Thermal Discharge Issue

In 2010, the Environmental Protection Agency (EPA) began objecting to permits with temperature limits that exceeded the segment criteria. At that time, the Texas Commission on Environmental Quality (TCEQ) began negotiations with the EPA to develop a strategy to address thermal discharges in Texas. The TCEQ and the EPA recently agreed that TCEQ will develop screening procedures to develop thermal limits in Texas Pollutant Discharge Elimination System (TPDES) permits to address this issue. Concurrently, and over a more extended time frame, the TCEQ will evaluate existing temperature criteria.

Water Quality Standards

The 2010 TSWQS contain two types of temperature criteria for surface waters: 1) a site-specific maximum temperature, and 2) limits on temperature increases above ambient conditions. Generally, maximum temperatures for classified segments range from 80 ^{o}F to 95 ^{o}F. Criteria for the allowable rise over ambient criteria range from 1.5 ^{o}F to 5 ^{o}F depending on water body type and season, and are established for classified segments and unclassified water bodies. Temperature criteria are assessed for attainment using measurements taken at the surface of water bodies, and the criteria are applicable on an instantaneous basis. Texas provides exceptions to these criteria for areas within designated mixing zones, measurements taken below critical low-flows in streams and rivers, certain cooling water impoundments, for temperature elevations due to municipal discharges, and for industrial facilities discharging stormwater runoff only.

In 2014, the TSWQS were revised to include the addition of industrial cooling water areas and revisions to mixing zone provisions to facilitate implementation of thermal water quality standards in wastewater permitting. Although adopted by TCEQ on February 12, 2014, these provisions must be approved by EPA prior to use in Clean Water Act activities such as wastewater permitting.

Temperature is also closely tied to dissolved oxygen (DO) levels in receiving waters and is a key parameter when performing DO modeling. Warmer water has less potential to absorb and hold DO than cooler water, and chemical reactions that consume oxygen accelerate as temperature is increased. Therefore, accurate estimation of temperature can be important when modeling wastewater streams containing significant levels of oxygen-demanding constituents such as BOD5 and ammonia-nitrogen or when trying to assess potentially low DO due to thermal discharges. TCEQ modelers have historically used statistically derived temperatures developed from past measurements for DO modeling.

Initial Concepts for Screening Procedures to Support TPDES Permitting of Thermal Discharges

Screening Procedure Concepts/Objectives

The primary objective of developing screening procedures for thermal discharges is to ensure that TPDES permits issued for discharges with elevated temperatures comply with the TSWQS. To achieve this goal as efficiently as possible, analytical procedures need to be technically valid while striving to minimize unnecessary complexity. One option to consider for accomplishing this is through a risk-based screening approach that accounts for the sensitivity of the receiving waters to thermal loads and the character of the thermal loads being discharged. One approach to trigger discussion is the establishment of categories of discharge and/or associated receiving waters representing levels of risk that can be separated into tiers with different screening procedures assigned to the individual levels. An example of this concept is presented below.

Level I: Low risk water bodies/discharges *(need stakeholder input on levels/risk characterization/applicability)*

This level could include cases exempt from further detailed analytical screening. Examples might include:

- Intermittent streams with minimal aquatic life use assignment
- Discharges to industrial cooling water impoundments
- Discharges that are less than 10% effluent at the edge of the thermal mixing zone (MZ)
- Discharges that are less than 5° F warmer than ambient (freshwater Lakes) or 3°F warmer than ambient (freshwater streams)
- Other cases?

Level IIa: Moderate risk water bodies/discharges *(need stakeholder input on levels/risk characterization/applicability)*

This level could include cases amenable to screening with simple mass balance methods. Examples might include:

- Discharges constituting ≥ 10% effluent, but less than 50% effluent at the edge of the thermal MZ
- Small discharges to perennial streams and rivers
- Other cases?

Level IIb: Moderate risk water bodies/discharges *(need stakeholder input on level/risk characterization/applicability)*

This level could include cases amenable to simplified numerical modeling techniques. Examples might include:

- Discharges constituting ≥ 50% ambient flow into environments where standardized modeling protocols can be readily developed
- Discharges with MZs large enough that significant temperature moderation can occur before reaching the edge
- Environments with multiple thermal discharges in close proximity
- Discharges into an "industrial cooling water area" that are amenable to simplified modeling, which may include and go beyond a mass balance approach
- Other cases?

Level III: High risk water bodies/discharges *(need stakeholder input on levels/risk characterization/applicability)*

This level could include large thermal discharges into complex environments requiring sophisticated site-specific numerical modeling. Examples might include:

- Large power plant discharges into estuaries or other large multi-use reservoirs
- Highly intermittent large volume thermal discharges
- Discharges requiring seasonal temperature limits
- Discharges with site-specific data available for thermal model calibration
- Other cases?

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Additional Needs and Considerations to Support Screening Procedure Development

- A clearly defined process for prescribing thermal MZ and "industrial cooling water area" dimensions ***(need stakeholder input on this)***.
- Development of practices to determine critical conditions at thermal MZ boundaries ***(need stakeholder input on this).***
- Data analysis and cataloging of ambient temperatures collected at surface water quality monitoring stations for use in screening analyses.
- Development of simplified modeling procedures and guidance for complex modeling analyses ***(need stakeholder input on this).***

- Development of policies regarding the respective responsibilities of TCEQ and applicants related to modeling and data collection ***(need stakeholder input on this).***
- How do antidegradation policies and analytical practices dovetail with thermal screening procedures?

Re-evaluate existing temperature criteria which may include

- Evaluation of the magnitude and applicability of the allowable temperature rise above ambient in 30 TAC 307.4
- Evaluate the maximum temperature criteria for selected water bodies
- Evaluate spatial and temporal applicability of temperature criteria

TCEQ has begun the temperature criteria evaluation by initiating an intensive literature search to evaluate these possibilities. Based upon the results of the literature search, TCEQ will identify areas for continued evaluation if applicable. This is a long-term evaluation of the criteria which may or may not result in additional actions.