pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Clean Water

Standard Operating Procedure (SOP)[1] for Clean Water Program
Implementing General Water Quality Criteria
SOP No. BCW-PMT-035
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Version 1.0

This SOP describes the procedures by which application managers will determine whether NPDES permit conditions should be established to achieve the general water quality criteria contained in 25 Pa. Code § 93.6. It presents the general sequence of activities that application managers will undertake, with coordination as required with regional Water Quality Specialists and other DEP staff, to establish whether exceedances of general water quality criteria are occurring and appropriate remedial permit conditions are needed. These remedial permit conditions may include Part A numeric effluent limits, other treatment requirements, changes to operational practices, or best management practices.

Since general water quality criteria may be subjective and exceedances of general water quality criteria may manifest through many different scenarios, the remedial measures and permit conditions identified in this SOP are not exhaustive and application managers may need to consider remedial measures and permit conditions not specifically identified in this SOP. This SOP applies to all NPDES permits issued by the Clean Water Program, including general permit coverage. Facilities with general permit coverage may need to be required to obtain individual NPDES permit coverage in order to facilitate remedial permit conditions. With respect to Color, this SOP also describes the process through which the specific water quality criterion for color contained in 25 Pa. Code § 93.7 should be implemented.

I. General Water Quality Criteria

The following general water quality criteria are addressed in this SOP:

A. The discharge of floating materials, scum, sheen or substances that result in deposits in the receiving water. (25 Pa. Code § 92a.41(c))

B. The discharge of foam, oil, grease, or substances that produce an observable change in the color, taste, odor, or turbidity of the receiving water. (25 Pa. Code § 92a.41(c))

C. The discharge of oil or grease that produces a film or sheen upon or discoloration of the receiving water or adjoining shoreline. (25 Pa. Code § 95.2(2)(i))

D. The discharge of any substance in concentrations or amounts sufficient to be inimical or harmful to protected water uses or to human, animal, plant or aquatic life. Protected water uses are described at 25 Pa. Code §§ 93.3 and 93.4. (25 Pa. Code § 93.6(a))

NOTE – General water quality criteria must be achieved at all times at design conditions (25 Pa. Code § 96.3 (c)), and any instance of one or more of the conditions described above constitutes an exceedance of general water quality criteria. However, if DEP determines that the

[1] **DISCLAIMER**: The process and procedures outlined in this SOP are intended to supplement existing requirements. Nothing in the SOP shall affect regulatory requirements. The process, procedures and interpretations herein are not an adjudication or a regulation. There is no intent on the part of DEP to give the rules in this SOP that weight or deference. This document establishes the framework within which DEP will exercise its administrative discretion in the future. DEP reserves the discretion to deviate from this policy statement if circumstances warrant.

exceedance was the result of an unusual event not representative of design conditions, such as a flood or one-time operational upset or equipment failure, remedial permit conditions may not be required. The determination of whether remedial permit conditions are appropriate is independent of any determination related to appropriate enforcement actions.

NOTE – Determinations related to general water quality criteria may involve field assessments. Field assessments may be performed by application managers or other regional staff including Water Quality Specialists whose normal duties comprise facility inspections. The application manager will be responsible to make the determination as to whether a discharge is causing an exceedance of general water quality criteria, considering the input of other regional staff and the public, as applicable.

II. Exceedances of General Water Quality Criteria

If one or more of the following conditions exists, proceed to the corresponding section in this SOP:

A. Color in effluent reported on the permit application, DMRs, or other reliable source is greater than 75 Pt-Co color units (see Section III).

B. Based on direct observation from any source including DEP staff or the public, one or more of the following conditions may exist:

1. Discharge causes a color plume in receiving water, or changes the color of the receiving surface water to a perceptible degree (see Section III).

2. Discharge contains floating solid materials (see Section IV).

3. Discharge contains scum or sheen, or produces a film, sheen, or discoloration in the receiving surface water, rocks, adjoining shoreline, or any other substrate contained in or adjacent to the surface water (see Section V).

4. Discharge causes solid deposits in receiving stream, including the area in the immediate vicinity of the discharge (see Section VI).

5. Discharge contains or produces floating foam that persists beyond the immediate vicinity of the discharge (see Section VII).

6. Discharge produces odiferous or other organoleptic conditions that are reported as objectionable, either in the immediate vicinity of the discharge or at downstream potable water supplies (see Section VIII).

III. Color

A. Perform a PENTOXSD analysis to determine whether effluent limits or monitoring for Color is appropriate. Effluent limits designed to achieve the 75 Pt-Co specific criterion for Color should eliminate any exceedance of general water quality criteria for color in most or all cases. If PENTOXSD analysis is not feasible (e.g., no design flow), proceed to paragraph III.B.

1. Add the parameter “Color (Pt-Co units)” to PENTOXSD, with a Threshold Human Health (THH) value of 75. Save the new parameter.

2. Model Color and determine reasonable potential consistent with SOP No. BPNPSM-PMT-032, *Establishing Effluent Limitations for Individual Industrial Permits*, for a non-conservative pollutant. Establish effluent limits or monitoring for Color as appropriate.

   NOTE – Unless site-specific data are available, use 10 Pt-Co as an initial background value (Tributary Concentration) in the PENTOXSD analysis. If effluent limits for Color are required based on the PENTOXSD analysis, upstream sampling of Color targeting dry, low-flow conditions is recommended in order to confirm the default assumption of 10 Pt-Co.

3. If based on the reasonable potential analysis, effluent limits for Color are determined to be necessary establish effluent limits or monitoring and, proceed to paragraph III.B. If Color is an issue based on direct observation of a Color plume or effect as described in paragraph II.B.1, proceed to paragraph III.B for all cases.

NOTE – Platinum-Cobalt (Pt-Co) color units are commonly used to measure pollution levels in effluent and surface waters. The Pt-Co scale is designed to measure color hues (yellow-brown) typical of natural colors, and should be appropriate for many point sources including paper and pulp operations, landfill leachate, and leather tanning. The Pt-Co scale, however, is not designed to measure colors in certain highly colored industrial wastes, for example, synthetic dyes or inks in the effluent of a textile operation. The American Dye Manufacturer's Institute (ADMI) color scale, with units expressed in ADMI color units, is designed to measure color in industrial effluent having color characteristics significantly different from Pt-Co standards, as well as to waters and wastewaters similar in hue to the Pt-Co standards. The ADMI color scale is an option in NPDES permitting but it should be used only when necessary.

NOTE – With regard to the PENTOXSD analysis and compliance with the 75 Pt-Co specific criterion, all effluent and surface water Color samples and effluent limits should be measured and expressed as true Color and not apparent Color.

B. Perform a field assessment of the effect of the discharge on the receiving water to determine whether the discharge causes a Color plume in the receiving water, or changes the Color of the receiving water, to a perceptible degree that may constitute an exceedance of general water quality criteria.

1. Field assessments may be performed at any time, but one or more field assessments should be performed during normal facility operations and targeting dry weather, low-flow conditions in the receiving stream before concluding that there is no exceedance of general water quality criteria. If effluent limits for Color have been established based on a PENTOXSD analysis or other basis, one or more field assessments should be performed after the final effluent limits are effective in the permit.

2. Take photographs of upstream conditions, the discharge outfall and immediately adjacent surface waters, the receiving stream immediately downstream of the discharge, and successive points downstream at estimated downstream distances. These should include 100 feet downstream and 1,000 feet downstream, if feasible. These pictures will document the Color condition and should be added to the fact sheet.

3. Determine whether the effect of the discharge on the receiving water constitutes an exceedance of general water quality criteria. Consider these general acceptance parameters when making this determination:

   a. The effluent may be a noticeably different Color than the receiving water, as this does not in itself constitute an exceedance of general water quality criteria. It is the effect of the discharge on the receiving water that is the concern.

b. After complete mixing with the receiving water, the receiving water downstream should look largely unchanged with regard to Color as the receiving water upstream of the discharge. If complete mixing does not occur within a reasonable distance downstream, the plume should be evaluated as outlined in paragraph c. below.

c. Prior to the point of complete mix, a persistent plume of noticeably different color than the receiving water may reasonably be considered as an exceedance of general water quality criteria. In general, color plumes are not persistent if they extend 100 feet or less from the discharge point, and plumes are persistent if they extend 1,000 feet or more from the discharge. If feasible and using best professional judgment, between 100 and 1,000 feet of the discharge determine whether the Color effect on the receiving stream is perceptible and therefore an exceedance of general water quality criteria, especially considering any complaints or other input from the public that may have been received.

d. If the effluent is <u>less</u> colored than the receiving water, there is no potential for an exceedance of general water quality criteria regardless of any localized plume or effect on the color of the receiving water.

e. The results of any field assessment should be documented in the fact sheet, including photographs as applicable. Multiple field assessments may be considered if there is any doubt regarding whether design, worst-case conditions have been assessed.

4. If based on the field assessment there is no exceedance of general water quality criteria, no additional permit conditions are needed. If based on the field assessment there is an exceedance of general water quality criteria, proceed to paragraph 5 below.

5. If effluent limits targeting compliance with the 75 Pt-Co specific water quality criterion in 25 Pa. Code § 93.7 have not already been implemented, then those effluent limits should be developed and established in the permit. This may be performed using PENTOXSD as described above or another appropriate method. If following establishment of those effluents limits or if the analysis did not result in effluent limits, and based on one or more subsequent field assessments there continue to be exceedances of general water quality criteria, proceed to paragraph 6 below.

6. Effluent limits should be established or made more stringent. In general, an iterative approach is recommended, with progressively more stringent effluent limits being established until the color impact on the receiving water is reduced to the extent needed to achieve the general water quality criteria at all times at design conditions. Consider the following options and contingencies:

   a. If suspended solids in the effluent may be contributing significantly to Color, both the apparent and the true Color of the effluent should be measured to establish the relationship between the two quantities. Effluent where suspended solids are contributing significantly to Color should be highly treatable as required.

   b. Consider the use of the ADMI color scale (as described earlier) for wastewaters that may exhibit Color hues significantly different than the characteristic yellow-brown of the Pt-Co color scale. This may help establish the relationship between the Color of the discharge and the effect on the receiving water and provide a rational basis for effluent limits expressed in ADMI color units.

   c. Consider any increased treatment options that may be proposed by the permittee. Treatment options for Color removal include chemical coagulation, activated carbon, and chemical oxidation including chlorination. Chemical precipitation of iron and manganese, if present, may mitigate Color issues.

NOTE – If compliance with general water quality criteria is achieved through increased treatment, establish effluent limits expressed in color units based on the monitored Color of the discharge following implementation of the increased treatment.

d. In any iterative approach, effluent limits expressed in color units should be made more stringent by at least 10% to ensure a reasonable chance of achieving general water quality criteria. If the Color plume or effect on the stream is severe and obvious, however, effluent limits should be made iteratively more stringent in proportion to the observed Color effect.

NOTE – A temporary exceedance of general water quality criteria may persist while an iterative approach is being implemented, and this does not in itself constitute a violation of permit conditions so long as the permit contains numeric effluent limits for Color. In all cases, however, effluent limits must be made more stringent until the general water quality criteria for Color are achieved.

e. Consideration may be given by the application manager to the establishment of upstream and downstream (relative to the discharge) monitoring location(s) and sampling requirements for Color in the NPDES permit to evaluate compliance with the numeric water quality standard. If feasible and using best professional judgment, downstream monitoring location(s) should generally be between 100 and 1,000 feet downstream of the discharge. The presence of additional downstream flow through tributaries or other discharges would be a consideration for the monitoring location.

IV. Floating Solid Materials

Perform one or more field assessments to determine whether the discharge contains floating solid materials. Floating solid materials are specifically prohibited and there should be essentially no floating solid materials contained in a discharge.

A. Field assessments may be performed at any time, but one or more field assessments should be performed during normal facility operations and targeting dry weather, low-flow conditions in the receiving stream before concluding that there is no exceedance of general water quality criteria.

B. If feasible, use a skimmer or otherwise collect floating solid materials in a sample container. Take photographs of floating solid materials in the discharge or in any collection device. If floating solid materials are observed, proceed to paragraph IV.C. If floating solid materials are not observed, document the finding in the fact sheet.

C. Consider these factors when developing remedial measures:

1. In general, issues with floating solid materials in effluent are not addressable using effluent limits.

2. Floating solid materials in effluent is most commonly the result of poor clarifier performance. If clarifiers are not present, they may be needed.

3. If clarifiers are present, they may be overloaded, poorly maintained, or have some other operational issue. As a first best option, consider securing the assistance of DEP operations staff to assist the permittee with an assessment of clarifier performance. Remedial permit conditions may not be needed if a poor condition at the facility can be corrected.

V. Sheen, Scum, Film, or Discoloration

Perform one or more field assessments to determine whether the discharge contains sheen or scum, or produces a film, sheen, or discoloration in the receiving surface water, rocks, adjoining shoreline, or any other substrate contained in or adjacent to the surface water. These conditions are specifically prohibited and inherently constitute an exceedance of general water quality criteria.

A. Field assessments may be performed at any time, but one or more field assessments should be performed during normal facility operations and targeting dry weather, low-flow conditions in the receiving stream before concluding that there is no exceedance of general water quality criteria.

B. Consider the nature of the facility and examine permit application data to assess whether the discharge may contain Oil and Grease. If the issue may be related to Oil and Grease, establish the 25 Pa. Code § 95.2 treatment requirement of 15 mg/L average and 30 mg/L maximum as a Part A effluent limit. This limit may be made more stringent as required to eliminate the exceedance of general water quality criteria.

C. If the issue may be related to poor clarifier performance, consider the measures described in Section IV for floating solid materials.

D. Otherwise the application manager should consider all available data to assess whether certain organics or metals have not been adequately addressed in the permit. Ensure that pH control is consistent and within allowable limits. The goal should be to identify the offending parameters and establish appropriate effluent limits using PENTOXSD or other appropriate process.

VI. Solid Deposits

Perform one or more field assessments to determine whether the discharge has caused solid deposits in the receiving water. Solid deposits in any area of the receiving water are specifically prohibited and inherently constitute an exceedance of general water quality criteria.

A. Field assessments may be performed at any time, but one or more field assessment should be performed during normal facility operations and targeting dry weather, low-flow conditions in the receiving stream before concluding that there is no exceedance of general water quality criteria.

B. Photograph the deposits to document the condition.

C. If feasible, take one or more samples of the deposits.

1. Soft deposits are likely temporary related to poor control of Total Suspended Solids (TSS) in the discharge, a condition that may only occur during certain adverse operational conditions. New or more stringent effluent limits or other permit conditions controlling TSS in the discharge should be considered, including increased frequency of monitoring and composite sampling if not already applicable in the permit. Alternatively, the application manager may secure the assistance of DEP operations staff to assist the permittee with an assessment of operational issues contributing to the problem. Remedial permit conditions may not be needed if poor operational conditions or practices at the facility can be corrected.

2. Hard deposits are likely persistent and related to poor control of inorganic settleable solids, including solids associated with chemical precipitation treatment processes. Precipitated solids may be depositing in the surface water instead of in treatment vessels. Remedial permit conditions should include effluent limits that target the metal or metals that are part of the deposited compound.

VII. Foam

Perform one or more field assessments to determine whether the discharge causes persistent floating foam in the receiving water. Consider these general acceptance parameters when making this determination:

A. Incidental foaming caused by the discharge in the immediate vicinity of the outfall does not constitute an exceedance of general water quality criteria, but persistent floating foam in the receiving water does constitute an exceedance of general water quality criteria.

B. Floating foam is not persistent if it dissipates 100 feet or less from the discharge point. In general, floating foam should not persist beyond 100 feet or more from the discharge.

C. Consider securing the assistance of DEP operations staff to assist the permittee with an assessment of operational issues that may be contributing to the excessive foaming. Failing that, remedial actions or permit conditions may include the use of defoaming agents.

VIII. Taste and Odor

Water may not contain substances attributable to point or nonpoint source discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life. (25 Pa. Code § 93.6(a))

A. Regarding taste and odor issues, the inimical effect is likely to manifest at downstream potable water supplies. A wide range of objectionable conditions may manifest, such that a site-specific evaluation is recommended. The application manager, with the assistance of drinking water and other DEP staff as applicable, should assess the nature of the effect on taste and odor at the potable water supply and determine if it is potentially attributable to one or more point source discharges.

B. Potable water supply (PWS) is a protected use. If a discharge causes an inimical effect on taste or odor at a downstream affected potable water supply, and the water treatment plant already uses conventional treatment as defined in Chapter 93, the discharger is responsible to remove the offending substance to concentrations or levels that do not cause inimical downstream taste and odor effects. Treatment at the source of the discharge, therefore, generally is the appropriate approach.

C. General water quality criteria apply only to odor issues that are associated with the discharge. Odor issues related to the facility more generally, including treatment reactors, are not related to general water quality criteria and generally are not addressable through NPDES permit conditions.

Version History

Date	Version	Revision Reason
2/15/2017	1.0	Original