



Background Information and Instructions for: Evaluation for Reducing Discharge of Phosphorus Form

Background

High phosphorus concentrations in waters of the state support the growth of algae and aquatic plants, which provide food and habitat for fish, shellfish and smaller organisms that live in water. But when too much phosphorus enters the environment, water can become polluted. Nutrient pollution is a major water quality problem in Ohio as significant increases in algae growth have recently occurred throughout the state due to excessive phosphorus concentrations. 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 algal blooms are harmful to humans because they produce elevated toxins and bacterial growth that can make people sick if they come into contact with polluted water, consume tainted fish or shellfish, or drink contaminated water.

While efforts to control nutrient enrichment over the past 30 years have yielded some positive results, current evidence shows the need to develop newer solutions and improve the effectiveness and efficiency of existing strategies to reduce nutrients in our waterways.

Current Solutions to Phosphorus Enrichment

Ohio EPA's current approach to address nutrient pollution is based on narrative standards for protection against adverse aesthetic conditions and harm to aquatic life. One approach that is appropriate in specific watersheds is water quality trading; where a permittee may pay a non-point source of nutrients, such as a farm, to install practices that mitigate nutrient concentrations to state waters. The permittee then obtains nutrient credits that may be applied to the NPDES permit to meet specific nutrient requirements. Other traditional approaches are installations of new facilities that include biological nutrient removal or chemical additions for end of pipe treatment.

The Agency also believes that operational changes specific to individual permittees may be the most economical approach allowing for the most immediate results. Many studies indicate that operational changes involving zones of decreased and increased oxygen, cycling of oxygen, and other changes that require little capital investment can cut nutrient concentrations well below current levels. As this is an exploratory option that the Agency has not been able to document previously, the corresponding form was developed to determine what operational changes have been utilized and proven both effective and economical.

Explanation of Form

As part of the approach to decrease nutrient enrichment in Ohio waters, Ohio EPA has developed a form for facilities to fill out when submitting NPDES permit renewal applications. The form will be used by the Agency to evaluate what approaches permittees have taken to decrease the nutrient concentrations of their discharges to waters of the state. This will allow Ohio EPA to get a broader picture of what transpires at the NPDES permitted facility and gives the Agency a better understanding of what types of associated costs and investments have been put forward to improve nutrient management. This form will not only help with your individual NPDES permit renewal but is a pivotal step in categorizing nutrient reduction efforts across the state.

Instructions to Fill Out the Form

Section I:

Insert the name of your facility and the permit number of your current permit (even if the permit has expired) as it reads in your eDMR reports.

Section II:

Calculate and enter the median concentrations of the applicable nutrients for the previous five calendar years. The Agency asks for the median concentration rather than the average to account for possible outliers in data that could result in a non-representative calculated average of the plant effluent. The previous five calendar years means looking at the median of each individual year from January 1 to December 31 of each year, for the most recent five complete years. If your facility is not monitoring for a specific parameter, write N/A in the space provided for the median concentration of that particular parameter.

Section III:

In the section of the form entitled "Identification of Operational Procedures the Facility Attempted to Reduce Nutrients," indicate any new operations or changes made at the facility in an effort to reduce nutrient concentrations in the plant effluent over the previous five years. The list should include both operational procedures that achieved lower nutrient reductions and did not.

For the procedures that did achieve lower nutrient reductions, continue down the form and identify what procedure was used from the drop down list. An explanation of each item in the drop down list is given below.

An example is adding chemical feed to the plant. If this project cost \$20,000 to install, then this cost should be captured in the Capital Cost column. Under the associated year that the construction was completed, the permittee would write \$20,000. Associated operating and maintenance (O&M) costs that could include the annual chemical supply, electricity needed to run the mechanism, and any other annual maintenance required, would be captured in the O&M Cost column. Depending on variability of specific costs, the O&M column may have varying figures from year to year.

Explanation of Drop Down List Options in Section III:

Addition of Anaerobic Tank – Installation or retrofitting of a tank which has anaerobic properties in an attempt to reduce nutrient concentrations of the effluent.

Addition of Gravity Thickener – Installation or retrofitting of a tank which has the properties in which biosolids are condensed to produce a concentrated solids product in an attempt to reduce nutrient concentrations of the effluent.

Addition of Sludge Fermenter – Installation or retrofitting of a tank that allows sludge to ferment in an attempt to reduce nutrient concentrations of the effluent

Chemical Feed – Installation of or use of an existing mechanism that feeds chemicals (other than carbon) into the waste water stream in an attempt to reduce nutrient concentrations of the effluent.

Oxygen Cycling Procedures – Installation of new oxygen pumps or cycling of current pumps that changes the oxygen feed duration in any specific tank waste water flows through in the treatment process.

Septage Receiving Policies – A change in the collection or distribution of sludge in the waste stream process in an attempt to reduce nutrients in the plant effluent. This includes changes in wasting procedures or changes in sludge decant.

Other Changes in Process Flow – Any adoption of a new process/procedure that changes flow of wastewater and that is not listed above.

Other (Specify in Reasoning Column) – Any installation of a physical mechanism not listed above.

Section IV:

Sign and date the form. The signatory shall be the operator of record or individual that signs the NPDES permit renewal application and understands the responsibility of signing the document and consequences of falsifying information.

Informational Resources for Nutrient Reduction via Operational Changes/Plant Optimization

The following websites are a good source of information on possible changes that could be made at individual facilities across the state. The Agency does not endorse any external website that is not written and maintained by Ohio EPA.

Further Background:

Gulf of Mexico Hypoxia:

http://water.epa.gov/type/watersheds/named/msbasin/upload/hypoxia_annual_federal_strategy_508.pdf

Lake Erie Algal Blooms:

<http://www.epa.state.oh.us/portals/35/lakeerie/ptaskforce/LakeErieBackground.pdf>

Ohio EPA Nutrient Reduction Strategy Home Page:

<http://www.epa.state.oh.us/dsw/wqs/NutrientReduction.aspx>

Ohio EPA Nutrient Reduction Strategy Document:

http://www.epa.state.oh.us/Portals/35/wqs/ONRS_final_jun13.pdf

Additional Resources:

The Water Planet Company-Nutrient Reduction via Operation Procedures Library:

<http://www.cleanwaterops.com/wastewater-science/>

USEPA: Municipal Nutrient Removal Technologies Reference Document:

<http://water.epa.gov/scitech/wastetech/upload/mnrt-volume1.pdf>

Minnesota Pollution Control Agency – Optimization for Phosphorus Removal

<http://www.pca.state.mn.us/index.php/view-document.html?gid=7094>

Minnesota Pollution Control Agency – Phosphorus Treatment and Removal Technologies

<http://www.pca.state.mn.us/index.php/view-document.html?gid=7095>

Contact Information

For questions about the individual form and how to fill it out or other related NPDES questions please contact Andy Bachman at (614)644-3075, or andrew.bachman@epa.ohio.gov

For questions about plant performance and implementation of specific operational procedures please contact Jon VanDommelen at (614)644-2001, or jon.vandommelen@epa.ohio.gov