United States
Environmental Protection Agency

Office of Water
Washington, DC

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National Pollutant Discharge Elimination System (NPDES) Permit Quality Review (PQR) Nutrient Programmatic Questions Checklist Companion

This guidance was developed by staff within the U.S. Environmental Protection Agency's (EPA's) Office of Wastewater Management and addresses development of wastewater discharge permits under the National Pollutant Discharge Elimination System (NPDES). NPDES permit development is governed by existing requirements of the Clean Water Act (CWA) and the EPA NPDES implementing regulations. CWA provisions and regulations contain legally binding requirements. This document does not substitute for those provisions or regulations. Recommendations in this guidance are not binding; the permitting authority may consider other approaches consistent with the CWA and EPA regulations. When EPA makes a permitting decision, it will make each decision on a case-by-case basis and will be guided by the applicable requirements of the CWA and implementing regulations, taking into account comments and information presented at that time by interested persons regarding the appropriateness of applying these recommendations to the situation. This guidance incorporates, and does not modify, existing EPA policy and guidance on developing NPDES permits.
EPA may change this guidance in the future.

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Nutrient Programmatic Checklist Companion

Nutrient pollution occurs when too much nitrogen and phosphorus enter the environment from a wide range of human activities. The effects of nutrient pollution are diverse and far-reaching and include changes in chemical and physical characteristics of a water body such as lower dissolved oxygen concentrations and hypoxia, changes in aquatic habitat and food sources, such as excess algae in the water column blocking sunlight needed by submerged aquatic plants, toxicity to aquatic life and wildlife, such as from the direct toxic effects of some forms of nitrogen or from toxic algal blooms, impacts on public health, such as from seafood contamination or direct exposure to algal toxins, and economic impacts, such as the costs of commercial fishery losses and lost recreational opportunities or the cost of drinking additional water treatment. Effects from nutrient enrichment can be observed at and beyond the immediate receiving waters. Proper nutrient permitting assures the attainment and maintenance of water body uses susceptible to nutrient-related impacts.

This section of the checklist provides an evaluation of nutrient-based water quality standards.

1. Has the state adopted water quality criteria for nutrients?

Nutrients are implemented through numeric criteria for causal variables (i.e., nitrogen and phosphorus), through numeric criteria for response variables (e.g., chlorophyll a, DO, clarity) and through narrative criteria.

The reviewer should consult records or the applicable/relevant state website to determine if nutrient-related criteria have been adopted into state WQS. The intent of this question is to determine whether or not the state has adopted nutrient-related water quality standards pursuant to the Clean Water Act goals. State WQS nutrient-related criteria may be either numeric-based causal criteria or response-based criteria. If nutrient-related criteria have not been adopted into state WQS, the reviewer should identify any progress made towards the development of such criteria.

a) Nitrogen (as… N, nitrate, etc.)?

Nitrogen in a water body can cycle among various forms. Thus, nitrogen pollution generally is measured in terms of total nitrogen when we are looking at the impacts caused by the indirect effects of nutrient over-enrichment in surface waters (e.g., intensive growth of algae leading to reduced sunlight penetrating the water, decreased amount of oxygen dissolved in the water, and unaesthetic or potentially toxic conditions that could impair water supply and recreational uses).

A few states have developed numeric criteria for total nitrogen to address accelerated eutrophication. Keep in mind that some forms of nitrogen (e.g., unionized ammonia, nitrate) have direct toxic or human health effects. Generally, states already have water quality criteria for these forms of nitrogen and have developed permitting procedures to address their direct impact on water quality and attainment of designated uses.

Enter Y or N to indicate whether the state has adopted water quality criteria for nitrogen.

I. Numeric?

Numeric standards related to nitrogen include:

- Total Nitrogen (TN)
- Total Kjeldahl Nitrogen (TKN),
- Dissolved Inorganic Nitrogen (DIN)
- Nitrates

- Nitrites

Enter Y or N to indicate whether the state has adopted numeric water quality criteria for nitrogen.

1. *If yes, what is it?*

Provide the numeric criterion/criteria, along with any other information about specific forms of nitrogen, averaging periods, and associated flows.

II. Narrative

Narrative criteria related to nutrient pollution may include, but are not limited to submerged aquatic vegetation, nuisance algae, clarity/Secchi depth, and eutrophication. Examples of nutrient-related narrative criteria include:

- Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths that impair designated beneficial uses.
- No nitrogen or phosphorus in amounts that will result in growths of algae, weeds, and slimes that will prevent waters from attaining their best beneficial uses.
- For lakes, human actions considered cumulatively may not decrease the dissolved oxygen concentration more than 0.2 mg/L below natural condition.
- Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth.

In the absence of nutrient specific criteria, more generic narrative criteria may be used for nutrient permitting. Examples of these types of criteria include:

- Free froms, including color, odor, slime, floating materials, etc.
- change in trophic state
- imbalance of flora or fauna
- Protection of existing and designated uses (propagation of fish, shellfish, wildlife; recreation; potability/palatability)
- Free from substances in amounts or combinations that settle to create a nuisance

The reviewer should identify what the applicable nutrient related standards are for the state and record necessary information for use later when reviewing individual permit limits. Enough information should be recorded in order to assess whether the permitting authority has developed limits that are consisting with nutrient related WQS including, if the criteria is statewide, or if it only applies to particular segments, or water bodies. If the criteria are site specific, there may be multiple WQS that apply under different conditions, times of year and/or water body type.

Enter Y or N to indicate whether the state has narrative water quality criteria for nutrients.

1. *If yes, do the standards or other state-related rules/policies provide translation procedures to a numeric expression?*

Enter Y or N to indicate whether the standard or other state-related rules/policies provide translation procedures to a numeric expression for nitrogen and include the information in the comments section for

this question. Include information as to whether the permits were issued using a TMDL or without the benefit of a TMDL.

b) Phosphorus (as… P, other)?

Phosphorus in a water body can cycle among various forms. Thus, phosphorus pollution generally is measured in terms of total phosphorus when we are looking at the impacts caused by the indirect effects of nutrient over-enrichment in surface waters.

Enter Y or N to indicate whether the state has adopted water quality criteria for phosphorus.

I. Numeric?

Numeric standards related to phosphorus include:

- Phosphorus (total, elemental, dissolved, ortho-)
- Phosphate (total, elemental, dissolved, ortho-)

Enter Y or N to indicate whether the state has adopted numeric water quality criteria for phosphorus.

1. If yes, what is it?

Provide the numeric criterion/criteria, along with any other information about specific forms of phosphorus, averaging periods, and associated flows.

II. Narrative

Please see a) I. above for a discussion of narrative water quality criteria.

Enter Y or N to indicate whether the state has narrative water quality criteria for that are specific to phosphorus. Otherwise, the information in a) I. is sufficient.

1. If yes, do the standards or other state-related rules/policies provide translation procedures to a numeric expression?

Enter Y or N to indicate whether the standard or other state-related rules/policies provide translation procedures to a numeric expression for phosphorus and include the information in the comments section for this question.

c) Response variable or biological impacts? (e.g. chlorophyll a, clarity, DO, SAV, algae formation, etc.)

Some water quality standards include numeric criteria for response variables rather than, or in addition to, numeric criteria for nitrogen and phosphorus. Response variable criteria focus on the underlying water quality concerns. For example, they might address dissolved oxygen concentration, turbidity, or chlorophyll a concentration. However, permit writers have to translate these response variables to total phosphorus and total nitrogen to use these response variable criteria in NPDES permitting.

The permit writer needs to have some mechanism or procedure for relating response variables to a nutrient load or concentration. For example, if the response variable criterion for a lake is a growing season mean chlorophyll a concentration of 10 µg/L, developing effluent limitations for nutrients requires determining the target ambient nutrient concentrations that will ensure that the mean chlorophyll a concentration criterion is maintained. That nutrient concentration then could be used to develop effluent limitations. Alternatively, the

regulatory authority could determine the overall nutrient loading that will ensure that the criterion is achieved and then apportion that loading among the various sources of nutrient loadings to the lake, including upstream sources if applicable.

Enter Y or N to indicate whether the state has adopted water quality criteria for response variables.

I. Numeric?

Enter Y or N to indicate whether the state has adopted numeric water quality criteria for any response variable(s).

1. If yes, what is it?

Provide the numeric criterion/criteria, along with any other information about the response variables, averaging periods, and associated flows.

II. Narrative (e.g., "no nuisance species, no substances that produce undesirable effects/ eutrophic conditions, etc.")?

Please see a) I. above for a discussion of narrative water quality criteria.

Narrative criteria that apply to response variables include:

- no nuisance species
- no substances that produce undesirable effects/ eutrophic conditions

Enter Y or N to indicate whether the state has narrative water quality criteria for that are specific to response variables. Otherwise, the information in a) I. is sufficient.

1. If yes, do the standards or other state-related rules/policies provide translation procedures to a numeric expression?

Enter Y or N to indicate whether the standard or other state-related rules/policies provide translation procedures to a numeric expression for a response variable or biological impacts, and include the information in the comments section for this question.

d) If the state has not adopted water quality criteria for nutrients, what is the status of any state program for managing nutrients? Describe:

If a state does not have specific water quality criteria for nutrients, the state might have a policy or state program for managing nutrients.

The reviewer would describe any programs here.

2. Has the state adopted implementation procedures specific to nutrient-based permitting?

The reviewer should identify if the state has written implementation procedures for NPDES permitting for nutrients. The permit should reference applicable permitting regulations, policy, and guidance for the approved water quality-based permitting procedures in their state. If state implementation procedures have not been adopted, the state should reference EPA's NPDES Permit Writers' Manual, which provides Water Quality Standards implementation procedures. In addition, if applicable, the reviewer should note whether the state has adopted implementation strategies related to reducing nitrogen and phosphorus. This was outlined as one of the framework elements in the Nancy Stoner memorandum to the Regional

Administrators from March 16, 2011*, Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions.*

Enter Y or N to indicate whether the state has adopted implementation procedures specific to nutrient-based permitting and include details in the comments section. Include any information about how the implementation procedures for nutrients differ from procedures for other pollutants (e.g., toxics).