

# “Salty discharge” monitoring at NPDES/SDS permitted facilities

## History of past monitoring

Wastewater may contain high levels of chlorides, total dissolved solids (TDS), specific conductivity, hardness, bicarbonate and dissolved minerals. For simplicity, these are often referred to as “salty parameters”. Sources associated with high salt concentrations include municipal or industrial water softening processes using concentrating treatment technologies (e.g., reverse osmosis, ion exchange, membrane filtration, etc.). Industrial sources include food processing using density-based (saline) sorting, biofuels, and others. Two notable sources of salts in municipal effluents are chlorides from point-of-entry ion exchange softeners (in-home water softening) and naturally occurring salts from the drinking water supply.

The Minnesota Pollution Control Agency (MPCA) has been requiring effluent monitoring for these parameters (Table 1) at selected NPDES/SDS permitted facilities since 2009. The MPCA also required monitoring for total dissolved solids (TDS) starting in 2010 for all NPDES/SDS permitted facilities that have an average wet weather design flow equal or greater than 0.1 million gallons per day (mgd) to comply with 40 C.F.R. § 122.21(j). The salty monitoring strategy was updated in 2020.

## Justification for current monitoring

The wealth of data provided by years of effluent monitoring has allowed MPCA to further examine relationships between salty parameters. In particular, the MPCA examined the likelihood of having the reasonable potential (RP) to exceed the water quality standard for one parameter, given RP for another. Reasonable potential is the statistical test used to determine whether a water quality-based effluent limit is necessary in a permit. The MPCA is concerned about all the parameters but is specifically interested in chloride because of its association with aquatic life.

By looking at the data collected to date, the MPCA was able to determine that facilities with a reasonable potential for TDS are 29 times more likely to also have reasonable potential for chlorides. Therefore, high TDS, high chlorides, and other salty parameter generally go hand in hand. To date, there are over 130 municipal facilities who have received monitoring for only TDS based on the federal requirements. If one of these municipal facilities has reasonable potential for TDS, it is extremely likely that chloride loading from point-of-entry ion exchange softeners is contributing to the reasonable potential for TDS, regardless of the size or type of municipal wastewater treatment plant.

## Changes to Minn. R. ch. 7050

In July 2021, the Minn. R. ch. 7050 was updated during the rulemaking process. Several salty parameter Water Quality Standards (WQS) changed or removed. The water quality standards for the Class 3 chloride, hardness (meas. as Ca + Mg as CaCO<sub>3</sub>) WQS, the Class 4A total bicarbonates (as HCO<sub>3</sub>) WQS, and the percent sodium WQS were removed. Reasonable potential (RP) analysis will no longer be done on the previously mentioned five WQS. The rulemaking effort did update the class 4A specific conductivity WQS, the Class 4B Total Dissolved Solids WQS and introduced the class 4B Total Sulfate WQS (to protect livestock and wildlife). No changes were made for the Class 2B total chloride WQS to protect downstream aquatic life. The Class 4A WQS are designed to protect irrigation needs, while class 4B WQS are intended to protect livestock and wildlife via consuming water.

Reasonable potential analysis will be done for the Class 2B total chloride WQS, the Class 4A specific conductance WQS, and Class 4B Total Dissolved Solids WQS, and the class 4B total sulfate WQS (to protect livestock and wildlife). A separate reasonable potential evaluation will be done for the Class 4A total sulfate WQS for the protection of wild rice. See the webpage titled '[Protecting wild rice waters](#)' to find the procedures the MPCA is taking to implement sulfate standards in NPDES permits. See also the memos developed by effluent limit staff to notify Permittees of potential sulfate limits.

Because of this rule change, permittees will no longer be required to monitor for total calcium, total potassium, total magnesium, total sodium, total hardness (meas. as Ca + Mg as CaCO<sub>3</sub>), or total bicarbonates (as HCO<sub>3</sub>) unless the permittee is expanding, or the facility has experienced problems with Whole Effluent Toxicity (WET) testing.

## Monitoring parameters

When required, municipal NPDES/SDS facilities will be required to monitor the effluent for the parameters listed in Table 1 at the frequencies specified in Table 2. Industries and water treatment plants with salty waste streams from concentrating treatment technologies, food processing industries using saline sorting, beverage, ethanol, biofuels, and animal rendering industries, and publicly owned treatment works that accept these waste streams, will be required to monitor for the parameters in Table 1, regardless of the receiving water to effluent flow dilution ratio.

**Table 1. Monitoring parameters**

Analyte	Units	Water quality standard/justifications
Total Chloride	mg/L	Class 2
Specific Conductance	umhos/cm	Class 4A
Total Dissolved Solids	mg/L	Class 4B
Total Sulfate as SO <sub>4</sub>	mg/L	Class 4A, 4B

## Monitoring frequency

Monitoring frequencies will vary depending on the type of facility being permitted. If the permit does not already contain an effluent limit for a parameter listed in Table 1, the sampling frequencies in Table 2 will be included in reissued NPDES/SDS permits. If the permit already has or will be getting a new effluent limit for a parameter in Table 1, the monitoring frequency will in no case be less frequent than that listed in Table 2.

**Table 2. Municipal facilities monitoring frequencies**

Facility type	Effective period	Sample type	Monitoring frequency
Major facilities (defined in Minn. R. 7002.0220, subp. 4)	January - December	24-hour flow composite	1X month
Minor facilities	January - December	24-hour flow composite	1X quarter
Pond facilities	—During pre-defined discharge periods (spring & fall)	Grab samples	2X week (during discharge)
Pond facilities (aerated and continuous discharge)	January - December	24-hour flow composite. If 24-hour flow composite sampling is not available, collect grab samples.	Follow the monitoring frequency consistent with the mechanical coding above based on Class of facility.

# Permits proposing expansion or permits with Whole Effluent Toxicity (WET) Problems

If a POTW is proposing an expansion or has had problems with meeting WET testing requirements, an expanded list of salty monitoring requirements beyond the four salty parameters listed in Table 1 will be required listed in Table 3 below.

**Table 3. Monitoring parameters for facilities that are proposing to expand or for facilities that have WET issues**

Analyte	Units (Jan. – Dec. MoMax)	Sample type	WQ standard/justification
Bicarbonates (HCO <sub>3</sub> )	mg/L	24-hour flow composite	For facilities with WET problems
Calcium	mg/L	24-hour flow composite	Class 4A (SAR*)
Chloride	mg/L	24-hour flow composite	Class 2 and WET
Hardness, Ca and mg as (CaCO <sub>3</sub> )	mg/L	24-hour flow composite.	For facilities with WET problems
Magnesium	mg/L	24-hour flow composite	Class 4A (SAR*)
Potassium	mg/L	24-hour flow composite	For facilities with WET problems
Sodium	mg/L	24-hour flow composite	Class 4A (SAR*)
Specific Conductance	umhos/cm	Measurement	Class 4A
Solids, Total Dissolved (TDS)	mg/L	24-hour flow composite	Class 4B
Total Sulfate as SO <sub>4</sub>	mg/L	24-hour flow composite	Class 4A, 4B

\*SAR: Sodium Absorption Ratio.

## Additional considerations

This document is part of the larger salty parameter limit setting approach the MPCA has developed. A summary of the larger approach is available at MPCA's webpage link titled '[Chloride and wastewater facilities](#)'. The larger approach discusses topics such as compliance strategies, implementation costs, the effluent limit setting process, and more.

If you have questions regarding the revised NPDES/SDS Salty Parameter Permit monitoring requirements, please call 651-296-6300 or 800-657-3864 and ask for Wastewater Point Source staff.