

REVIEW OF TOXICITY BIOMONITORING REPORT

Environmental Toxicology, NPDES Permitting Program/OWQ

Biomonitoring Review Report: IDEM/100/29/334/138/2024	Document Date:	11/21/2023
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Discharger: Shelbyville WWTP NPDES No. IN0032867
 City: Shelbyville County: Shelby State: IN Zip 46176

I. Background Information: (To be completed by the testing lab)

A. Test Material:

Effluent/W. Water: Whole Effluent Outfall No(s): 001
 Grab/Composite: 24-hr Composite Date(s) Effluent Collected: 11/06/2023 11/08/2023 11/10/2023
 Concentrations Used: Control, 6.25%, 12.5%, 25%, 50%, 100% Dilution Factor: 0.5
 Dilution Water: Receiving Water Reconstituted Perrier
 Name of Receiving Water Body: Big Blue River Test Date(s): 10/07/2022- 11/14/2023
10/07/2022- 10/14/2022

B. Testing Laboratory: Biomonitor, Inc. 8802 W. Washington St.
 City: Indianapolis State IN Zip 46231

Responsible Person(s):

Study Director/Manager: Michael Britton
 Technical Staff: Initials
 Phone No. 317-297-7713

C. Toxicity Test Conducted:

Acute Test:

- | | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | 1. <i>Ceriodaphnia dubia / reticulata</i> |
| <input type="checkbox"/> | 2. <i>Daphnia magna</i> or <i>Daphnia pulex</i> |
| <input checked="" type="checkbox"/> | 3. <i>Pimephales promelas</i> (Fathead Minnow) |
| <input type="checkbox"/> | 4. Other: _____ |

Short-Term Chronic Test:

- | | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | 1. <i>Ceriodaphnia dubia / reticulata</i>
Survival & Reproduction test |
| <input checked="" type="checkbox"/> | 2. <i>Pimephales promelas</i> (Fathead Minnow)
Larval Survival & Growth test |
| <input type="checkbox"/> | 3. <i>Selenastrum capricornutum</i> Growth |
| <input type="checkbox"/> | 4. Other: _____ |

D. Chemical Analyses Checklist:

Parameter	Day							Comment
	1	2	3	4	5	6	7	
1. Control:								
D.O. Initial	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Final	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	_____
pH Initial	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Final	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Alkalinity:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hardness:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Conductivity:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Chlorine:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2. Test Sample:								
D.O. Initial	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Final	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	_____
pH Initial	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Final	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Alkalinity:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hardness:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Conductivity:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Chlorine:	<u>N. D.</u>	<input type="checkbox"/>	<u>N. D.</u>	<input type="checkbox"/>	<u>N. D.</u>	<input type="checkbox"/>	<input type="checkbox"/>	<u>100% Only</u>

II. *Daphnia* or *Ceriodaphnia* Toxicity Test Information
(To be completed by the testing lab)

A. Data Analyses:

Statistical Test	Method Used	Comment
Normality test:	<u>Chi-Square Test</u>	<u>Passed. Indicates Normal Distribution for Reprod.</u>
Homogeneity test:	<u>Hartley Test</u>	<u>Passed. Indicates Equal Variances for Reprod.</u>
Significance test:		
1. Parametric:	<u>Dunnett's Test</u>	<u>Passed. No Significant Difference for Reprod</u>
2. Non-Parametric	<u>Steel Many-One Rank Test</u>	
:	<u>Fisher's Exact test</u>	<u>Passed. No Significant Difference for Survival.</u>
3. Are the Critical Values of Significance Provided?	<u>Yes.</u>	
4. Other:	<u>No Calculations were necessary for acute endpoints.</u>	

B. Toxicity Test Results:

1. Acute:

LC50 (48-hr): >100% Effluent (1 TUa)

2. Chronic:

NOEL:	Survival	<u>100% (1 TUc)</u>	Reproduction	<u>100% (1TUc)</u>	Growth	_____
LOEL:	Survival	_____	Reproduction	_____	Growth	_____
Chronic Value:	Survival	_____	Reproduction	_____	Growth	_____

C. Permit Limits Requirement:

1. Acute:

LC50 (48-hr): 100% Effluent (1 TUa)

2. Chronic:

NOEL:	Survival	<u>53% (1.9 TUc)</u>	Reproduction	<u>53% (1.9 TUc)</u>	Growth	_____
LOEL:	Survival	_____	Reproduction	_____	Growth	_____

D. Reference Toxicant Data:

- Reference Toxicant: Copper chloride, Reagent Grade, from Carolina Biological
- Test Date: October 3 – 10, 2023
- Results: 48-hr LC50 = 113 µg/L, NOEL (Reprod.) = 40 µg/L, LOEL (Reprod.) = 80 µg/L as Cu.
- Acceptable Range: Within Laboratory Control Limits.

E. Permit Limits Compliance: (To be completed by IDEM Staff only)

<input checked="" type="checkbox"/>	Pass (LC50 [48-hr])	<u>(1 TUa)</u>	<input type="checkbox"/>	Fail (LC50 [48-hr])	_____
<input checked="" type="checkbox"/>	Pass (NOEL/Survival)	<u>(1 TUc)</u>	<input type="checkbox"/>	Fail (NOEL/Survival)	_____
<input checked="" type="checkbox"/>	Pass (NOEL/Reprod.)	<u>(1 TUc)</u>	<input type="checkbox"/>	Fail (NOEL/Reprod.)	_____
<input type="checkbox"/>	Pass (NOEL/Growth)	_____	<input type="checkbox"/>	Fail (NOEL/Growth)	_____

Is the Test Acceptable? Yes No Reason _____

III. Fathead Minnow (*Pimephales promelas*) Toxicity Test Information
(To be completed by the testing lab)

A. Data Analyses:

Statistical Test	Method Used	Comment
Normality test:	<u>Chi-Square Test</u>	<u>Passed. Indicates Normal Distribution for Growth.</u>
Homogeneity test:	<u>Hartley Test</u>	<u>Passed. Indicates Equal Variances for Growth.</u>
Significance test:		
1. Parametric:	<u>Dunnett's Test</u>	<u>Passed. No significant Difference for Growth</u>
2. Non-Parametric	<u>Steels Many-One Rank Test</u>	<u>Passed. No Significant difference for Survival.</u>
3. Are the Critical Values of Significance Provided?		<u>Yes.</u>
4. Other:	_____	

B. Toxicity Test Results:

1. Acute:

LC₅₀ (96-hr): >100% Effluent (1 TUa)

2. Chronic:

NOEL:	Survival	<u>100% (1 TUc)</u>	Reproduction	_____	Growth	<u>100% (1 TUc)</u> <u>IC₂₅=58.8%</u> <u>(1.7 TUc)</u>
LOEL:	Survival	_____	Reproduction	_____	Growth	_____
Chronic Value:	Survival	_____	Reproduction	_____	Growth	_____

C. Permit Limits Requirement:

1. Acute:

LC₅₀ (96-hr): 100% Effluent (1 TUa)

2. Chronic:

NOEL:	Survival	<u>53% (1.9 TUc)</u>	Reproduction	_____	Growth	<u>53% (1.9 TUc)</u>
LOEL:	Survival	_____	Reproduction	_____	Growth	_____

D. Reference Toxicant Data:

- Reference Toxicant: Potassium chloride, Reagent Grade, from Sigma -Aldrich
- Test Date: October 3 – 10, 2023
- Results: 96-hr LC₅ = 1225 mg/L, NOEL (Growth.) = 500 mg/L, LOEL (Growth.) = 1000 mg/L as KCl
- Acceptable Range: Within Laboratory Control Limits.

E. Permit Limits Compliance: (To be completed by IDEM Staff only)

<input checked="" type="checkbox"/>	Pass (LC ₅₀ [96-hr])	<u>(1 TUa)</u>	<input type="checkbox"/>	Fail (LC ₅₀ [96-hr])	_____
<input checked="" type="checkbox"/>	Pass (NOEL/Survival)	<u>(1 TUc)</u>	<input type="checkbox"/>	Fail (NOEL/Survival)	_____
<input type="checkbox"/>	Pass (NOEL/Reprod.)	_____	<input type="checkbox"/>	Fail (NOEL/Reprod.)	_____
<input checked="" type="checkbox"/>	Pass (NOEL/Growth)	<u>(1 TUc)</u>	<input type="checkbox"/>	Fail (NOEL/Growth)	_____

Is the Test Acceptable? Yes No Reason _____

IV. GLP and QA/QC Compliance:
(To be completed by IDEM Staff only)

A. Does the Biomonitoring Report provide?

- | | | | | |
|---|-------|-------------------------------------|----|--------------------------|
| 1. GLP Compliance Statement: | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> |
| 2. QA/QC Compliance Statement: | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> |
| 3. Were the required GLPs followed? | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> |
| 4. If not, the Report lacks what major information: | _____ | | | |


B. Laboratory Raw Data Sheets:

- | | | | | |
|--|-------|-------------------------------------|----|--------------------------|
| 1. Does the Report enclose raw data sheets? | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> |
| 2. Does the raw data sheets provide essential information? | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> |
| 3. If not, the Report lacks what major information: | _____ | | | |

V. Comments and Recommendations:
(To be completed by IDEM Staff only)

- In November 2023 in the Semi-annual testing whole effluent from **Shelbyville WWTP** did not demonstrate any acute or chronic toxicity to *Ceriodaphnia dubia* or to Fathead minnow, *Pimephales promelas*. The 48-hr and the 96-hr LC₅₀ to both the test species was **>100% effluent (<1 TUa)**. Likewise, the NOEL for *Ceriodaphnia dubia* Survival and Reproduction and for *Pimephales promelas* Survival and Growth was **100% effluent (1 TUc)** and acceptable as compared to **53% effluent (1.9 TUc)** WET compliance limit in the facility NPDES permit.

Reviewed by:

Signature:  Date: 06/19/2024
 Syed GhiasUddin Title: Environmental Toxicologist
 NPDES Permits Branch, OWQ

Electronic copy:

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