

NUTRIENT REDUCTION EVALUATION FORM INSTRUCTIONS

Kentucky Pollutant Discharge Elimination System



Background:

High phosphorus and nitrogen concentrations in the Waters of the Commonwealth support the growth of algae and aquatic plants, which provide food and habitat for fish, shellfish and smaller organisms that live in water. However, when elevated levels of phosphorus and/or nitrogen enters the environment, water may become polluted by excessive algae growth. Excessive algae harms water quality, food resources and habitats, and decreases the oxygen that fish and other aquatic life need to survive. Large growths of algae, also known as algal blooms, can severely reduce or eliminate oxygen in the water, leading to illnesses in fish and the death of large numbers of fish. Some blooms may further develop into a form of bacteria that can be harmful to human health.

Applicability:

This form may serve as a tool for Publicly Owned Treatment Works (POTWs) seeking to optimize nutrient reductions within its facility and to fulfill requirements for a nutrient reduction evaluation imposed on a Kentucky Pollutant Discharge Elimination System (KPDES) permit. The form will assist the POTW in gathering and evaluating source reduction measures, operational procedures, and unit process configurations, along with consideration of associated costs and potential savings for reducing nutrients in the effluent discharge. The goal of the evaluation is to establish feasible nutrient reduction through optimization.

What You Will Need to Complete this Form:

Required Form Inputs:

- Average monthly total phosphorus and total nitrogen concentrations of the effluent and influent for the most recent five calendar years.
- Average monthly effluent flow for the most recent five calendar years.
- Determination of whether the POTW is currently capable of continually discharging Total Phosphorus (TP) at or below a final effluent discharge average monthly concentration of 1.0 milligrams per liter and of continually discharging Total Nitrogen (TN) at or below a final effluent discharge average monthly concentration of 10 milligrams per liter.
- Known processes that are currently implemented or have been previously implemented to reduce TP and TN concentrations.

Required Form Outputs:

- Possible changes to your facility/operations that would be required to continually discharge at or below the target values of TP and TN.
- Reasonable estimate of costs associated with these changes.

Instructions to Complete the Form:

REQUIRED FORM INPUTS: (Sections I, II, and III)

Section I:

Select the most appropriate choice that best describes the overall treatment process. For example, the most common treatment process for POTW's is the Oxidation Ditch. An oxidation ditch is one type of the activated sludge process. If your facility does not use activated sludge, a sequence batch reactor, or a lagoon system, mark "Other" and provide a description of the treatment technologies implemented.

Section II:

The facility shall use netDMR data for filling out this table where available. The data shall be monthly for a continuous 5-year period, at a minimum, and the data shall cover the most recent five calendar years.

Section III:

In the space provided, include a summary of source reduction measures, operational procedures [including biological phosphorus removal], unit process configuration improvements, and additional treatment measures that are currently being performed which contribute to decreased TP and TN discharges. All methodologies employed that you believe reduce total phosphorus and total nitrogen in the discharge should be included in this section.

(Example: Ferric chloride is currently added to help enhance settling which also reduces TP in the discharge. We also evaluated possible source reduction and aeration changes previously.)

REQUIRED FORM OUTPUTS: (Sections IV and V)**Section IV:**

In the space provided, include a summary of measures identified and evaluated to achieve the target effluent discharge values for TP and TN. For each measure, identify the associated reasonable estimated capital costs and the annual operating and maintenance (O&M) costs along with the reasoning for the annual costs (e.g. electric cost, time, chemical cost, etc.) The estimated costs should include the costs for purchasing equipment and materials as well as construction. The measures evaluated should include:

- Source Reduction Measures – Measures which reduce influent concentrations of nutrients. This may include evaluating industrial sources and determining if industrial users may be able to pre-treat or reduce nutrient discharges to the POTW. Examples of potential reductions include: non-phosphorus based additives to replace those that use phosphorus, creating nutrient awareness programs for areas that connect to the sewer system, and promotion of other best management practices for any discharger that contributes nutrient loadings to the POTW. Imposing nutrient limits or optimization in pretreatment permits may be another source reduction measure.
- Operational Improvement Measures - Altering conventional treatment methods to increase removal of nutrients. This may include changes to aeration procedures allowing for the creation of anaerobic zones, changes in septage receiving procedures, change in the collection or distribution of return sludge in the waste stream process in an attempt to reduce nutrients in the plant effluent, and any other changes to process flow.
- Unit Process Configuration Improvement Measures - Physical adaptations to the treatment system to increase treatment of nutrients. This could include retrofitting existing tanks to create anaerobic zones; modifications to gravity thickeners, sludge fermenters, or baffles; or any other changes to the system that increase treatment of nutrients.
- Additional Treatment Measures - Installation of new treatment technologies that are specifically designed to treat TP and TN to achieve the target effluent discharge values. For example, this may include a chemical dosing mechanism that adds alum, ferric, or any other phosphorus-treating-additive or installation of a new biological phosphorus removal treatment process.

Section V:

From the potential measures identified in Section IV, identify the measure(s) selected by the permittee to achieve the target nutrient effluent discharge values.

If the targets cannot be met:

- Identify any difficulties or problems believed to interfere with the facility's ability to achieve the target nutrient effluent discharge values, and
- Identify the measures that can be taken and the target nutrient effluent discharge value for these measures.

For each measure selected identify the estimated timeframe necessary to fully implement the measure.

Section VI:

Sign and date the form. The signatory shall be an individual with legal authority to sign a KPDES permit application and understands the responsibility of signing the document and the consequences of falsifying information.