Fail	PASS	

Replicate No.	Test Completion Date 2/2/2021 Control	TIWC
1	0.9	0.8
2	0.9	0.8
3	1	0.7
4	0.9	0.9
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.925	0.800
Std Dev.	0.050	0.082
# Replicates	4	4
T-Test Result	6.6879	
Deg. of Freedom	4	
Critical T Value	0.7407	
Pass or Fail	PASS	

Replicate No.	Test Completion Date 2/16/2022 Control	TIWC
1	1	1
2	1	1
3	1	0.7
4	1	0.5
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	1.000	0.800
Std Dev.	0.000	0.245
# Replicates	4	4
T-Test Result	1.8376	
Deg. of Freedom	3	
Critical T Value	0.7649	
Pass or Fail	PASS	

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Pimephales
Endpoint	Growth
TIWC (decimal)	0.43
No. Per Replicate	10
TST b value	0.75
TST alpha value	0.25

Facility Name: Bradford Sewage Treatment Plant

Permit No.: PA0026379

Test Completion Date: 5/7/2019

Replicate No.	Control	TIWC
1	0.319	0.314
2	0.297	0.279
3	0.29	0.246
4	0.28	0.269
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.297	0.277
Std Dev.	0.017	0.028
# Replicates	4	4

T-Test Result	3.5385
Deg. of Freedom	4
Critical T Value	0.7407
Pass or Fail	PASS

Test Completion Date: 4/28/2020

Replicate No.	Control	TIWC
1	0.39	0.309
2	0.337	0.336
3	0.378	0.363
4	0.422	0.421
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.382	0.357
Std Dev.	0.035	0.048
# Replicates	4	4

T-Test Result	2.5959
Deg. of Freedom	5
Critical T Value	0.7267
Pass or Fail	PASS

Test Completion Date: 2/2/2021

Replicate No.	Control	TIWC
1	0.471	0.335
2	0.426	0.426
3	0.455	0.329
4	0.314	0.369
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.417	0.365
Std Dev.	0.071	0.044
# Replicates	4	4

T-Test Result	1.5121
Deg. of Freedom	5
Critical T Value	0.7267
Pass or Fail	PASS

Test Completion Date: 2/15/2022

Replicate No.	Control	TIWC
1	0.33	0.362
2	0.229	0.372
3	0.281	0.203
4	0.24	0.238
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.270	0.294
Std Dev.	0.046	0.086
# Replicates	4	4

T-Test Result	1.9729
Deg. of Freedom	4
Critical T Value	0.7407
Pass or Fail	PASS

WET Summary and Evaluation

Facility Name	Bradford Sewage Treatment Plant
Permit No.	PA0026379
Design Flow (MGD)	8.8
Q_{7-10} Flow (cfs)	11
PMF_a	1
PMF_c	1

		Test Results (Pass/Fail)			
		Test Date	Test Date	Test Date	Test Date
Species	**Endpoint**	5/6/19	4/26/20	2/1/21	3/14/22
Ceriodaphnia	Reproduction	PASS	PASS	PASS	PASS

		Test Results (Pass/Fail)			
		Test Date	Test Date	Test Date	Test Date
Species	**Endpoint**	5/6/19	4/26/20	2/1/21	3/14/22
Ceriodaphnia	Survival	PASS	PASS	PASS	PASS

		Test Results (Pass/Fail)			
		Test Date	Test Date	Test Date	Test Date
Species	**Endpoint**	5/7/19	4/28/20	2/2/21	2/16/22
Pimephales	Survival	PASS	PASS	PASS	PASS

		Test Results (Pass/Fail)			
		Test Date	Test Date	Test Date	Test Date
Species	**Endpoint**	5/7/19	4/28/20	2/2/21	2/15/22
Pimephales	Growth	PASS	PASS	PASS	PASS

Reasonable Potential? NO

Permit Recommendations

Test Type	**Chronic**
TIWC	**55** % Effluent
Dilution Series	**14, 28, 55, 78, 100** % Effluent
Permit Limit	**None**
Permit Limit Species	

Attachment 4
2/16/2022 WET Test – C. Dubia Reproduction Failure

RESULTS OF CHRONIC TOXICITY TESTS

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

Test date: February 8-16, 2022
Sampling period: February 6-11, 2022
Report date: February 23, 2022

PA0026379

Conducted For:

BRADFORD SA
28 Kennedy St.
Bradford, PA 16701

Conducted and Prepared By:

ENVIROSCIENCE, INCORPORATED
5070 Stow Rd.
Stow, OH 44224

EnviroScience
Excellence In Any Environment

For ENVIROSCIENCE, INC.:

_____, Aquatic Biologist

For BRADFORD SA:

_____, _____
(signature) (title)

Excellence In Any Environment

February 23, 2022

Ms. Karla Leone
Bradford Sanitary Authority
28 Kennedy St.
Bradford, PA 16701

Dear Ms. Leone:

Enclosed is a copy of EnviroScience's report for the following Whole Effluent Toxicity (WET) tests that were initiated on February 8, 2022:

(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 11, 22, 43, 72, and 100 percent effluent diluted with moderately hard water. The TIWC is 43%. The PMSD for the reproduction endpoint was above the upper bound. The PMSD for the growth endpoint was above the upper bound. Endpoints are listed below.

WET endpoints for Bradford SA; 02/2022
sampling period: 02/06-11/22

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} =	68.19% effluent (TU_c as 100÷IC_{25} = 1.47)
	TIWC =	Fail (survival) Pass (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=	43% effluent
	LOEC=	72% effluent
	Ch V=	55.64% effluent
	TU_c=	2.33 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,

Alexandria M. Tite, 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: Bradford SA Report Date: 02/23/22

2. Facility Address: 410 Seaward Ave, Bradford, PA 16701

3. NPDES Permit #: PA0026379 4. Receiving Stream: _____

5. Facility Contact: Donnie Hayden 6. Phone #: 814-368-7105

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

8. Lab contact: Alex Tite 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
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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
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SRT information, dechlorination procedure, deviations/relevant information, summary of results, list of endpoints

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

Signature of preparer 02/23/22
Date

Alexandria M. Tite Aquatic Biologist
Name (typed or printed) 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	2 gal	02/06/22-0900	02/07/22-0900	
001	composite	2 gal	02/08/22-0900	02/09/22-0900	
001	composite	3 gal	02/10/22-0900	02/11/22-0900	

Dates/Times of Test Performance:			
Ceriodaphnia dubia		*Pimephales promelas*	
Start Date: MM/DD/YY	02/08/22	Start Date: MM/DD/YY	02/08/22
Start Time:	0945 hrs	Start Time:	0900 hrs
End Date: MM/DD/YY	02/16/22	End Date: MM/DD/YY	02/15/22
End Time:	0945 hrs	End Time:	0900 hrs

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

1. 02/07/22 at 1245 hrs; 0.5 °C
2. 02/09/22 at 1730 hrs; 1.4 °C
3. 02/11/22 at 1715 hrs; 1.2 °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:	2-4 hours, ECT 02/08/22, 0800-1000	<24 hours, EnviroScience 02/07/22-1500
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. $2.3x10^5$ 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:	11, 22, 43, 72, and 100	11, 22, 43, 72, and 100
13.	Renewal MM/DD-test days:	02/07-0,1; 02/09-2,3; 02/11-4,5,6	02/07-0,1; 02/09-2,3; 02/11-4,5,6
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

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:							
07 February 22	8.6	6.4	1034	30	100	<0.02	0.80
09 February 22	8.6	6.3	1071	38	100	<0.02	2.09
11 February 22	8.6	6.6	1482	44	116	<0.02	3.74

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 02/08/22 – 02/16/22 using Effluent from Outfall 001.

Test Solutions	Cumulative Percent Survival[a] Test Day							No. Young Produced per Specimen	
	1	2	3	4	5	6	7/8	Mean[a]	%CV
MHRW control/ dilution water	100	100	100	100	100	100	90	19.0	28.29
11% Effluent	100	100	100	100	100	100	100	24.2	23.11
22% Effluent	100	100	100	90	90	90	90	23.2	39.55
43% Effluent	100	100	80	80	80	80	80	22.9	54.29
72% Effluent	100	90	90	70	60	60	60	12.8	86.20
100% Effluent	100	100	100	100	100	90	80	19.0	55.14

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} = 68.19% IC_{50} = >100%	**TUc as 100÷IC_{25}: 1.47**

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. PMSD above upper bound.

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

control group % surviving	control group mean # young/survivor	control group %CV for mean young	control group % survivors producing 3 broods
90	19.0	28.29	70

TABLE 6

Results of a 7-Day *Pimephales promelas* Survival and Growth Test Conducted 02/08/22 – 02/15/22 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	100	0.270	16.97
11% Effluent	100	100	100	100	100	88	82	0.266	30.14
22% Effluent	100	100	92	92	92	70	68	0.262	31.23
43% Effluent	100	98	90	90	90	82	80	0.294	29.23
72% Effluent	100	100	100	98	98	68	60*	0.230	40.43
100% Effluent	100	100	98	78	72	72	68*	0.266	24.67

Acute **96**-Hour LC_{50} = >100% (48-Hour LC_{50}: = >100%)	Survival NOEC = 43%	Growth NOEC = 100%	**Chronic Toxicity Unit (TUc):**
95% C.I. Lower Limit: --- 95% C.I. Upper Limit: ---	Survival LOEC = 72%	Growth LOEC = >100%	**1.0 (100÷NOEC)**
Acute Toxicity Unit (TUa): <1.0 (100÷96-Hour LC_{50})	Chronic Value Survival = 55.64%	Chronic Value Growth = >100%	
		IC_{25} = >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 (pass), Dunnett's, ICp model; Cetis 1.9.6. PMSD above upper 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
1.0	0.0	0.270	17.0

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**	01/18/22-01/25/22	7 days	NaCl/ MHRW	80	21.4 young	IC_{25}: 0.991 g/l	yes
P. promelas *	01/18/22-01/25/22	7 days	KCl/ DMW	100	0.387 mg	IC_{25}: 1.013 g/l	yes

* chronic test.
Acute SRT charts maintained for acute test protocols only. For test dates 01/27-29/22, *C. dubia* 48-hr LC_{50} = 2.16 g NaCl/L MHRW at 25°C; 01/20-24/22, *P. promelas* 96-hr LC_{50} = 6.42 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 Bradford SA; 02/2022
sampling period: 02/06-11/22

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} =	68.19% effluent (TU_c as 100÷IC_{25} = 1.47)
	TIWC =	Fail (survival) Pass (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=	43% effluent
	LOEC=	72% effluent
	Ch V=	55.64% effluent
	TU_c=	2.33 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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Cover Sheet

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: **PA0026379** Facility Name: **Bradford SA**

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.	02/07/22-0900	001	0.5°C	<36hrs	<0.02 mg/L	☐ Yes ☒ No
2.	02/09/22-0900	001	1.4°C	<36hrs	<0.02 mg/L	☐ Yes ☒ No
3.	02/11/22-0900	001	1.2°C	<36hrs	<0.02 mg/L	☐ Yes ☒ No

TEST CONDITIONS

Date/Time of Test Initiation: **02/08/22-1050** Date/Time of Test Termination: **02/16/22-0950**

☒ Renewal Test ☐ Non-Renewal Test Frequency of Renewals: **daily**

Dilution Series: **11, 22, 43, 72, 100** Target Instream Waste Concentration (TIWC): **43%**

Age of Organisms at Start of Tests: **2-4 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: **02/12/22** Conductivity: **306** µmhos/cm

pH: **7.3** TRC: **<0.02** mg/L

CONTROL RESULTS

Ceriodaphnia dubia ***Pimephales promelas***

Survival: **90%** Survival:

Percent that produced 3 broods (if applicable): **70 %** Mean Dry Weight of Survivors (if applicable):

Young per Surviving Female (if applicable): **19.0**

REFERENCE TOXICITY TESTS

Date of most recent test: **01/18/22** 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.

Alexandria M. Tite		02/23/22	68-01628
Name of Laboratory Manager	Signature of Laboratory Manager	Date	DEP Lab ID No.

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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: **PA0026379** Facility Name: **Bradford SA**

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.	02/07/22-0900	001	0.5°C	<36hrs	<0.02 mg/L	☐ Yes ☒ No
2.	02/09/22-0900	001	1.4°C	<36hrs	<0.02 mg/L	☐ Yes ☒ No
3.	02/11/22-0900	001	1.2°C	<36hrs	<0.02 mg/L	☐ Yes ☒ No

TEST CONDITIONS

Date/Time of Test Initiation: **02/08/22-0900** Date/Time of Test Termination: **02/15/22-0900**

☒ Renewal Test ☐ Non-Renewal Test Frequency of Renewals: **daily**

Dilution Series: **11, 22, 43, 72, 100** Target Instream Waste Concentration (TIWC): **43%**

Age of Organisms at Start of Tests: **<24 hrs**

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: **02/11/22** Conductivity: **186** µmhos/cm

pH: **7.3** TRC: **<0.02** mg/L

CONTROL RESULTS

Ceriodaphnia dubia ***Pimephales promelas***

Survival: Survival: **100%**

Percent that produced 3 broods (if applicable): % Mean Dry Weight of Survivors (if applicable): **0.270**

Young per Surviving Female (if applicable):

REFERENCE TOXICITY TESTS

Date of most recent test: **01/18/22** 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.

Alexandria M. Tite		02/23/22	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	Survival
TIWC (decimal)	0.43
No. Per Replicate	1
TST b value	0.75
TST alpha value	0.2

Facility Name: Bradford Sanitary Authority

Permit No.:

Replicate No.	Test Completion Date 5/6/2019 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	0
11		
12		
13		
14		
15		
Mean	1.000	0.900
Std Dev.	0.000	0.316
# Replicates	10	10

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

Replicate No.	Test Completion Date 4/28/2020 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**

Replicate No.	Test Completion Date 2/1/2021 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**

Replicate No.	Test Completion Date 2/16/2022 Control	TIWC
1	1	0
2	1	1
3	1	0
4	0	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	0.900	0.800
Std Dev.	0.316	0.422
# Replicates	10	10

T-Test Result 0.8171
Deg. of Freedom 15
Critical T Value 0.8662
Pass or Fail **FAIL**

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Ceriodaphnia
Endpoint	Reproduction
TIWC (decimal)	0.43
No. Per Replicate	1
TST b value	0.75
TST alpha value	0.2

Facility Name

Bradford Sanitary Authority

Permit No.

Test Completion Date: 5/6/2019

Replicate No.	Control	TIWC
1	32	33
2	32	33
3	35	36
4	29	20
5	36	29
6	32	20
7	37	32
8	36	38
9	31	33
10	28	19
11		
12		
13		
14		
15		
Mean	32.800	29.300
Std Dev.	3.084	7.056
# Replicates	10	10

T-Test Result	2.0016
Deg. of Freedom	13
Critical T Value	0.8702
Pass or Fail	**PASS**

Test Completion Date: 4/28/2020

Replicate No.	Control	TIWC
1	23	28
2	23	21
3	21	26
4	27	29
5	20	24
6	28	28
7	23	25
8	25	31
9	30	25
10	18	26
11		
12		
13		
14		
15		
Mean	23.800	26.300
Std Dev.	3.736	2.830
# Replicates	10	10

T-Test Result	6.7095
Deg. of Freedom	17
Critical T Value	0.8633
Pass or Fail	**PASS**

Test Completion Date: 2/1/2021

Replicate No.	Control	TIWC
1	32	36
2	43	45
3	39	33
4	39	40
5	39	39
6	40	40
7	44	41
8	38	36
9	46	42
10	41	36
11		
12		
13		
14		
15		
Mean	40.100	38.800
Std Dev.	3.843	3.553
# Replicates	10	10

T-Test Result	6.0311
Deg. of Freedom	16
Critical T Value	0.8647
Pass or Fail	**PASS**

Test Completion Date: 2/16/2022

Replicate No.	Control	TIWC
1	22	0
2	25	31
3	20	0
4	11	30
5	12	24
6	24	26
7	12	28
8	20	28
9	24	35
10	20	27
11		
12		
13		
14		
15		
Mean	19.000	22.900
Std Dev.	5.375	12.432
# Replicates	10	10

T-Test Result	2.0930
Deg. of Freedom	13
Critical T Value	0.8702
Pass or Fail	**PASS**

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Pimephales
Endpoint	Survival
TIWC (decimal)	0.43
No. Per Replicate	10
TST b value	0.75
TST alpha value	0.25

Facility Name

Bradford Sanitary Authority

Permit No.

Replicate No.	Test Completion Date 5/7/2019 Control	TIWC
1	1	0.9
2	1	0.9
3	1	1
4	1	1
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	1.000	0.950
Std Dev.	0.000	0.058
# Replicates	4	4

T-Test Result	14.6031
Deg. of Freedom	3
Critical T Value	0.7649
Pass or Fail	**PASS**

Replicate No.	Test Completion Date 4/28/2020 Control	TIWC
1	1	0.8
2	1	1
3	0.9	0.8
4	1	0.9
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.975	0.875
Std Dev.	0.050	0.096
# Replicates	4	4

T-Test Result	6.8869
Deg. of Freedom	4
Critical T Value	0.7407
Pass or Fail	**PASS**

Replicate No.	Test Completion Date 2/2/2021 Control	TIWC
1	0.9	0.8
2	0.9	0.8
3	1	0.7
4	0.9	0.9
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.925	0.800
Std Dev.	0.050	0.082
# Replicates	4	4

T-Test Result	6.6879
Deg. of Freedom	4
Critical T Value	0.7407
Pass or Fail	**PASS**

Replicate No.	Test Completion Date 2/16/2022 Control	TIWC
1	1	1
2	1	1
3	1	0.7
4	1	0.5
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	1.000	0.800
Std Dev.	0.000	0.245
# Replicates	4	4

T-Test Result	1.8376
Deg. of Freedom	3
Critical T Value	0.7649
Pass or Fail	**PASS**

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Pimephales
Endpoint	Growth
TIWC (decimal)	0.43
No. Per Replicate	10
TST b value	0.75
TST alpha value	0.25

Facility Name: Bradford Sanitary Authority

Permit No.:

Replicate No.	Test Completion Date: 5/7/2019 Control	TIWC
1	0.319	0.314
2	0.297	0.279
3	0.29	0.248
4	0.28	0.269
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.297	0.278
Std Dev.	0.017	0.028
# Replicates	4	4

T-Test Result	3.6489
Deg. of Freedom	4
Critical T Value	0.7407
Pass or Fail	**PASS**

Replicate No.	Test Completion Date: 4/28/2020 Control	TIWC
1	0.39	0.309
2	0.337	0.336
3	0.378	0.363
4	0.422	0.421
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.382	0.357
Std Dev.	0.035	0.048
# Replicates	4	4

T-Test Result	2.5959
Deg. of Freedom	5
Critical T Value	0.7267
Pass or Fail	**PASS**

Replicate No.	Test Completion Date: 2/2/2021 Control	TIWC
1	0.471	0.335
2	0.428	0.426
3	0.455	0.329
4	0.314	0.369
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.417	0.365
Std Dev.	0.071	0.044
# Replicates	4	4

T-Test Result	1.5000
Deg. of Freedom	5
Critical T Value	0.7267
Pass or Fail	**PASS**

Replicate No.	Test Completion Date: 2/15/2022 Control	TIWC
1	0.33	0.362
2	0.229	0.372
3	0.281	0.203
4	0.24	0.238
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.270	0.294
Std Dev.	0.046	0.086
# Replicates	4	4

T-Test Result	1.9729
Deg. of Freedom	4
Critical T Value	0.7407
Pass or Fail	**PASS**

EnviroScience
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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: Bradford Sanitary Authority
Address: 410 Seaward Ave.
Bradford, PA 16701
Contact: Donnie Hayden
Phone: 814-368-7105
Permit #: **PA0026379**

AMPLE SUBMISSION AND CHAIN OF CUSTODY FORM

st(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 _____

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

art		End		Station	Sample Site	Sample Type		Number of	Chemistry				
ıte	Time	Date	Time	No.		Comp	Grab	Cubitainers	TRC	Cond	D.O.	pH	Te °
2/6/22	0900	12/7/22	0900	1	Final Effluent	X		2			8.4	6.79	8.4°C
							X	1			7.9	6.51	10.4°C

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

ımpling Collector's Information: please ✓ all appropriate boxes

X	Effluent	Collectors Name:	Matt Dennis
	Upstream	Collectors Signature:	
	Near Field	M.G.D. =	
	Far Field	Weather Conditions:	
ıme Determined By What Method?			

EnviroScience Personnel Only

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

ımments:

ceived from:	Received by:	Date	Time	Transport Information		EnviroScience Use Only	
		2-7-22	0909	Transport Date	2-7-22	Client	Bradford SA
		2-7-22	1245	Transport Time	0912	Sample ID's	BRAD020722
				Transport Method	ES	Cond. Of Container	Good
				ES Vehicle (if applicable)	ECO	Temp. °C	0.5

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

Client Bradford SA

ES Sample ID BRAD 020722

Cooler Received by: RE

Date Cooler Received and Opened 2-7-22

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 0.5 °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:___

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

Client: Bradford Sanitary Authority
Address: 410 Seaward Ave.
Bradford, PA 16701
Contact: Donnie Hayden
Phone: 814-368-7105
Permit #: PA0026379

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
2/8/22	0900	2/9/22	0900	1	Final Effluent	X		2			8.7	6.78	8.6°C
"		2/9/22	0900	1	Final Effluent	"	X	1			9.3	6.61	10.4°C

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:	Matt Dennis
	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	
Bradford		2-9-22	1300	Transport Date	2-9-22	Client	BRAD
		2-9-22	1730	Transport Time	1300	Sample ID's	020922
				Transport Method	ES	Cond. Of Container	good
				ES Vehicle (if applicable)	68	Temp. °C	1.4

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

Client Bradford

ES Sample ID BRAD

Cooler Received by: KK

Date Cooler Received and Opened 2-9-22

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 1.4 °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:___

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1-800-940-4025

Client: Bradford Sanitary Authority
Address: 410 Seaward Ave.
Bradford, PA 16701
Contact: Donnie Hayden
Phone: 814-368-7105
Permit #: PA0026379

SAMPLE SUBMISSION AND CHAIN OF CUSTODY FORM

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

Test Species
(X) 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
2/10/22	0900	2/11/22	0900	1	Final Effluent	X		3	0.03		10.41	6.93	8.2
2/11/22	0710				Final Effluent		X		0.01		8.8	7.01	12.7

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:	Don Hayden / Justin Grice
	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	
Justin Grice		2/10/22	1300	Transport Date	2/10/22	Client	BRAD
		2/10/22	1715	Transport Time	1300	Sample ID's	021022
				Transport Method	ES	Cond. Of Container	good
				ES Vehicle (if applicable)	45	Temp. °C	1.2

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

Client Bradford

ES Sample ID BRAD

Cooler Received by: KW

Date Cooler Received and Opened 2-11-22

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 1.2 ° 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:___

EnviroScience
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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:	BRAD 020722	**Start Date:**	020822	**Time:**	0945 MD / 1050
Permit No.:	PA0026379	**End Date:**	021622	**Time:**	0945 / 1050 0950 MJ
Diluent:	MHR				

MHR

Day	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 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♂	3♂	3♂	3♂	6♂	2♂	0♀	0♀	10	0 / 0
5	0♀	0♀	0♀	0♀	0♀	0♀	0♀	0♀	5♂	5♂	10	0 / 0
6	8♂	0♀	0♀	3♂	0♀	0♀	0♀	2♂	2♂	0♀	10	0 / 0
7	9♂ 15♂	9♂ 13♂	8♂ 10♂	5♂ ▶	9♂ 0♀	9♂ 17♂	6♂ 0♀	6♂ 10♂	6♂ 11♂	5♂ 10♂	10 / 10	0 / 0 / 1 / 1
Totals	22	25	20	11	12	24	12	20	24	20	$\bar{X}$ = 19.0	
Number of Broods	4	3	3	2	2	3	2	3	3	3	CV = 28.29	

11

Day	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 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♂	0	0	0	0	0	0	0	0	2	10	0 / 0
5	0	4	5	5	4	4	5	4	6	8	10	0 / 0
6	3	0	2	0	0	3	2	2	0	0	10	0 / 0
7	8♂ 14	8 10	6 9	4 13	5 21	8 19	6 0	4 13	3 16	0 13	10 / 10	0 / 0 / 0 / 0
Totals	27	22	21	24	30	34	13	23	25	23	$\bar{X}$ = 24.2	
Number of Broods	3	3	3	3	3	3	2	3	3	3	CV = 23.11	

22

Day	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 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	0♂	0	0	0	0	0	0	0	0	0	10	1 / 1
5	4	4	5	5	4	4	5	↓	3	4	10	1 / 1
6	0	0	0	0	2	0	0	↓	0	4	10	1 / 1
7	7 6	5 14	6 17	9 15	10 12	8 11	8 15	↓	8 21	4 12	10 / 10	1 / 1 / 1 / 1
Totals	17	23	28	29	28	23	28	0	32	24	$\bar{X}$ = 23.2	
Number of Broods	3	3	3	3	3	3	3	0	3	3	CV = 39.55	

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

Project ID:	BRAD 020122
Permit No.:	

Start Date: 020827

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Day	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Number Adults	# Dead/ # Adversely Affected
1	/	/	/	/	/	/	/	/	/	/	10	0 / 0
2	/	/	/	/	/	/	/	/	/	/	10	0 / 0
3	D	0	D	0	0	0	0	0	0	0	10	2D / 1D 2
4	|	0	|	0	0	0	0	0	0	0	10	2 / 2
5	|	5	|	5	5	4	4	5	5	5	10	2 / 2
6	|	(3)	|	0	(3)	3	(2)	(4)	0	(3)	10	2 / 2
7	↓	6/13	↓	7/18	5/11	10/9	9/13	8/11	10/20	8/11	10/10	0/2 / 2/2
Totals	0	31	0	30	24	20	28	28	35	27	$\bar{X}$ = 22.9	
Number of Broods	0	3	0	3	3	3	3	3	3	3	CV = 54.29	

72

Day	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Number Adults	# Dead/ # Adversely Affected
1	/	/	/	/	/	/	/	/	/	/	10	0 / 0
2	/	D	/	/	/	/	/	/	/	/	10	0 / 0
3	0	|	0	0	0	0	0	0	0	0	10	0 / 0
4	0	|	D	D	9	D	0	0	(1)	0	10	3 / 3
5	3	|	4	|	D	|	4	4	(4)	4	10	4 / 4
6	0	|	0	|	|	|	0	0	(2)	(5)	10	4 / 4
7	6/13	↓	9/9	↓	|	↓	8/10	9/8	6/8	4/7	10/10	4/4 / 4/4
Totals	22	0	22	0	0	0	22	21	21	20	$\bar{X}$ = 12.8	
Number of Broods	3	0	3	0	0	0	3	3	3	3	CV = 86.20	

100

Day	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 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	0	0	0	0	0	(2)	0	0	0	0	10	0 / 0
5	0	3	4	3	(3)	(2)	4D	5	4	4	10	0 / 0
6	0	0	0	0	(3)	0	D	0	(3)	0	10	1 / 1
7	8/0	6/14	8/9	10/5	10/15	4/7	↓/2	D↘	8/4	9/6	10/10	2/2 / 2/2
Totals	8	25	21	18	31	25	4	5	34	19	$\bar{X}$ = 19.0	
Number of Broods	1	3	3	3	3	3	1	1	3	3	CV = 55.14	

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

Project ID:	BRAD 020722
Permit No.:	

YAT

Start Date:	020822

Brood Board Information:

Replicate	1	2	3	4	5	6	7	8	9	10	BB #: EC 613122
	L	A	N	D	O	M	1	2	E	D	Date: 020822
											Time: 0800 - 1000

Test Information:

Day	Initiation	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7	
YAT Batch #	YAT D 011822	YAT D 011822		YAT E 011822		YAT E 011822		YAT E 011822		YAT F 011822		YAT A 020922		YAT A 020922	
Algae Batch #	ESB 122921	ESB 122921		ESB 122921		ESC 122921		ESC 122921		ESC 122921		ESA 112922		ESA 012822	
Test Level:	Solution Temperature EC for Initial (I) and Final (F) solutions													Day 8	
	I	I	F	I	F	I	F	I	F	I	F	I	F	I	F
MHP	1410	24.0	24.0	24.0	24.1	24.0	24.0	24.0	24.0	24.0	24.8	24.0	24.3	24.0 24.0	24.0
11	1410	24.0	24.0	24.0	24.1	24.0	24.1	24.0	24.0	24.0	24.6	24.0	24.1	24.0 24.0	24.0
22	1410	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.4	24.0	24.2	24.0 24.0	24.0
43	1410	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.3	24.0	24.2	24.0 24.0	24.0
72	1410	24.0	24.0	24.0	24.2	24.0	24.0	24.0	24.0	24.0	24.5	24.0	24.0	24.0 24.0	24.0
100	1410	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.8	24.0	24.4	24.0 24.0	24.0
Change time	1050	1810	40	1024	2340	0940	40	0840	1450	1000	00	1000	05	1000	0950
√transfer	Loading	✓		✓		✓		✓		✓		✓		✓	✓
Initials	VB	NP		NP		NP		NP		TM		MJ		MJ	MJ

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: 22 Feb-22 06:06 (p 1 of 1)
Test Code/ID: 471BFD2 / 00-7456-3538

Ceriodaphnia 7-d Survival and Reproduction Test — EnviroScience

Analysis ID:	17-4872-1046	Endpoint:	7d Survival Rate	CETIS Version:	CETISv1.9.6
Analyzed:	21 Feb-22 9:59	Analysis:	STP 2xK Contingency Tables	Status Level:	1
Sample ID:	15-3603-6543	Code:	5B8E0EBF	Project:	
Sample Date:	07 Feb-22 09:00	Material:	POTW Effluent	Source:	Discharge Monitoring Report
Receipt Date:	07 Feb-22 12:45	CAS (PC):		Station:	001
Sample Age:	25h	Client:	Bradford		

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		11	1.0000	Exact	1.0000	Non-Significant Effect
		22	0.7632	Exact	1.0000	Non-Significant Effect
		43	0.5000	Exact	1.0000	Non-Significant Effect
		72	0.1517	Exact	0.7585	Non-Significant Effect
		100	0.5000	Exact	1.0000	Non-Significant Effect

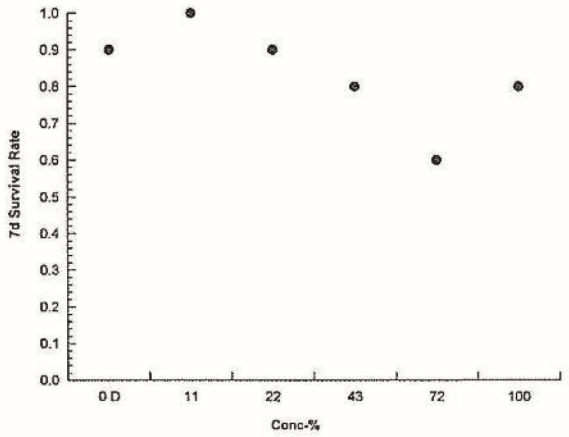
Data Summary

Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	D	9	1	10	0.9	0.1	0.0%
11		10	0	10	1	0	-11.11%
22		9	1	10	0.9	0.1	0.0%
43		8	2	10	0.8	0.2	11.11%
72		6	4	10	0.6	0.4	33.33%
100		8	2	10	0.8	0.2	11.11%

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	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
11		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
22		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
43		0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
72		1.0000	0.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	1.0000	1.0000

Graphics



CETIS Analytical Report

Report Date: 22 Feb-22 06:06 (p 1 of 2)
Test Code/ID: 471BFD2 / 00-7456-3538

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

Analysis ID:	01-5173-4169	Endpoint:	Reproduction	CETIS Version:	CETISv1.9.6
Analyzed:	22 Feb-22 6:06	Analysis:	Nonparametric-Control vs Treatments	Status Level:	1

Sample ID:	15-3603-6543	Code:	5B8E0EBF	Project:	
Sample Date:	07 Feb-22 09:00	Material:	POTW Effluent	Source:	Discharge Monitoring Report
Receipt Date:	07 Feb-22 12:45	CAS (PC):		Station:	001
Sample Age:	25h	Client:	Bradford		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	50.66%

★ above upper bound

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		11	132	75	3	18	CDF	0.9997	Non-Significant Effect
		22	130	75	1	18	CDF	0.9994	Non-Significant Effect
		43	133	75	1	18	CDF	0.9998	Non-Significant Effect
		72	91	75	2	18	CDF	0.3875	Non-Significant Effect
		100	106	75	1	18	CDF	0.8549	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	899.283	179.857	5	2.035	0.0883	Non-Significant Effect
Error	4773.7	88.4019	54			
Total	5672.98		59			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	9.584	15.09	0.0879	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9128	0.9459	4.0E-04	Non-Normal Distribution

Reproduction Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	10	19	15.16	22.84	20	11	25	1.7	28.29%	0.00%
11		10	24.2	20.2	28.2	23.5	13	34	1.769	23.11%	-27.37%
22		10	23.2	16.64	29.76	26	0	32	2.901	39.55%	-22.11%
43		10	22.9	14.01	31.79	27.5	0	35	3.931	54.29%	-20.53%
72		10	12.8	4.907	20.69	20.5	0	22	3.489	86.20%	32.63%
100		10	19	11.5	26.5	20	4	34	3.313	55.14%	0.00%

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	22	25	20	11	12	24	12	20	24	20
11		27	22	21	24	30	34	13	23	25	23
22		17	23	28	29	28	23	28	0	32	24
43		0	31	0	30	24	26	28	28	35	27
72		22	0	22	0	0	0	22	21	21	20
100		8	25	21	18	31	25	4	5	34	19

JAT

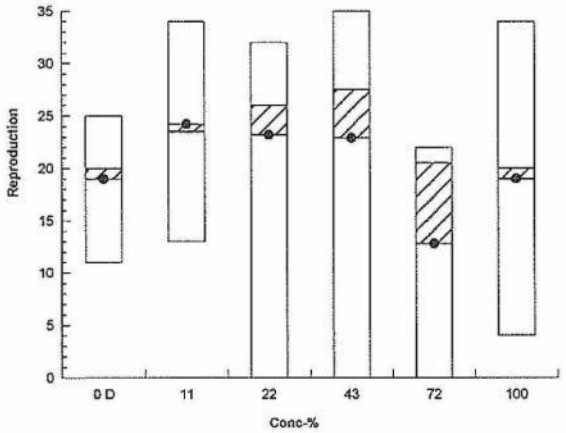
CETIS Analytical Report

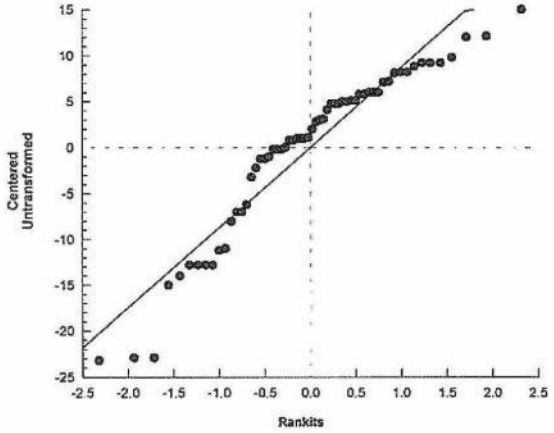
Report Date:	22 Feb-22 06:06 (p 2 of 2)
Test Code/ID:	471BFD2 / 00-7456-3538

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

Analysis ID:	01-5173-4169	**Endpoint:**	Reproduction	**CETIS Version:**	CETISv1.9.6
Analyzed:	22 Feb-22 6:06	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Graphics





CETIS Analytical Report

Report Date: 22 Feb-22 06:06 (p 1 of 2)
Test Code/ID: 471BFD2 / 00-7456-3538

Ceriodaphnia 7-d Survival and Reproduction Test — EnviroScience

Analysis ID:	20-1120-8099	Endpoint:	Reproduction	CETIS Version:	CETISv1.9.6
Analyzed:	21 Feb-22 9:59	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1
Sample ID:	15-3603-6543	Code:	5B8E0EBF	Project:	
Sample Date:	07 Feb-22 09:00	Material:	POTW Effluent	Source:	Discharge Monitoring Report
Receipt Date:	07 Feb-22 12:45	CAS (PC):		Station:	001
Sample Age:	25h	Client:	Bradford		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	86305	1000	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC25	68.19	40.75	n/a	1.466	n/a	2.454
IC50	>100	n/a	n/a	<1	n/a	n/a

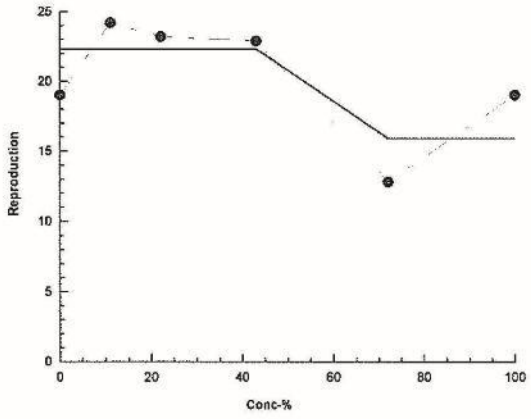
Reproduction Summary

			Calculated Variate						Isotonic Variate	
Conc-%	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	Mean	%Effect
0	D	10	19	11	25	5.375	28.29%	0.0%	22.32	0.0%
11		10	24.2	13	34	5.594	23.11%	-27.37%	22.32	0.0%
22		10	23.2	0	32	9.175	39.55%	-22.11%	22.32	0.0%
43		10	22.9	0	35	12.43	54.29%	-20.53%	22.32	0.0%
72		10	12.8	0	22	11.03	86.20%	32.63%	15.9	28.78%
100		10	19	4	34	10.48	55.14%	0.0%	15.9	28.78%

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	22	25	20	11	12	24	12	20	24	20
11		27	22	21	24	30	34	13	23	25	23
22		17	23	28	29	28	23	28	0	32	24
43		0	31	0	30	24	26	28	28	35	27
72		22	0	22	0	0	0	22	21	21	20
100		8	25	21	18	31	25	4	5	34	19

Graphics



Form 8080-1 rev. 01/20/21

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

Project ID:	BRAD	**Start Date:**	020821	**Time:**	0900
Permit No.:	PA0026379	**End Date:**	021521	**Time:**	0900
Hatch #:	021722 1500 SUE BRD DAH	**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	0/0
	total %'s								
11	A	10	0/0	0/0	0/0	0/0	0/0	3/3	3/3
	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	2/2	2/2
	D	10	0/0	0/0	0/0	0/0	0/0	0/0	2/2
	total %'s								
22	A	10	0/0	0/0	1/1	1/1	1/1	1/1	1/1
	B	10	0/0	0/0	0/0	0/0	0/0	5/5	5/5
	C	10	0/0	0/0	0/0	0/0	0/0	2/2	2/2
	D	10	0/0	0/0	2/2	2/2	2/2	4/4	5/5
	total %'s								
43	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	3/3	3/3	3/3	3/3	3/3
	D	10	0/0	1/1	1/1	1/1	1/1	4/4	5/5
	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	24.3	24.0	24.4	24.0	24.2	24.0	24.0	24.0	24.0	24.0	24.0	24.0
11	24.0	24.0	24.0	24.0	24.4	24.0	24.2	24.0	24.0	24.0	24.0	24.0	24.0	24.0
22	24.0	24.0	24.0	24.0	24.4	24.0	24.0	24.0	24.0	24.0	24.1	24.0	24.0	24.0
43	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.1	24.0	24.0	24.1
72	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.1
100	24.0	24.0	24.0	24.0	24.2	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.3
renew time		1000		0955		0905		0955		0925		0935		0900
Initials	Set up JH	KB		MJ		JH		KB		JH		JH		JH
	# KB													

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

Project ID:	BRAD
Permit No.:	

Start Date:	02 08 22

	Rep	n_i	# of P. promelas Mortalities / # of P. promelas Adversely Affected						
			1	2	3	4	5	6	7
72	A	10	0 / 0	0 / 0	0 / 0	0 0	0 / 0	2 / 2	3 / 3
	B	10	0 / 0	0 / 0	0 / 0	1 / 1	1 / 1	1 / 1	3 / 3
	C	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	8 / 8	8 / 8
	D	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	2 / 2	2 / 2
	total %'s								
100	A	10	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	1 / 1	2 / 2
	B	10	0 / 0	0 / 0	0 / 0	5 / 5	5 / 5	5 / 5	5 / 5
	C	10	0 / 0	0 / 0	0 / 0	2 / 2	3 / 3	3 / 3	4 / 4
	D	10	0 0	0 / 0	0 / 0	2 / 2	2 / 2	2 / 2	2 / 2
	total %'s								
	A	10	/	/	/	/	/	/	/
	B	10	/	/	/	/	/	/	/
	C	10	/	/	/	/	/	/	/
	D	10	/	/	/	/	/	/	/
	total %'s								
	A	10	/	/	/	/	/	/	/
	B	10	/	/	/	/	/	/	/
	C	10	/	/	/	/	/	/	/
	D	10	/	/	/	/	/	/	/
	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: 22 Feb-22 06:08 (p 1 of 4)
Test Code/ID: 790560DC / 20-3039-5612

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

Analysis ID:	20-0045-7954	Endpoint:	7d Survival Rate	CETIS Version:	CETISv1.9.6
Analyzed:	21 Feb-22 10:15	Analysis:	Nonparametric-Control vs Treatments	Status Level:	1
Sample ID:	13-1331-2760	Code:	4E478FF8	Project:	
Sample Date:	07 Feb-22 09:00	Material:	POTW Effluent	Source:	Discharge Monitoring Report
Receipt Date:	07 Feb-22 12:45	CAS (PC):		Station:	001
Sample Age:	24h	Client:	Bradford		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	43	72	55.64	2.326	26.10%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		11	12	10	1	6	CDF	0.1424	Non-Significant Effect
		22*	10	10	0	6	CDF	0.0417	Significant Effect
		43	14	10	1	6	CDF	0.3451	Non-Significant Effect
		72*	10	10	0	6	CDF	0.0417	Significant Effect
		100*	10	10	0	6	CDF	0.0417	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.71147	0.142294	5	2.893	0.0435	Significant Effect
Error	0.885346	0.0491859	18			
Total	1.59682		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	0.9467	0.884	0.2295	Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
11		4	0.8250	0.6248	1.0000	0.8000	0.7000	1.0000	0.0629	15.25%	17.50%
22		4	0.6750	0.3470	1.0000	0.6500	0.5000	0.9000	0.1031	30.54%	32.50%
43		4	0.8000	0.4102	1.0000	0.8500	0.5000	1.0000	0.1225	30.62%	20.00%
72		4	0.6000	0.1691	1.0000	0.7000	0.2000	0.8000	0.1354	45.13%	40.00%
100		4	0.6750	0.4363	0.9137	0.7000	0.5000	0.8000	0.0750	22.22%	32.50%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.00%	0.00%
11		4	1.154	0.8675	1.441	1.107	0.9912	1.412	0.09013	15.62%	18.25%
22		4	0.9817	0.6094	1.354	0.9463	0.7854	1.249	0.117	23.84%	30.47%
43		4	1.15	0.6508	1.65	1.202	0.7854	1.412	0.1569	27.29%	18.55%
72		4	0.8883	0.4295	1.347	0.9912	0.4636	1.107	0.1442	32.46%	37.09%
100		4	0.9714	0.7137	1.229	0.9966	0.7854	1.107	0.081	16.68%	31.20%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
11		0.7000	1.0000	0.8000	0.8000
22		0.9000	0.5000	0.8000	0.5000
43		1.0000	1.0000	0.7000	0.5000
72		0.7000	0.7000	0.2000	0.8000
100		0.8000	0.5000	0.6000	0.8000

CETIS Analytical Report

Report Date: 22 Feb-22 06:08 (p 2 of 4)
Test Code/ID: 790560DC / 20-3039-5612

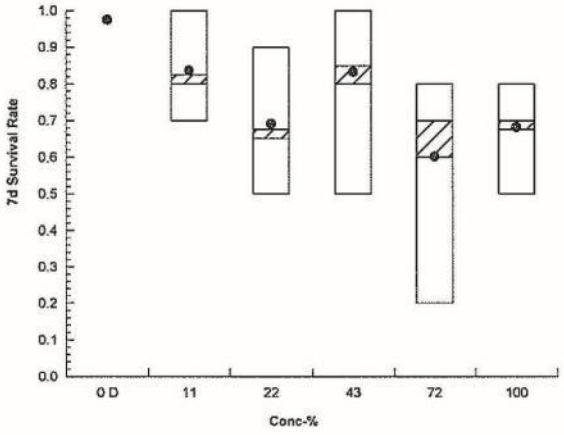
Fathead Minnow 7-d Larval Survival and Growth Test **EnviroScience**

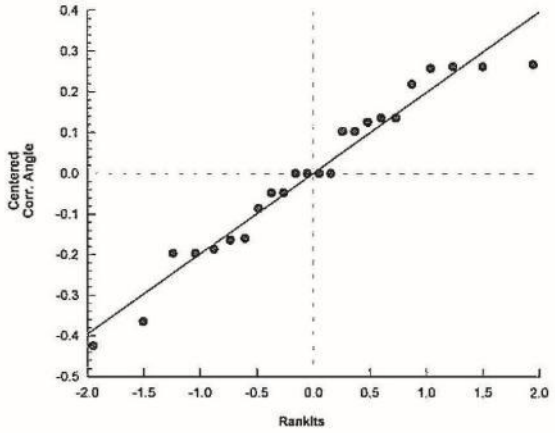
Analysis ID:	20-0045-7954	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	21 Feb-22 10:15	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.412	1.412	1.412	1.412
11		0.9912	1.412	1.107	1.107
22		1.249	0.7854	1.107	0.7854
43		1.412	1.412	0.9912	0.7854
72		0.9912	0.9912	0.4636	1.107
100		1.107	0.7854	0.8861	1.107

Graphics





CETIS Analytical Report

Report Date: 22 Feb-22 06:08 (p 3 of 4)
Test Code/ID: 790560DC / 20-3039-5612

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

Analysis ID:	03-2833-2829	Endpoint:	Mean Dry Weight-mg	CETIS Version:	CETISv1.9.6
Analyzed:	21 Feb-22 10:15	Analysis:	Parametric-Control vs Treatments	Status Level:	1
Sample ID:	13-1331-2760	Code:	4E478FF8	Project:	
Sample Date:	07 Feb-22 09:00	Material:	POTW Effluent	Source:	Discharge Monitoring Report
Receipt Date:	07 Feb-22 12:45	CAS (PC):		Station:	001
Sample Age:	24h	Client:	Bradford		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	>100	n/a	1	48.50%

above upper bound

Dunnett Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		11	0.07349	2.407	0.131	6	CDF	0.8108	Non-Significant Effect
		22	0.1424	2.407	0.131	6	CDF	0.7880	Non-Significant Effect
		43	-0.4366	2.407	0.131	6	CDF	0.9303	Non-Significant Effect
		72	0.7444	2.407	0.131	6	CDF	0.5377	Non-Significant Effect
		100	0.08269	2.407	0.131	6	CDF	0.8078	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0084761	0.0016952	5	0.2864	0.9144	Non-Significant Effect
Error	0.106541	0.005919	18			
Total	0.115018		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	1.475	15.09	0.9159	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9303	0.884	0.0992	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	0.27	0.1971	0.3429	0.2605	0.229	0.33	0.02291	16.97%	0.00%
11		4	0.266	0.1384	0.3936	0.253	0.187	0.371	0.04009	30.14%	1.48%
22		4	0.2622	0.1319	0.3926	0.268	0.173	0.34	0.04095	31.23%	2.87%
43		4	0.2937	0.1571	0.4304	0.3	0.203	0.372	0.04294	29.23%	-8.80%
72		4	0.2295	0.08184	0.3772	0.2485	0.109	0.312	0.0464	40.43%	15.00%
100		4	0.2655	0.1613	0.3697	0.262	0.19	0.348	0.03275	24.67%	1.67%

Mean Dry Weight-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	0.33	0.229	0.281	0.24
11		0.282	0.371	0.224	0.187
22		0.34	0.173	0.323	0.213
43		0.362	0.372	0.203	0.238
72		0.292	0.312	0.109	0.205
100		0.348	0.19	0.249	0.275

JK

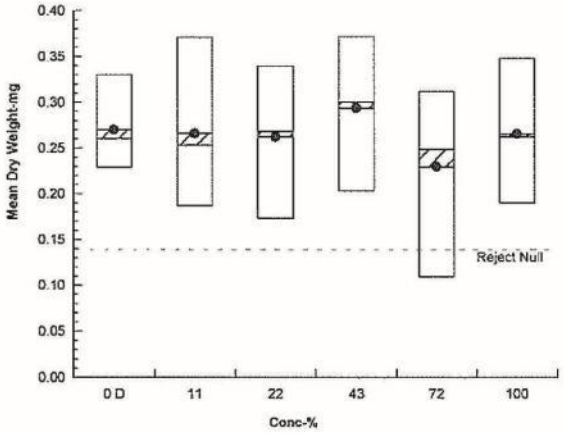
CETIS Analytical Report

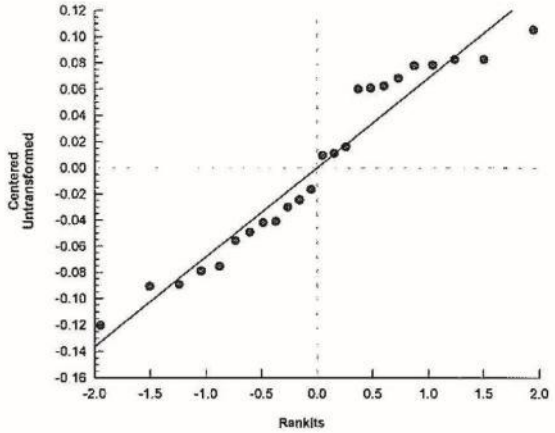
Report Date: 22 Feb-22 06:08 (p 4 of 4)
Test Code/ID: 790560DC / 20-3039-5612

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

Analysis ID:	03-2833-2829	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	21 Feb-22 10:15	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Graphics





CETIS Analytical Report

Report Date: 22 Feb-22 06:08 (p 1 of 1)
Test Code/ID: 790560DC / 20-3039-5612

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

Analysis ID:	05-7715-1079	Endpoint:	Mean Dry Weight-mg	CETIS Version:	CETISv1.9.6
Analyzed:	21 Feb-22 10:15	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1

Sample ID:	13-1331-2760	Code:	4E478FF8	Project:	
Sample Date:	07 Feb-22 09:00	Material:	POTW Effluent	Source:	Discharge Monitoring Report
Receipt Date:	07 Feb-22 12:45	CAS (PC):		Station:	001
Sample Age:	24h	Client:	Bradford		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	83354	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

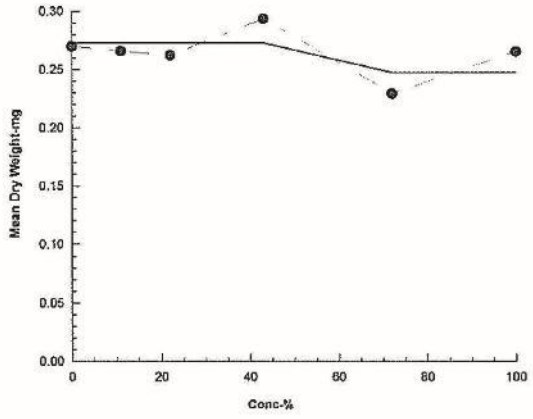
Mean Dry Weight-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-%	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	Mean	%Effect
0	D	4	0.27	0.229	0.33	0.04583	16.97%	0.0%	0.273	0.0%
11		4	0.266	0.187	0.371	0.08018	30.14%	1.48%	0.273	0.0%
22		4	0.2622	0.173	0.34	0.08191	31.23%	2.87%	0.273	0.0%
43		4	0.2937	0.203	0.372	0.08588	29.23%	-8.8%	0.273	0.0%
72		4	0.2295	0.109	0.312	0.0928	40.43%	15.0%	0.2475	9.34%
100		4	0.2655	0.19	0.348	0.06549	24.67%	1.67%	0.2475	9.34%

Mean Dry Weight-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	0.33	0.229	0.281	0.24
11		0.282	0.371	0.224	0.187
22		0.34	0.173	0.323	0.213
43		0.362	0.372	0.203	0.238
72		0.292	0.312	0.109	0.205
100		0.348	0.19	0.249	0.275

Graphics



Form 8080-2 rev. 01/20/21

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

Project ID:	BRAD
Permit No.:	PA0026379

Start Date:	020821

Concen-tration	Rep. no.	Pan no.	Weight of pan (g)	Total dry wt. (g)	No. fish
DMW	A	X1	1.07853	1.08183	10
	B	X2	1.08159	1.08388	10
	C	X3	1.06692	1.06973	6
	D	X4	1.08263	1.08503	10
11%	A	X5	1.06891	1.07173	7
	B	X6	1.10060	1.10431	10
	C	X7	1.07950	1.08174	8
	D	X8	1.08068	1.08255	8
22%	A	X9	1.06188	1.06528 JV 021622	9
	B	X10	1.07459	1.07632	5
	C	X11	1.09211	1.09534	8
	D	X12	1.08655	1.08868	5
43%	A	X13	1.08159	1.08521	10
	B	X14	1.08993	1.09365	10
	C	X15	1.08089	1.08292	7
	D	X16	1.06228	1.06466	5
72%	A	X17	1.08310	1.08602	7
	B	X18	1.09172	1.09484	7
	C	X19	1.05312	1.05421	2
	D	X20	1.06786	1.06991	8
100%	A	X21	1.06914	1.07262	8
	B	X22	1.07769	1.07959	5
	C	X23	1.09653	1.07902 JV 021622	6
	D	X24	1.09434	1.09709	8
Initials		TM	JV	JV	JV

Comments:

Reviewer pgs 1-2 AT

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

Project ID:	BRAD
Permit No.:	

Start Date:	020821

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	X29	1.07584	1.07589	
	B	X30	1.06603	1.06605	
	C	X31	1.07146	1.07151	
	D	X32	1.14441	1.14445	
Initials		TM	JV	JV	

S Weight calibrations	S wgt	Date: 021022	S wgt	Date: 021622
	2g	2.00002	2g	2.00000
	1g	0.99996	1g	0.99998
	500mg	0.49995	500mg	0.49999
	100mg	0.09999	100mg	0.09999
Initials		JV		JV

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 @	021522	0930	102 AT	JH
Pans w/fish removed @	021622	0930	80	AT

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

NPDES Permit Fact Sheet
Bradford STP

NPDES Permit No. PA0026379

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

Project ID:	B	R	A	P	020722	Permit No.:	PA0026379	Date:	02	08	22

Conductivity µmhos/cm - INITIAL

level	0	1	2	3	4	5	6
MHR	298	298	307	309	309	308	308
11%	381	375	398	412	435	445	464
22%	455	466	474	484	550	561	574
43%	607	614	636	630	801	790	804
72%	824	827	871	876	1126	1135	1146
100%	1026	1054	1100	1103	1457	1481	1480

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

	day→	0	1	2	3	4	5	6
TECH	Initial	TM	NJ	TM	NS		NK	NS
TECH	Final	MJ	TM	NS	NS	NK	NS	NS
DO	830							
	820							
	YSI	I F	I F	I F	I F	F	I F	I F
pH	920	F	I F	I	I	F	I F	F
	2Star		I					I
cond.	160	F	I	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
11%	8.6	8.6	8.6	8.6	8.6	8.6	8.6
22%	8.6	8.6	8.6	8.6	8.6	8.6	8.6
43%	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
100%	8.6	8.6	8.6	8.6	8.6	8.6	8.6

VAT

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
11%	8.6	8.6	8.6	8.6	8.6	8.6	8.6
22%	8.6	8.6	8.6	8.6	8.6	8.6	8.6
43%	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
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	7.2	7.5	7.6	7.4	7.5	7.4
11%	7.1	7.0	7.0	7.2	7.2	7.1	7.0
22%	7.0	6.9	7.0	7.1	7.1	7.0	7.0
43%	6.9	6.7	6.8	7.0	6.9	6.9	7.1
72%	6.7	6.5	6.6	6.8	6.7	6.7	6.9
100%	6.5	6.4	6.6	6.8	6.8	6.6	6.7

pH s.u. - FINAL

level	0	1	2	3	4	5	6 ms
MHR	7.5	7.4	7.4	7.6	7.4	7.5	~~7.5~~
11%	7.5	7.5	7.4	7.6	7.5	7.5	~~7.2~~
22%	7.5	7.4	7.4	7.6	7.5	7.5	~~7.2~~
43%	7.5	7.4	7.4	7.6	7.5	7.5	~~7.0~~
72%	7.4	7.3	7.4	7.4	7.5	7.4	~~6.9~~
100%	7.4	7.3	7.3	7.4	7.5	7.5	7.4

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

Project ID:	B	R	A	D	030122	Permit No.:	PA0026379	Date:	02	08	22

Conductivity µmhos/cm - **INITIAL**

level	0	1	2	3	4	5	6
DMW	183	184	182	181	184	188	186
11%	276	279	279	282	326	327	335
22%	369	369	389	382	456	472	482
43%	544	548	568	566	728	736	739
72%	785	804	825	839	1106	1117	1120
100%	1026	1054	1100	1103	1457	1481	1480

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

	day→	0	1	2	3	4	5	6
TECH	Initial	TM	NN	JM	NS	NS	NK	~~NS~~
TECH	Final	NS	TM	NS	~~NS~~ K	NK	~~NS~~ NS	NS
DO	830							
	820							
	YSI	I F	I F	I	I F	I F	I F	I F
pH	920	I F	I F	I			I F	I F
	2Star				I F	F		
cond.	160	F	I	I	I F	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
11%	8.6	8.6	8.6	8.6	8.6	8.6	8.6
22%	8.6	8.6	8.6	8.6	8.6	8.6	8.6
43%	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
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	86	8.6	8.6	8.6
11%	7.9	8.6	8.6	86	8.6	7.5	8.6
22%	8.6	8.6	8.6	86	8.6	8.6	8.6
43%	8.1	8.6	8.6	86	8.6	7.8	8.4
72%	8.6	8.6	8.6	86	8.6	7.6	8.4
100%	8.3	8.6	8.6	86	8.6	7.5	8.3

pH s.u. - **INITIAL**

level	0	1	2	3	4	5	6
DMW	7.4	7.0	7.5	7.1	7.3	7.2	7.3
11%	7.2	7.1	7.3	7.3	7.2	7.3	7.3
22%	7.1	7.0	7.1	7.2	7.1	7.2	7.2
43%	6.9	6.8	6.8	7.0	7.0	6.9	7.0
72%	6.6	6.6	6.7	6.9	6.8	6.7	6.9
100%	6.5	6.4	6.6	6.8	6.8	6.6	6.7

pH s.u. - **FINAL**

level	0	1	2	3	4	5	6
DMW	7.3	7.5	7.7	7.3	7.5	7.0	7.2
11%	7.2	7.4	7.5	7.4	7.4	7.0	7.2
22%	7.2	7.4	7.5	7.4	7.4	7.1	7.2
43%	7.2	7.3	7.5	7.5	7.4	7.0	7.2
72%	7.2	7.2	7.4	7.5	7.3	7.0	7.1
100%	7.0	7.2	7.2	7.5	7.2	7.0	7.1

Form 5000-3 rev. 01/20/21

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

Project ID: BRAD 120722 Permit No.: PA0026379
Test Date: 012822

Sample Type: →	EFFLUENT					
EnviroScience No.:	BRAD 030722 EFF	BRAD 120722 EFF	BRAD 021122 EFF			
D. Oxygen (mg/l-%sat) **>4 & <100%?**	8.6	8.6	8.6			
pH (s.u) **6-9?**	6.4	6.3	6.6			
Conductivity (µmhos/cm)	1034	1071	1482			
Alkalinity (mg/l $CaCO_3$) **MDL = 20 mg/l**	(1.5) 30	(1.9) 38	(2.2) 44			
Hardness (mg/l $CaCO_3$) **MDL = 5 mg/l**	(2.5) 100	(2.5) 100	(2.9) 116			
TRC_I (mg/l) **<0.02?**	<0.02	<0.02	<0.02			
TRC_A (mg/l) <0.02?						
Ammonia as N (mg/L)	0.80	2.09	3.74			
Tech Initials:	TM	TM	NS			

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.

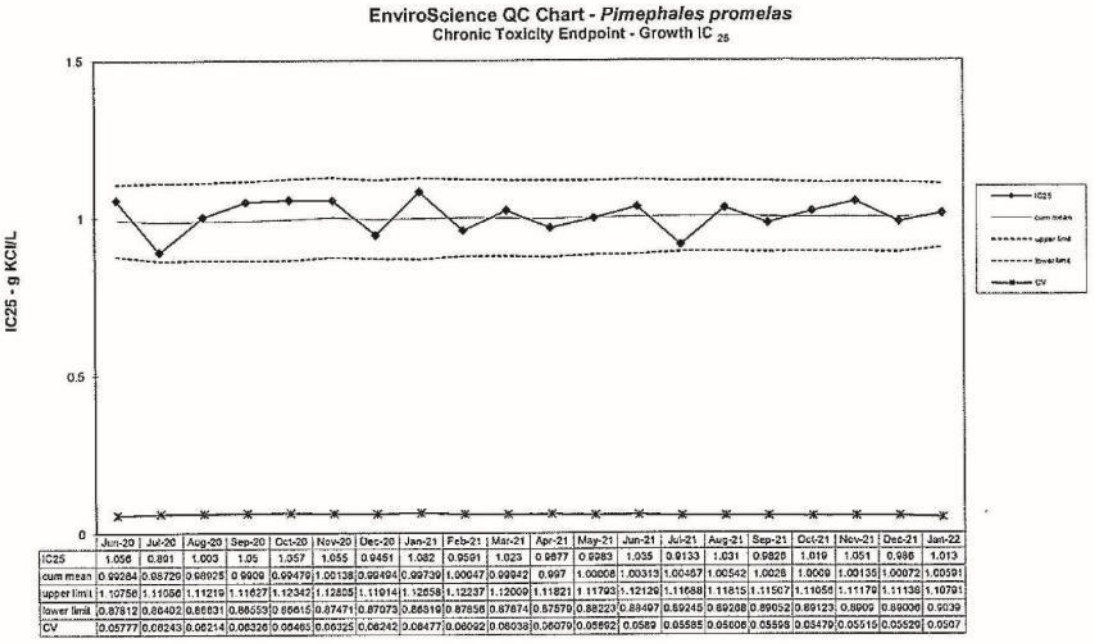
EnviroScience No.: Tracking number from C-O-C (client code+date received+type/outfall/unique #)

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.

√ AT

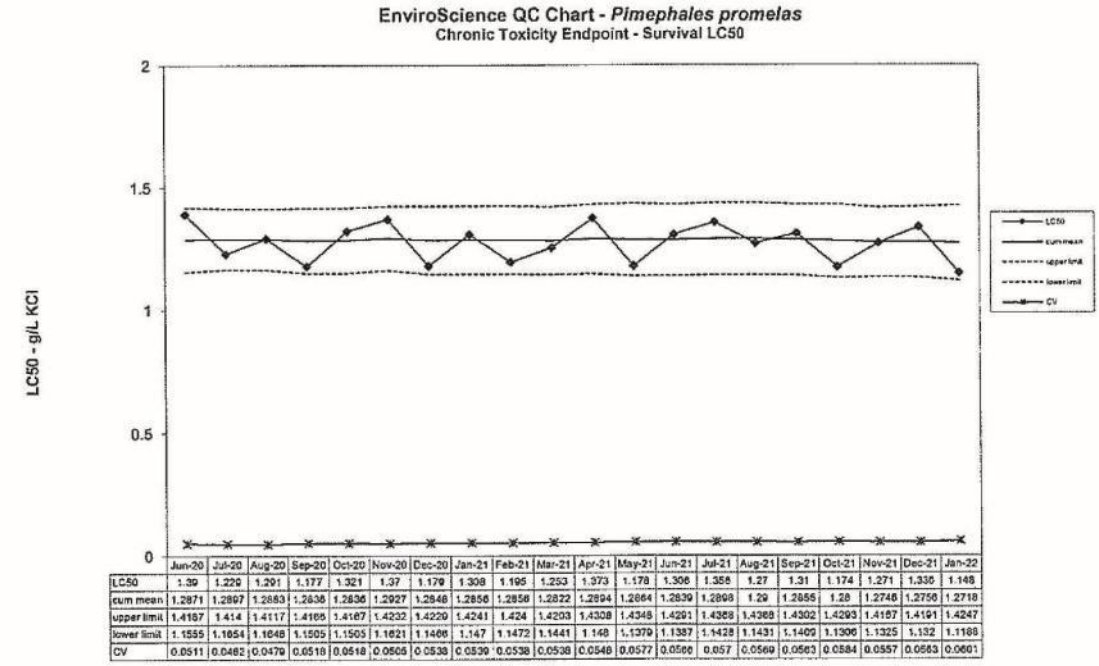


	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22
IC25	1.056	0.891	1.003	1.05	1.057	1.055	0.9451	1.082	0.9591	1.023	0.9877	0.9983	1.035	0.9133	1.031	0.9828	1.019	1.051	0.986	1.013
cum mean	0.99284	0.98729	0.98925	0.9909	0.99479	1.00138	0.99494	0.99739	1.00047	0.99942	0.997	1.00008	1.00313	1.00467	1.00542	1.0028	1.0009	1.00135	1.00072	1.00091
upper limit	1.10756	1.11056	1.11219	1.11627	1.12342	1.12805	1.11014	1.12658	1.12237	1.12009	1.11821	1.11793	1.12126	1.11688	1.11815	1.11507	1.11056	1.11179	1.11138	1.10791
lower limit	0.87812	0.86402	0.86631	0.86553	0.86615	0.87471	0.87073	0.86819	0.87856	0.87674	0.87579	0.88223	0.88497	0.89245	0.89268	0.89052	0.89123	0.8909	0.89006	0.9039
CV	0.05777	0.08243	0.06214	0.06326	0.06465	0.06325	0.06242	0.06477	0.06092	0.06038	0.06079	0.05892	0.0589	0.05585	0.05606	0.05598	0.05479	0.05515	0.05529	0.0507

Test Date

EnviroScience QC/SRT Chart rev. 02/03/22

Tests conducted with DMW



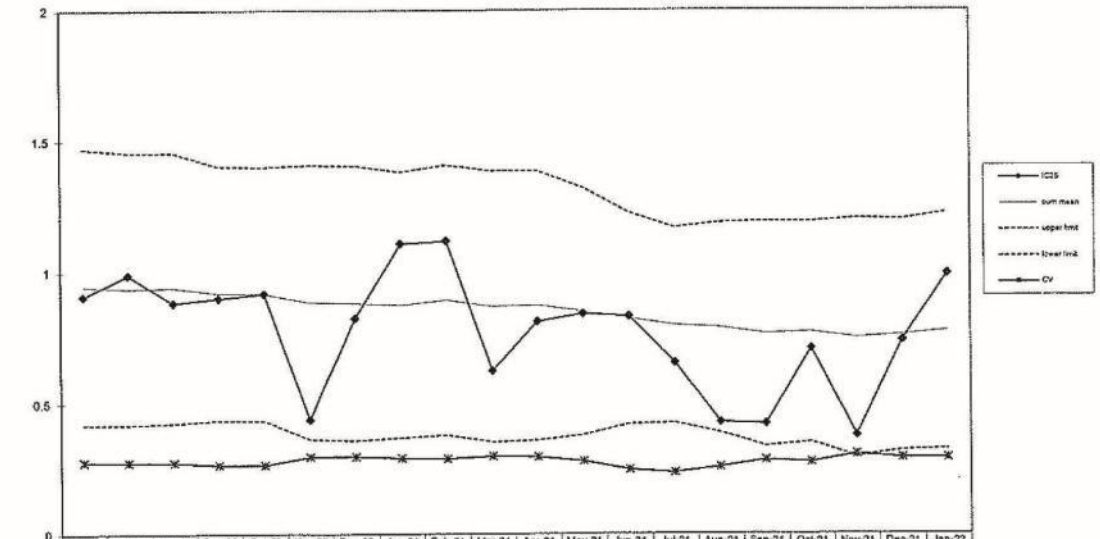
	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22
LC50	1.39	1.229	1.291	1.177	1.321	1.37	1.179	1.308	1.195	1.253	1.373	1.178	1.306	1.356	1.27	1.31	1.174	1.271	1.336	1.145
cum mean	1.2871	1.2867	1.2883	1.2836	1.2836	1.2927	1.2848	1.2856	1.2856	1.2822	1.2894	1.2864	1.2839	1.2898	1.29	1.2855	1.28	1.2746	1.2756	1.2718
upper limit	1.4167	1.414	1.4117	1.4166	1.4167	1.4232	1.4229	1.4241	1.424	1.4203	1.4308	1.4348	1.4291	1.4368	1.4368	1.4302	1.4293	1.4167	1.4191	1.4247
lower limit	1.1555	1.1654	1.1648	1.1505	1.1505	1.1621	1.1466	1.147	1.1472	1.1441	1.148	1.1379	1.1387	1.1428	1.1431	1.1409	1.1306	1.1325	1.132	1.1189
CV	0.0511	0.0462	0.0479	0.0518	0.0518	0.0505	0.0538	0.0539	0.0538	0.0536	0.0548	0.0577	0.0566	0.057	0.0569	0.0563	0.0584	0.0557	0.0563	0.0601

Test Date

EnviroScience QC/SRT Chart rev. 02/03/22

Tests conducted with DMW

EnviroScience QC Chart - *Ceriodaphnia dubia*
Chronic Toxicity Endpoint - Reproduction IC $_{25}$



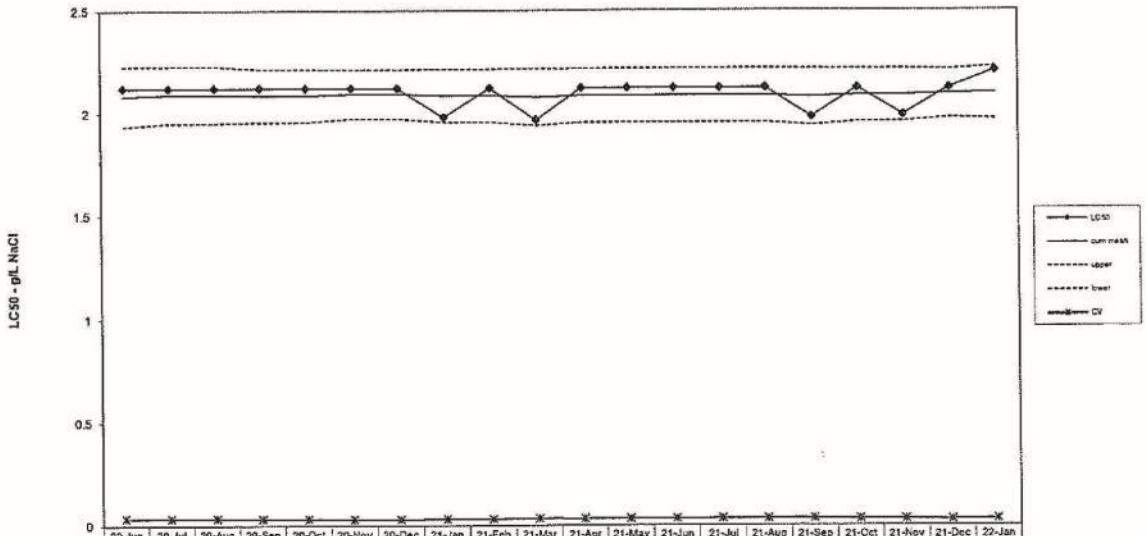
	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22
IC25	0.9064	0.9889	0.8828	0.9003	0.918	0.4373	0.8242	1.108	1.119	0.6228	0.8103	0.8382	0.8298	0.6511	0.4244	0.419	0.7054	0.375	0.7369	0.9913
cum mean	0.94592	0.93807	0.94049	0.91971	0.91705	0.88552	0.88192	0.87502	0.89314	0.88658	0.87265	0.84616	0.82215	0.79561	0.78594	0.76263	0.78654	0.74762	0.75936	0.77455
upper limit	1.47166	1.45588	1.45668	1.40477	1.40151	1.40913	1.40622	1.38251	1.40884	1.38657	1.39729	1.32126	1.22561	1.16804	1.18677	1.16232	1.19035	1.20307	1.20003	1.22562
lower limit	0.42018	0.42027	0.4243	0.43464	0.43259	0.3619	0.35762	0.36753	0.37784	0.35059	0.35501	0.37708	0.41869	0.42317	0.38511	0.33293	0.34872	0.29217	0.31888	0.32347
CV	0.2779	0.27599	0.27443	0.26371	0.26414	0.29566	0.29725	0.28999	0.28859	0.29816	0.29487	0.27798	0.24537	0.23406	0.255	0.28172	0.27342	0.3046	0.29017	0.29118

Test Date

EnviroScience QC/SRT Chart rev. 02/03/22

Tests conducted with MHRW

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



	20-Jun	20-Jul	20-Aug	20-Sep	20-Oct	20-Nov	20-Dec	21-Jan	21-Feb	21-Mar	21-Apr	21-May	21-Jun	21-Jul	21-Aug	21-Sep	21-Oct	21-Nov	21-Dec	22-Jan
LC50	2.121	2.121	2.121	2.121	2.121	2.121	2.121	1.979	2.121	1.965	2.121	2.121	2.121	2.121	2.121	1.979	2.121	1.986	2.121	2.205
cum mean	2.0819	2.089	2.089	2.0848	2.0848	2.0919	2.0919	2.0848	2.0848	2.077	2.0841	2.0841	2.0841	2.0841	2.0841	2.077	2.0848	2.08525	2.09235	2.09655
upper	2.22818	2.22784	2.22784	2.21359	2.21359	2.21145	2.21145	2.21359	2.21359	2.21511	2.21543	2.21543	2.21543	2.21543	2.21543	2.21511	2.21359	2.21253	2.21017	2.22424
lower	1.93562	1.95016	1.95016	1.95601	1.95601	1.97235	1.97235	1.95601	1.95601	1.93889	1.95277	1.95277	1.95277	1.95277	1.95277	1.93889	1.95601	1.95797	1.97453	1.96886
CV	0.03513	0.03323	0.03323	0.03089	0.03089	0.02858	0.02858	0.03089	0.03089	0.03325	0.03151	0.03151	0.03151	0.03151	0.03151	0.03325	0.03089	0.03052	0.02815	0.03045

Test Date

EnviroScience QC/SRT Chart rev. 02/03/22

Tests conducted with MHRW