

Voluntary Early Nutrient Monitoring Program for Point Sources
According to the Nutrient Loss Reduction Strategy

1. Purpose:

The regulations at 10 CSR 20-7.015(9)(D)7 include effluent monitoring requirements for point sources discharging nitrogen and phosphorus to waters of the state. The inclusion of monitoring requirements for point sources that have a design capacity of greater than 100,000 gallons per day occurs during the renewal of National Pollutant Discharge Elimination System state operating permits. The department renews these permits on a rotating watershed basis, which depending on the watershed remain in effect no more than five years. Therefore, the nutrient monitoring requirements of 10 CSR 20-7.015(9)(D)7 may not be fully implemented in the state until March 2019 or five years after the regulation's effective date. According to the Missouri Nutrient Loss Reduction Strategy (NLRS), "Additional steps could be taken to expedite the collection of effluent monitoring data and to more rapidly reduce nutrient loadings from point sources. This paper outlines the implementation of a voluntary early nutrient monitoring program for all publicly-owned treatment works (POTWs) and all industrial storm water and wastewater treatment facilities that are designed and permitted to discharge greater than or equal to 100,000 gallons per day. Under this procedure facilities may voluntarily agree to monitor when and where appropriate to enhance available data related to nutrient loadings for this group of point sources as recommended in the NLRS.

2. Monitoring:

For the first three years of the NLRS implementation, following monitoring would occur on a voluntary basis:

- a. 1- Publicly-owned treatment works (POTWs) and industrial storm water or wastewater discharges (facilities) with design flow capacity between 0.1 million gallon per day (MGD) and 1 MGD conduct **quarterly** monitoring of total nitrogen (TN) that must include sampling for total kjeldahl nitrogen (TKN), ammonia, nitrate-nitrites and total phosphorus (TP);

2- POTWs and industrial storm water or wastewater discharges with design flow capacity greater than or equal to (\geq) 1 MGD conduct **monthly** monitoring of total nitrogen (TN) which must include sampling for total kjeldahl nitrogen (TKN), ammonia, nitrate-nitrites and TP.
- b. In addition, POTWs and industrial storm water or wastewater discharges may elect, depending on the receiving stream, to conduct instream sampling upstream and downstream of the outfall for TN (TKN, ammonia, nitrate-nitrates), TP and instream flow at a frequency no less than the effluent sampling for TN and TP. Instream flow

should be collected using a procedure specified in the Voluntary Early Nutrient Monitoring Program letter or the department's Environmental Services Program Standard Operating Procedure for *Flow Measurements in Open Channels* (Appendix A) <http://n-nr1.nra.ads.state.mo.us/env/esp/SOP/eer-fss-sop/documents/MDNR-ESP-113.pdf>. Facilities volunteering to conduct the nutrient monitoring can choose a specific site upstream and downstream of their discharge outfall for easy access, but once chosen, it should remain fixed for consistency.

- c. **Data Quality:** The facility's Quality Control Procedures should be followed. Many facilities have procedures that ensure, for instance, sampling meters are calibrated and proper sampling methods are followed. The department also expects that, according to Standard Condition, Part 1: "The analytical and sampling methods used shall conform to the reference methods listed in 10 CSR 20-7.015 unless alternates are approved by the Department. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants." Because the department has no established nutrient criteria for streams, we recommend that the sampling method be sensitive enough to detect 0.25 mg/L, TP and 4 mg/L, TN. EPA approved methods (40 CFR Part 136): TKN – EPA Method 350.1 – MDL = 0.05 mg/L, Ammonia as N – EPA Method 350.1 – MDL = 0.03 mg/L, Nitrate as N – EPA Method 353.2 – MDL = 0.01 mg/L, Nitrite as N – EPA Method 353.2 – MDL = 0.01 mg/L, and Total Phosphorus – EPA Method 365.4 – MDL = 0.01 mg/L. Reference: DNR, Environmental Services Program list of their current MDLs (2014).

Note: The following are monitoring specifications and frequencies that are in addition to the monitoring requirements of your effective permit. Data collected for the purposes of permit compliance can be used as part of the Voluntary Nutrient Monitoring Program where applicable.

3. Reporting:

Facilities will submit the voluntary early nutrient monitoring effluent and instream monitoring data as part of their normal discharge monitoring report (DMR) and according to Standard Conditions for NPDES Permit, Part 1. The Voluntary Early Nutrient Monitoring Program Acceptance Letter (see below) will provide a separate DMR form for voluntary monitoring. The effluent DMR form will have a total of five parameters, TKN, ammonia, nitrate, nitrite, and total phosphorus and the instream sampling DMR will have the same five parameters, plus upstream flow monitoring. Those facilities that are using eDMR for reporting should continue using this electronic format.

The following are instructions that permit writers will use when setting up permitted features in the Missouri Clean Water Information System (MOCWIS) for participants of the Voluntary

Early Nutrient Monitoring Program. The effluent monitoring limit set will have a total of six parameters, TN, TKN, ammonia, nitrate, nitrite, and total phosphorus (Note: $TN = TKN + \text{nitrate} + \text{nitrite}$).

- a. MOCWIS data entry steps for effluent monitoring data are:
 - i. Conduct a “permit modification” in MOCWIS by following standard procedures to create a modified permit in MOCWIS. (If the MS Word version of the NPDES permit is modified, then the permit record in MOCWIS will need to be modified);
 - ii. Access “Limit Set” page;
 - iii. Use the primary outfall (typically 001) and create a new “Limit Set Designator” by calling it “001 – V;”
 - iv. Check the “Unscheduled” box;
 - v. Complete the “Initial Monitoring Period Date” - following standard procedures;
 - vi. Complete the “Initial DMR Due Date” - following standard procedures;
 - vii. Complete “DMR Reporting Frequency” – input “1” (Always “one” regardless of the sampling frequency);
 - viii. Leave “DMR Submission Frequency” – blank;
 - ix. Complete “Limit Detail” page (i.e., Parameter page) - following standard procedures;
 - x. Issue the modified permit.
- b. The MOCWIS procedure for instream data entry is similar to effluent data except the outfall identification is SM1 and SM2. The instream monitoring limit sets will have a total of seven parameters, TN, TKN, ammonia, nitrate, nitrite, total phosphorus, plus instream flow (Note: $TN = TKN + \text{nitrate} + \text{nitrite}$).

4. Voluntary Early Nutrient Monitoring Program Acceptance Letter:

- a. A participation solicitation letter will be sent to all facilities that have outfalls that discharge greater than 100,000 gallons per day for the Voluntary Early Nutrient Monitoring Program.
- b. A form permittee response letter will be attached to the solicitation letter that the permittee can fill out and return to the department containing:
 - i. Facility identification information, i.e., permit number, outfall # and design flow that can easily be matched with MOCWIS.
 - ii. Agreement to sample at frequency of once per month for those greater than 1 MGD and quarterly for those less than 1 MGD but greater than 100,000 GPD.
 - iii. Agreement to start sampling one month after our receipt of the acceptance letter and continue sampling until renewal.
 - iv. If facility elects to sample upstream and downstream of the facility outfall that will be sampled for TP and TN (TKN, ammonia, nitrate-nitrates), UTM

coordinates of fixed monitoring stations must be provided. If instream flow can be sampled at a fixed station, the department will request that a flow meter approved by ESP be used to measure instream flow. Instream flow need only be sampled upstream of the facility. Downstream flow can be calculated as the combine effluent flow and upstream flow.

- v. Sample methods for each parameter.

5. Analyses, Reporting and Data Uses:

As the department builds a nutrient monitoring dataset, more holistic approaches to managing the nutrients will emerge that will aid the department in achieving reduction goals set by the NLRs. After an adequate data set is established, an analysis of the available nutrient effluent monitoring data will be completed in order to estimate: 1) the aggregate nutrient concentrations and loadings (where possible) from different classes of point sources (municipal and industrial) by design flow capacity; and 2) the aggregate point source nutrient loadings per watershed or major tributary to a significant river. In addition, individual effluent monitoring data may be used to estimate its relative nutrient loading contribution to the watershed. Individual species of total nitrogen can be used for wastewater infrastructure planning.

This information could be assembled into a report for public use and comment.

Instream sampling information could aid in planning and fate and transport identification as well as:

- a. Upstream monitoring data can be used to estimate relative upstream contribution to instream nutrient loading above a specified outfall as well as potentially calculating effluent concentrations to meet downstream targets using a steady state modeling approach.
- b. Downstream monitoring data can be used to estimate efficiency of proposed treatment and fate and transport of nutrients after a discharge.
- c. This instream monitoring data can potentially be compared to data collected by the department at locations in the watershed or stream network.
- d. Other uses yet to be determined.

Appendix A

[MDNR – ESP -113]

Flow Measurements in Open Channels <http://n-nr1ntra.ads.state.mo.us/env/esp/SOP/eer-fss-sop/documents/MDNR-ESP-113.pdf>

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