Bio-Aquatic Testing, Inc.

TYSON POULTRY, INC. - CLARKSVILLE
INDUTRIAL WASTEWATER TREATMENT FACILITY
ADEQ PERMIT NO. AR0039268

TOXICITY REDUCTION EVALUATION PLAN

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Submitted To:

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BASIS FOR THE TRE:

Tyson Poultry, Inc. – Clarksville, Industrial Wastewater Treatment Facility is required to conduct a Toxicity Reduction Evaluation (TRE) on the final effluent from Outfall 001 as a result of failing whole effluent toxicity test requirements contained in the ADEQ discharge permit. The discharge permit requires quarterly chronic testing using *Ceriodaphnia dubia* and *Pimephales promelas*. The permit became effective on November 1, 2021 and will expire October 31, 2026. The permit establishes a chronic dilution series of 32%, 42%, 56%, 80%, and 100% effluent defining the critical low flow concentration as 100% effluent.

The test initiated in June 2022 had a significant lethal effect on the *Pimephales promelas* at 100% effluent. The *Ceriodaphnia dubia* did not demonstrate any toxicity in any of the test concentrations. The first retest was conducted in July 2022 and the *P. promelas* had significant lethality in all of the effluent concentrations (Table 1). Consequently, due to the two exceedances, the permittee is entering into a TRE.

The purpose of the TRE is to reduce or eliminate the cause of toxicity in the Clarksville WWTF effluent. The purpose of this document is to describe the approach Tyson Poultry, Inc. will use to help identify and control the factors responsible for the acute toxicity of their final effluent.

OBJECTIVES OF THE TRE

Tyson Poultry, Inc. is committed to identifying the factors responsible for the wastewater treatment plant's effluent toxicity, evaluating and implementing methods for controlling the factors, and determining that the control methods are adequate to attain and maintain consistent compliance with the ADEQ permit. They are committed to completing the TRE by November 2024 (28 months). Tyson Poultry, Inc. has identified five objectives of the TRE. These include the following:

1. Evaluate the operation and performance of the facility to identify potential deficiencies or abnormalities.
    a. The facility identified a cleaning agent utilized at the processing plant that could have contributed to the toxicity failure.
    b. The facility discontinued use of that cleaning agent and there has not been subsequent failures.

2. Evaluate the pattern and degree of effluent toxicity to determine the effect's intensity and consistency and to help approximate the condition of the effluent on a persistent basis.
3. Identify, using TIE fractionation techniques, chronic toxicity tests, bench-scale treatability tests, and/or chemical analyses, those factors responsible for the effluent toxicity.
4. Determine the source of the factors responsible for effluent toxicity.
5. Evaluate, select, and implement toxicity reduction methods and technologies to control effluent toxicity sufficient to maintain compliance with the ADEQ permit.

TRE APPROACH AND METHODOLOGY

The U.S. EPA has published guidance documents with respect to toxicity reduction for industrial and municipal wastewater treatment plants. This report identifies a sequence of events based on U.S. EPA guidance required to take place in order to fulfill the development and completion of a TRE. Our approach will follow the EPA guidelines including review of available analytical and biological data, type of tests, intensity and/or degradation of toxicity, plant design, operation and maintenance procedures, records, and system review. Figure 1 illustrates the series of steps to systematically identify the cause or causes of toxicity.

To achieve these objectives, Tyson Poultry, Inc. will utilize several key personnel and a team of environmental consultants. Bio-Aquatic Testing will coordinate and assist with TRE activities and conduct the aquatic toxicity portions of the study. Bio-Aquatic Testing is an aquatic toxicology lab with over 35 years of experience conducting biomonitoring and TRE studies. Biomonitoring samples requiring further analytical analysis will be sent to Eurofins. They have over 20 years of experience and a network of several laboratories. Other members or consultants with specific skills will be added if needed as we progress through the TRE.

Tyson Poultry, Inc. is committed to conducting a thorough evaluation of the factors responsible for effluent toxicity and methods for controlling these factors. They also understand that site-specific considerations may warrant modification and tailoring of its approach. The approach proposed will be conducted in stages as given below.

Stage I

1. Establish a team to aid in completion of the TRE.
    a. **Bio-Aquatic Testing, Inc, Environmental/Toxicity Consultants**
        Direct TRE activities, write quarterly reports, conduct biomonitoring analysis, Conduct TIE Phase I, II, III studies, prepare final report.
    b. **Eurofins Analytical**
        Provide analysis on an as-needed basis on samples pulled directly for that purpose or from aliquots poured from biomonitoring samples received at Bio-Aquatic Testing's facility.

c. Tyson Poultry, Inc. Clarksville WWTF Operations

Coordinate sampling activities at the facility, provide review of facility treatment systems, evaluate chemical usage and maintenance records, and represent the facility.

2. Continue with a plant performance evaluation (PPE) and review of biomonitoring and analytical data performed on effluent. Evaluate treatment systems, chemical uses, maintenance, and/or source for sample contamination. One suspect chemical has already been discovered and its use discontinued.

3. Use chronic toxicity tests with P*. promelas* to establish the pattern and degree of effluent toxicity and to define the scope of the TIE Characterization tests. At a minimum, quarterly monitoring of the *P. promelas* will be conducted. Additional sample volume will be collected for every sampling event. The extra volume will be kept in a dark, 0-6°C cooler, with zero head space. If a toxicity event is identified, additional studies will be performed on the toxic sample.

Stage II

1. Toxicity Identification Evaluations (TIEs) may be necessary to identify and establish the factor(s) responsible for the toxicity. The scope of these characterization tests will largely depend on the results of Stage I.

2. Quarterly reports will be submitted to ADEQ detailing at a minimum:
    a. The results of the TIEs and an interpretation of the findings.
    b. The results of the nature and source of toxicity and analysis of the findings
    c. An approach for Stage III describing specific objectives that will be sought, a schedule for completion, and submission of reports.

Stage III

1. Based on the results of Stage II, toxicity control options shall be evaluated.

2. Toxicity control methods involving marginal costs shall be implemented. If there are control methods requiring significant costs, Tyson Poultry, Inc. shall prepare an implementation plan detailing the nature of the control methods and a schedule describing specific increments of progress for implementing the control methods.

3. Follow-up chemical and biological monitoring of the effluent shall be conducted to ensure the effectiveness of the toxicity control method(s).

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IMPLEMENTATION SCHEDULE

Stage I of the TRE was initiated during July 2022. Because the TRE will be a step-wise process involving many decisions, Tyson Poultry, Inc. proposes to submit quarterly reports during the TRE. The following schedule is offered for consideration:

Stage	Completion Date
I	January 2023
II	July 2023
III	January 2024
Final Compliance (28 Months)	November 2024

Progress reports will be submitted to ADEQ upon completion of each stage or significant milestone.

SUMMARY

Tyson Poultry, Inc. Clarksville industrial WWTF has had a recent history of *P. promelas* failures. Tyson Poutry, Inc. has initiated toxicity reduction activities by assembling a team of consultants, gathering historical effluent analytical and biomonitoring data, and initiating a plant evaluation. Phase I Characterization procedures will be utilized to classify and confirm the toxicants(s) in the event of any future toxic events. Once this is completed, treatment options will be evaluated and implemented. TRE activities will continue until the toxicity is removed from the system.

The ability to conduct further TIE studies will be dependent on persistent toxicity events. Consideration may be given to demonstrating a "cessation of lethality" by showing no significant lethality for 12 consecutive testing events with a minimum of quarterly testing.

If you have any questions or comments, please contact Deanne Blake, Bio-Aquatic Testing, at 972-242-7750 ext. 119 (dblake@bio-aquatic.com) or Savannah Stuart-Dahl with Tyson Poultry, Inc. at 479-979-1511 (Savannah.Stuart-Dahl@Tyson.com).

Table 1: *P. promelas* tests conducted during 2022 and 2023. Red color indicates failure. Q* = value not calculable

	Survival		Growth	
Test Date	**NOEC**	**LOEC**	**NOEC**	**LOEC**
3/17/2022	100	Q*	100	Q*
6/21/2022	32	42	32	42
7/26/2022	0	32	0	32
9/20/2022	100	Q*	100	Q*
11/29/2022	100	Q*	100	Q*
3/21/2023	100	Q*	100	Q*

FIGURE 1: TRE OUTLINE